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Pest risk categorization – New plant health regulations for Norway

Scientific Opinion of the Panel on Plant Health of the Norwegian Scientific Committee for Food and Environment

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14.06.2021

ISBN: 978-82-8259-363-2
ISSN: 2535-4019
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Cover photo: All pictures from EPPO Global Database (EPPO 2021)

Suggested citation: VKM, Paal Krokene, May Bente Brurberg, Daniel Flø, Bjørn Arild Hatteland, Christer Magnusson, Mogens Nicolaisen, Simeon Rossmann, Johan A. Stenberg, Iben M. Thomsen, Venche Talgø, Micael Wendell, Beatrix Alsanius, Sandra A.I. Wright, Trond Rafoss (2021). Pest risk categorization – New plant health regulations for Norway. Scientific Opinion of the Panel on Plant Health. VKM Report 2021:09, ISBN: 978-82-8259-363-2, ISSN: 2535-4019. Norwegian Scientific Committee for Food and Environment (VKM), Oslo, Norway.

Preparation of the opinion

The Norwegian Scientific Committee for Food and Environment (Vitenskapskomiteen for mat og miljø, VKM) appointed a project group to draft the opinion. The project group consisted of five VKM committee members, two VKM staff members and four external experts. Two referees commented on and reviewed the draft opinion. The VKM Panel on Plant Health evaluated and approved the final opinion.

Authors of the opinion

The authors have contributed to the opinion in a way that fulfills the authorship principles of VKM (VKM, 2019). The principles reflect the collaborative nature of the work, and the authors have contributed as members of the project group and/or the VKM Panel on Plant Health.

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Acknowledgement

VKM would like to thank Johanne Longva, Linn Benjaminsen Hølvold, and Beate Fønhus at the University library of the Norwegian University of Life Sciences for their work on systematic literature searches. VKM would like to thank Tove Ladstein (Norsk gartnerforbund) for data and valuable information on greenhouse plant production in Norway and Juha Tuomola and Salla Hannunen (Finnish Food Authority) for valuable information on the use of FinnPRIO. VKM would also like to thank the referees Juha Tuomola (Finnish Food Authority) and Leif Sundheim (Emeritus) for their critical review of and valuable comments to the draft opinion. VKM emphasizes that the referees are not responsible for the content of the final opinion. In accordance with VKM's routines for approval of risk assessments (VKM, 2018), VKM received the referee comments before evaluation and approval of the opinion by the VKM Panel on Plant Health, and before the opinion was finalized for publication.

Competence of VKM experts

Persons working for VKM, either as appointed members of the Committees or as external experts, do this by virtue of their scientific expertise, not as representatives for their employers or third-party interests. The Civil Services Act instructions on legal competence apply for all work prepared by VKM.

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Summary

In an ongoing effort to renew Norwegian regulations related to plants and measures against plant pests, the Norwegian Food Safety Authority asked The Norwegian Scientific Committee for Food and Environment (VKM) which of the currently regulated pests that should still be regulated (either as a quarantine pest (QP) or a regulated non-quarantine pest (RNQP) for Norway), and whether there are any species that should be deregulated. Following such a risk categorization process the Norwegian Food Safety Authority will determine if pest risk assessments (PRA's) should be performed for quarantine pests.

International trade regulations define quarantine pests (QPs) as pests of potential economic importance to an area that are not yet present, or are present but not widely distributed and are subject to official control. A regulated non-quarantine pest (RNQP) is a pest whose presence in plants for planting affects the intended use of those plants with an economically unacceptable impact and which is therefore subject to official control within the territory of the importing contracting party and regulated in international trade.

In this report VKM presents an overview of the pest categorisation of some of the pests regulated in the current Norwegian regulation and concludes on whether each pest should be regulated as a potential QP, RNQP or none of these categories for Norway. The pest categorisation process – the process of determining whether a pest has or has not the characteristics of a QP or RNQP – has been done using the FinnPRIO model. The FinnPRIO model is a pest risk ranking tool that uses a hypervolume approach carry out quick, semi-quantitative expert assessments and that allows a high number of pest risk categorizations to be done cost-effectively and in a short period of time.

In total 33 pests were assessed as per request from the Norwegian Food Safety Authority. Of those 33 pests VKM suggests that the vast majority – 32 pests – are kept as a QPs for Norway. However, one pest, the cherry leafroll nepovirus (EPPO code CLRV00), fulfils the requirements for being a RNQP since it is most likely present in Norway already. Furthermore, one organism, the flatworm *Arthurdendyus triangulates* (ARDDTR), is suggested to not be regulated as QP or RNQP. This pest does not fulfil the requirements for being a QP since it would probably not cause direct damage to plants if it established in Norway. Also, it does not fulfill the requirements for being a regulated non-quarantine pest (RNQP) since its potential presence in plants for planting does not directly affect the intended use of those plants with an economically unacceptable impact.

Key words: risk assessment, plant pests, invasive species, quarantine pests, regulated non-quarantine pests, non-quarantine pests

Sammendrag på norsk

I samband med et pågående arbeid med å fornye det norske plantehelseregelverket har Mattilsynet bedt Vitenskapskomiteen for mat og miljø (VKM) om å gjennomføre risikokategoriseringer for noen utvalgte planteskadegjørere som er regulert i dagens forskrift om planter og tiltak mot planteskadegjørere. Ved hjelp av risikokategoriseringene vil Mattilsynet vurdere hvilke av disse skadegjørere det er behov for videre risikoanalyser (PRA) for.

Internasjonale handelsregler definerer karanteneskadegjørere (QPs) som skadegjørere med potensiell negativ økonomisk betydning for et område der de ennå ikke er til stede, eller som skadegjørere som er til stede men som ikke er utbredt og som er underlagt offisiell kontroll. En regulert ikke-karanteneskadegjører (RNQP) er en skadegjører hvis tilstedeværelse i planter og formeringsmateriale påvirker den tiltenkte bruken av plantene med en økonomisk uakseptabel effekt, og som derfor er underlagt offisiell kontroll på den importerende parts territorium og er regulert i internasjonal handel.

VKM har vurdert kategoriseringen av skadegjørerne som er regulert i gjeldende norske forskrift, og om disse bør reguleres som potensielle karanteneskadegjørere, regulerte ikke-karanteneskadegjørere eller ingen av disse kategoriene for Norge.

VKM har brukt FinnPRIO-modellen til å kategorisere skadegjørerne, – det vil si prosessen med å bestemme om en skadegjører har eller ikke har egenskapene til en karanteskadegjører eller regulert ikke-karanteneskadegjører. –FinnPRIO-modellen er et rangeringsverktøy for å gjøre raske, semi-kvantitative ekspertvurderinger av planteskadegjørere ved hjelp av en hypervolum-tilnærming. Modellen gjør det mulig å gjøre et høyt antall risikokategoriseringer på kort tid og kostnadseffektivt.

Totalt ble 33 skadegjørere vurdert etter forespørsel fra Mattilsynet. Av de 33 skadegjørerne vurderte VKM at de aller fleste – 32 stykker – oppfyller krav til å kategoriseres som karanteneskadegjørere for Norge. Ett virus, «cherry leafroll nepovirus» (EPPO-kode CLRV00), oppfyller kravene for å være en regulert ikke-karanteneskadegjørere, siden viruset mest sannsynlig er til stede i Norge allerede. Videre vurderes en organisme, flatormen *Arthurdendyus triangulates* (ARDDTR), till å ikke være en planteskadegjører. Årsaken er at ARDDTR sannsynligvis ikke ville forårsake direkte skade på planter hvis den etablerte seg i Norge. Den oppfyller heller ikke kravene om å være en regulert ikke-karanteneskadegjører siden dens potensielle tilstedeværelse i planter og formeringsmateriel ikke direkte påvirker den tiltenkte bruken av plantene med en økonomisk uakseptabel effekt.

Abbreviations and glossary

Table 1. All definitions of terms are from ISPM 5 Glossary of phytosanitary terms by the International Plant Protection Convention.

Terms and abbreviations	Definition
CABI	Centre for Agriculture and Bioscience International (CAB International)
endangered area	An area where ecological factors favor the establishment of a pest whose presence in the area will result in economically important loss
entry (of a pest)	Movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled
establishment	Perpetuation, for the foreseeable future, of a pest within an area after entry
GBIF	The Global Biodiversity Information Facility
interception	The detection of a pest during inspection or testing of an imported consignment
introduction (of a pest)	The entry of a pest resulting in its establishment
non-quarantine pest	Pest that is not a quarantine pest for an area
Pest	Any species, strain or biotype of plant, animal or pathogenic agent injurious to plants or plant products
pest categorization	The process of determining whether a pest has or has not the characteristics of a quarantine pest or those of a regulated non-quarantine pest
pest risk (for quarantine pests)	The probability of introduction and spread of a pest, and the magnitude of the associated potential economic consequences
pest risk (for regulated non-quarantine pests)	The probability that a pest in plants for planting affects the intended use of those plants with an economically unacceptable impact
regulated pest	A quarantine pest (QP) or a regulated non-quarantine pest (RNQP)
regulated non-quarantine pest (RNQP)	A non-quarantine pest whose presence in plants for planting affects the intended use of those plants with an economically unacceptable impact and which is, therefore, regulated within the territory of the importing contracting party
quarantine pest (QP)	A pest of potential economic importance to the endangered area and not yet present there, or present but not widely distributed and being officially controlled

Background as provided by the Norwegian Food Safety Authority

In the ongoing work on renewal of Norwegian regulations related to plants and measures against pests, the Norwegian Food Safety Authority has assigned several partial deliveries to both The Norwegian Scientific Committee for Food and Environment (VKM) and the Norwegian Institute of Bioeconomy Research (NIBIO).

In the first partial delivery VKM was asked to clarify which species were proposed as EU quarantine pests (QP), protected zone quarantine pests (QP-PZ) or regulated non-quarantine pests (RNQP) in the EU. In addition, VKM was asked to give an overview and an assessment of the available literature on the establishment and damage potential for pests listed in today's Norwegian regulations related to plants and on measures against pests.

The first partial delivery to the Norwegian Food Safety Authority from VKM was made in October 2019. In November 2019 the Norwegian Food Safety Authority received an overview from NIBIO of recommended names and EPPO codes for all the pests that are regulated in the current Norwegian regulations related to plants and measures against pests, as well as the status of occurrence in Norway for some of the pest species.

In the next step of the work, the Norwegian Food Safety Authority needs to know which of the pests that are regulated in today's regulations related to plants and measures against pests that should still be regulated (either as QP or RNQP for Norway), and whether there are any species that should be deregulated. With the support of risk categorizations the Norwegian Food Safety Authority wants to clarify for which pests there is a need for PRAs to be performed before further regulation can be decided

Terms of reference as provided by the Norwegian Food Safety Authority

The Norwegian Food Safety Authority asks VKM to carry out risk categorizations for a selection of plant pests that are regulated in the Norwegian regulations on plant health. The pests we want risk categorizations for are listed in these terms of references [not shown here, see instead appendix I or Table 2 below]. The selection of species includes those pests that are not regulated in the EU (cf. Annexes II, III and IV of Regulation 2019/2072), as well as those that are regulated as RNQP in the EU, but which we today have reason to assume do not occur in Norway. It is desired that the risk categorizations be compared to criteria for what characterizes a potential quarantine pest (QP) and a potential regulated non-quarantine pest (RNQP). For each of the pests, we ask that VKM briefly describes the following points:

- identity of the pest
- presence or absence in Norway
- regulatory status in Norway
- potential for establishment and spread in Norway
- potential for economic consequences
- available risk reduction options
- conclusion of the pest categorization

The conclusion of each risk categorization for the individual pests should end with an assessment of whether the pest can be categorized as a potential QP, a potential RNQP, or possibly none of these categories for Norway.

1 Methodology and Data

1.1 Method

1.1.1 The FinnPRIO model

VKM chose to use FinnPRIO, a pest risk ranking model with a hypervolume approach, to perform risk categorization of the plant pests or potential pests requested by the Norwegian Food Safety Authority. The FinnPRIO model is a tool for carrying out quick, semi-quantitative expert assessments and allows a high number of pest risk categorizations to be done cost-effectively and in a short period of time. The hypervolume approach is used to rank FinnPRIO scores for different species and enables risk managers to prioritize further actions. The FinnPRIO tool was developed by Heikkilä and co-workers (Heikkilä, J. et. al. 2016) at the Finnish Food Safety Authority and Natural Resources Institute Finland in response to a need for a procedure that is simpler and faster than a full-scale pest risk assessment, but that still can identify pests that pose a risk to plant production and the environment.

FinnPRIO follows the same basic structure as a full-scale pest risk assessment. For each assessed pest it calculates separate numeric scores for different risk categories (i.e. likelihood of entry, establishment and invasion, magnitude of impacts, and risk). The scores are based on multiple-choice questions with answer options that yield different numbers of points. For each question the assessor selects the most likely answer option as well as plausible minimum and maximum answer options. These answer options are subsequently used to define a PERT probability distribution that describes the uncertainty in the answer. The probability distributions of the final scores of the likelihood of entry, establishment and invasion, and the magnitude of impact and total risk are then derived from the question-specific PERT distributions using a Monte Carlo simulation.

Because the functional form of the FinnPRIO score probability distributions is not consistent between different assessments, the distributions cannot be reliably described or ranked based on summary metrics such as the mean or median. However, for each assessed species the hypervolume approach (Yemshanov et al., 2017) can be used to aggregate the probability distributions of FinnPRIO assessment scores into a single-dimensional priority order that reveals the preference order relationship of the distributions. The hypervolume approach first uses a pairwise stochastic dominance rule to establish the ordinal rank order of subsets of the score distributions. Within a subset, none of the score distributions stochastically dominate over other distributions and hence the subset is treated as a single priority rank. Next, the hypervolume indicator is used to estimate the position of each rank.

It should be noted that the scores provided by FinnPRIO and the hypervolume approach produce relative scores that are only directly comparable with other pests included in the

same analysis. Thus, it cannot necessarily be concluded that a pest that receives a high score represents a high risk compared to pests included in another FinnPRIO analysis.

1.2 Literature search and selection

A systematic literature search was made by librarians at the Norwegian University of Life Sciences. Searches on English and Norwegian common names, scientific species names, and their synonyms were done in Agricola, Biological Abstracts, CAB Abstracts, Web of Science, and Scopus. The search languages were limited to Norwegian, English, Danish and Swedish.

The comprehensive search strategy is presented in Appendix II.

Full risk categorizations, for each species in the FinnPRIO model, are presented in Appendix III.

1.3 Background data

1.3.1 List of the assessed pests with their known host plant species according to the EPPO global database

Table 2. The 33 assessed pests with host species according to the EPPO global database per May 2021 (EPPO 2021). References to scientific papers or other sources for host plant records are given in the EPPO database. For some pests the database may not give an exhaustive list of host species.

Pest name (family, order)	Pest EPPO-code	Host plants
Aculops fuchsiae (Eriophyidae, Acarida)	**ACUPFU**	*Fuchsia hybrids (Major host); Fuchsia (Host); Fuchsia magellanica (Host)*
Alternaria mali (Pleosporaceae, Pleosporales)	**ALTEMA**	*Malus domestica (Major host); Malus (Host); Malus sylvestris (Host)*
Arthurdendyus triangulatus (Geoplanidae, Seriata)	**ARDDTR**	(not a herbivore, see 5.3.1)
Cacoecimorpha pronubana (Tortricidae, Lepidoptera)	**TORTPR**	*Dianthus caryophyllus (Major host); Acacia (Host); Acer (Host); Berberis aquifolium (Host); Brassica oleracea (Host); Citrus (Host); Citrus limon (Host); Coriaria myrtifolia (Host); Daucus carota subsp. sativus (Host); Dendranthema x grandiflorum (Host); Euphorbia (Host); Hedera helix (Host); Hylotelephium spectabile (Host); Ilex aquifolium (Host); Jasminum nudiflorum (Host); Laurus nobilis (Host); Malus domestica (Host); Olea europaea (Host); Pelargonium (Host); Pisum sativum (Host); Pittosporum tenuifolium (Host); Populus (Host); Prunus (Host); Pyrus communis (Host); Rhododendron hybrids (Host); Rosa (Host); Rubus (Host); Securigera varia (Host); Solanum lycopersicum (Host); Solanum tuberosum (Host); Syringa vulgaris (Host); Trifolium (Host); Vicia faba (Host)*
***Candidatus* Phytoplasma pruni** **(Acholeplasmataceae, Acholeplasmatales)**	**PHYPPN**	*Prunus persica (Major host); Malus domestica (Host); Prunus (Host); Prunus armeniaca (Host); Prunus avium (Host); Prunus cerasus (Host); Prunus domestica (Host); Prunus dulcis (Host); Prunus salicina (Host); Prunus virginiana (Wild/Weed); Apium graveolens (Experimental)*
***Candidatus* Phytoplasma solani** (Acholeplasmataceae, Acholeplasmatales)	**PHYPSO**	*Solanum tuberosum (Major host); Anethum graveolens (Host); Apium graveolens (Host); Capsicum annuum (Host); Cichorium intybus (Host); Fragaria x ananassa (Host); Lavandula angustifolia (Host); Lavandula x intermedia (Host); Monarda fistulosa (Host); Paeonia suffruticosa (Host); Paeonia tenuifolia (Host); Pastinaca sativa (Host); Phaseolus vulgaris (Host); Pistacia vera (Host); Prunus domestica (Host); Rubus fruticosus (Host); Salvia miltiorrhiza (Host); Solanaceae (Host); Solanum (Host); Solanum glaucophyllum (Host); Solanum lycopersicum (Host); Solanum melongena (Host); Valeriana officinalis (Host); Vitis vinifera (Host); Zea mays (Host); Asteraceae (Wild/Weed); Convolvulus arvensis (Wild/Weed); Solanum nigrum (Wild/Weed); Trifolium (Wild/Weed); Tussilago farfara (Wild/Weed)*
Chaetosiphon fragaefolii **(Aphididae, Hemiptera)**	**CHTSFR**	No host listed in the EPPO global database

Pest name (family, order)	Pest EPPO-code	Host plants
Cherry leafroll virus (Secoviridae, Picornavirales)	**CLRV00**	*Prunus avium (Major host); Betula pendula (Host); Malus domestica (Host); Olea europaea (Host); Prunus (Host); Rubus (Host); Rubus fruticosus (Host); Rubus idaeus (Host); Sambucus nigra (Host); Ulmus (Host); Vaccinium (Host); Vitis vinifera (Host)*
Clavibacter michiganensis subsp. michiganensis (Microbacteriaceae, Actinomycetales)	**CORBMI**	*Solanum lycopersicum (Major host); Lycopersicon (Host); Phaseolus vulgaris (Host); Pisum sativum (Host); Solanum pectinatum (Host); Solanum quitoense (Host); Solanum tuberosum (Host); Zea mays (Host); Solanum nigrum (Wild/Weed); Solanum triflorum (Wild/Weed); (Wild/Weed); Avena sativa (Experimental); Citrullus lanatus (Experimental); Cucumis sativus (Experimental); Helianthus annuus (Experimental); Hordeum vulgare (Experimental); Secale cereale (Experimental); Triticum aestivum (Experimental)*
Comstockaspis perniciosa (Diaspididae, Hemiptera)	**QUADPE**	*Malus domestica (Major host); Prunus domestica (Major host); Prunus persica (Major host); Pyrus communis (Major host); Acacia (Host); Acacia dealbata (Host); Acer (Host); Acer negundo (Host); Actinidia chinensis (Host); Amelanchier (Host); Chaenomeles (Host); Cornus sanguinea (Host); Cotoneaster (Host); Crataegus (Host); Cydonia oblonga (Host); Eriobotrya japonica (Host); Euonymus japonicus (Host); Fagus (Host); Juglans (Host); Ligustrum (Host); Lonicera japonica (Host); Maclura pomifera (Host); Malus (Host); Mespilus germanica (Host); Populus (Host); Prunus (Host); Ptelea trifoliata (Host); Pyracantha (Host); Pyrus (Host); Ribes (Host); Rosa (Host); Rubus (Host); Salix (Host); Sorbus (Host); Spiraea salicifolia (Host); Symphoricarpos albus var. laevigatus (Host); Syringa vulgaris (Host); Tilia cordata (Host); Ulmus (Host); Vachellia farnesiana (Host); Betula (Wild/Weed); Betula pendula (Wild/Weed); Camellia sinensis (Wild/Weed); Castanea crenata (Wild/Weed); Pseudocydonia sinensis (Wild/Weed)*
Cryphonectria parasítica (Cryphonectriaceae, Diaporthales)	**ENDOPA**	*Castanea dentata (Major host); Castanea sativa (Major host); Acer (Host); Carpinus betulus (Host); Castanea (Host); Castanea crenata (Host); Castanea henryi (Host); Castanea mollissima (Host); Castanea ozarkensis (Host); Castanea pumila (Host); Castanea seguinii (Host); Quercus alba (Host); Quercus coccinea (Host); Quercus frainetto (Host); Quercus ilex (Host); Quercus petraea (Host); Quercus pubescens (Host); Quercus stellata (Host); Quercus virginiana (Host)*
Diaporthe vaccinia (Diaporthaceae, Diaporthales)	**DIAPVA**	*Vaccinium corymbosum (Major host); Vaccinium macrocarpon (Major host); Vaccinium oxycoccos (Major host); Vaccinium virgatum (Major host); Vaccinium (Host)*
Dickeya chrysanthemi pv. chrysanthemi (Pectobacteriaceae, Enterobacterales)	**DICKCC**	*Dianthus*; *Dendranthema; Solanum tuberosum*
Dickeya dianthicola (Pectobacteriaceae, Enterobacterales)	**ERWICD**	*Dianthus*; *Dendranthema; Solanum tuberosum*

Pest name (family, order)	Pest EPPO-code	Host plants
Epichoristodes acerbella (Tortricidae, Lepidoptera)	**EPIOIO**	*Dianthus caryophyllus (Major host); Dendranthema x grandiflorum (Host); Fragaria x ananassa (Host); Medicago sativa (Host); Pelargonium (Host); Prunus (Host); Pyrus communis (Host); Rosa (Host); Oxalis (Wild/Weed); Rhamnus cathartica (Wild/Weed); Rumex (Wild/Weed)*
Helicoverpa armigera (Noctuidae, Lepidoptera)	**HELIAR**	*Abelmoschus esculentus (Host); Aeschynomene indica (Host); Allium cepa (Host); Amaranthus sp. (Host); Antirrhinum majus (Host); Arachis hypogaea (Host); Asparagus officinalis (Host); Avena sativa (Host); Beta vulgaris (Host); Brassica oleracea (Host); Cajanus cajan (Host); Cannabis sativa (Host); Capsicum annuum (Host); Carthamus tinctorius (Host); Chamelaucium sp. (Host); Cicer arietinum (Host); Citrullus lanatus (Host); Citrus limon (Host); Coffea arabica (Host); Cucumis sativus (Host); Cucurbita maxima (Host); Delphinium sp. (Host); Dendranthema x grandiflorum (Host); Dianthus caryophyllus (Host); Fragaria sp. (Host); Gladiolus sp. (Host); Glycine max (Host); Gossypium hirsutum (Host); Guizotia abyssinica (Host); Helianthus annuus (Host); Ipomoea batatas (Host); Lablab purpureus (Host); Lathyrus odoratus (Host); Liatris sp. (Host); Limonium sp. (Host); Linum usitatissimum (Host); Mangifera indica (Host); Medicago sativa (Host); Mentha spicata (Host); Nicotiana tabacum (Host); Ocimum sp. (Host); Oryza sativa (Host); Phaseolus vulgaris (Host); Pinus radiata (Host); Pisum sativum (Host); Ricinus communis (Host); Sesamum indicum (Host); Solanum lycopersicum (Host); Solanum melongena (Host); Solanum tuberosum (Host); Sonchus oleraceus (Host); Sorghum bicolor (Host); Sphaeranthus indicus (Host); Spinacia oleracea (Host); Triticum aestivum (Host); Vigna radiata (Host); Vigna unguiculata (Host); Zea mays (Host)*
Lecanosticta acicula (Mycosphaerellaceae, Capnodiales)	**SCIRAC**	*Pinus palustris (Major host); Pinus sylvestris (Major host); Cedrus libani (Host); Pinus (Host); Pinus arizonica (Host); Pinus canariensis (Host); Pinus caribaea (Host); Pinus contorta (Host); Pinus elliottii (Host); Pinus halepensis (Host); Pinus maximinoi (Host); Pinus mugo (Host); Pinus muricata (Host); Pinus nigra (Host); Pinus nigra subsp. laricio (Host); Pinus nigra subsp. pallasiana (Host); Pinus oocarpa (Host); Pinus patula (Host); Pinus pinaster subsp. escarena (Host); Pinus pinea (Host); Pinus radiata (Host); Pinus strobus (Host); Pinus taeda (Host); Pinus thunbergii (Host)*
Melampsora medusae (Melampsoraceae, Pucciniales)	**MELMME**	*Populus balsamifera (Major host); Populus deltoides (Major host); Populus nigra (Major host); Populus tremuloides (Major host); Populus x canadensis (Major host); Populus x generosa (Major host); Populus (Host); Populus maximowiczii (Host); Populus mexicana (Host); Populus simonii (Host); Populus szechuanica (Host); Populus x jackii (Host); Populus yunnanensis (Host); Larix (Alternate); Larix decidua (Alternate); Larix laricina (Alternate); Larix occidentalis (Alternate); Pinus (Alternate); Pinus contorta (Alternate); Pinus ponderosa (Alternate); Pseudotsuga menziesii (Alternate); Abies (Experimental); Picea (Experimental); Picea sitchensis (Experimental); Tsuga (Experimental); Tsuga mertensiana (Experimental)*
Monilinia fructicola (Sclerotiniaceae, Helotiales)	**MONIFC**	*Prunus avium (Major host); Prunus domestica (Major host); Prunus persica (Major host); Chaenomeles (Host); Cornus mas (Host); Crataegus (Host); Cydonia oblonga (Host); Eriobotrya japonica (Host); Malus (Host); Malus domestica (Host); Prunus (Host); Prunus armeniaca (Host); Prunus cerasifera (Host); Prunus cerasus (Host); Prunus mume (Host); Prunus persica var. nucipersica (Host); Prunus salicina (Host); Pyrus (Host); Pyrus communis (Host); Vitis vinifera (Host)*

Pest name (family, order)	Pest EPPO-code	Host plants
Ophiostoma wageneri (Ophiostomataceae, Ophiostomatales)	**LEPGWA**	*Pinus ponderosa (Major host); Pseudotsuga menziesii (Major host); Pinus (Host); Pinus contorta (Host); Pinus edulis (Host); Pinus jeffreyi (Host); Pinus monophylla (Host)*
Opogona sacchari (Tineidae, Lepidoptera)	**OPOGSC**	*Dracaena fragrans (Major host); Dracaena marginata (Major host); Musa x paradisiaca (Major host); Yucca gigantea (Major host); Ananas comosus (Host); Arecaceae (Host); Bambusa vulgaris (Host); Begonia hybrids (Host); Bougainvillea spectabilis (Host); Bromeliaceae (Host); Cactaceae (Host); Capsicum annuum (Host); Chamaedorea elegans (Host); Cordyline fruticosa (Host); Dieffenbachia maculata (Host); Dracaena (Host); Euphorbia pulcherrima (Host); Ficus (Host); Heliconia psittacorum (Host); Hippeastrum hybrids (Host); Maranta (Host); Philodendron (Host); Saccharum officinarum (Host); Sansevieria trifasciata (Host); Sinningia (Host); Solanum melongena (Host); Strelitzia reginae (Host); Streptocarpus ionanthus (Host); Yucca (Host); Zea mays (Host)*
Paraburkholderia caryophylli **(Burkholderiaceae, Burkholderiales)**	**PSDMCA**	*Dianthus caryophyllus (Major host); Dianthus (Host); Dianthus allwoodii hybrids (Host); Dianthus barbatus (Host); Limonium sinuatum (Host)*
Phialophora cinerescens (Herpotrichiellaceae, Chaetothyriales)	**PHIACI**	*Dianthus caryophyllus (Major host); Dianthus (Host)*
Potato leafroll virus (Luteoviridae, NA)	**PLRV00**	*Solanum tuberosum*

Pest name (family, order)	Pest EPPO-code	Host plants
Potato spindle tuber viroid (Pospiviroidae, NA)	**PSTVD0**	*Solanum tuberosum (Major host); Brugmansia hybrids (Host); Brugmansia sanguinea (Host); Brugmansia suaveolens (Host); Calibrachoa sp. (Host); Capsicum annuum (Host); Cestrum aurantiacum (Host); Cestrum elegans (Host); Cestrum endlicheri (Host); Cestrum nocturnum (Host); Chenopodium eremaeum (Host); Dahlia sp. (Host); Datura leichhardtii (Host); Erigeron bonariensis (Host); Hevea brasiliensis (Host); Ipomoea batatas (Host); Lycianthes rantonnetii (Host); Nicandra physalodes (Host); Persea americana (Host); Petunia sp. (Host); Physalis angulata (Host); Physalis peruviana (Host); Solanum laxum (Host); Solanum lycopersicum (Host); Solanum muricatum (Host); Solanum nigrum (Host); Solanum pseudocapsicum (Host); Solanum sisymbriifolium (Host); Streptoglossa sp. (Host); Streptosolen jamesonii (Host); Atriplex semilunaris (Wild/Weed); Datura sp. (Wild/Weed); Solanum anguivi (Wild/Weed); Solanum coagulans (Wild/Weed); Solanum dasyphyllum (Wild/Weed); Anisodus stramoniifolius (Experimental); Anisodus tanguticus (Experimental); Atropa belladonna (Experimental); Atropanthe sinensis (Experimental); Browallia americana (Experimental); Browallia viscosa (Experimental); Campanula medium (Experimental); Capsicum baccatum (Experimental); Cardiospermum halicacabum (Experimental); Cerastium tomentosum (Experimental); Convolvulus tricolor (Experimental); Dianthus barbatus (Experimental); Gynura aurantiaca (Experimental); Jaltomata contorta (Experimental); Jaltomata procumbens (Experimental); Myosotis sylvatica (Experimental); Nicotiana (Experimental); Penstemon richardsonii (Experimental); Physalis (Experimental); Physochlaina physaloides (Experimental); Salpiglossis sinuata (Experimental); Salpiglossis spinescens (Experimental); Scabiosa japonica (Experimental); Schizanthus pinnatus (Experimental); Schizanthus retusus (Experimental); Scopolia carniolica (Experimental); Solanum (Experimental); Solanum aviculare (Experimental); Solanum betaceum (Experimental); Solanum dulcamara (Experimental); Solanum melongena (Experimental); Valeriana officinalis (Experimental)*
Puccinia horiana (Pucciniaceae, Pucciniales)	**PUCCHN**	*Dendranthema x grandiflorum (Major host); Dendranthema (Host)*
Puccinia pelargonii-zonalis (Pucciniaceae, Pucciniales)	**PUCCPZ**	*Pelargonium x hortorum (Major host); Pelargonium (Host)*
Radopholus similis (Pratylenchidae, Rhabditida)	**RADOSI**	*Goeppertia insignis (Major host); Goeppertia makoyana (Major host); Musa x paradisiaca (Major host); Ananas comosus (Host); Anthurium (Host); Aroideae (Host); Calathea (Host); Curcuma longa (Host); Elettaria cardamomum (Host); Marantaceae (Host); Musaceae (Host); Persea americana (Host); Philodendron (Host); Piper nigrum (Host); Strelitzia reginae (Host); Zingiber officinale (Host); Coffea arabica (Experimental); Glycine max (Experimental); Saccharum officinarum (Experimental); Solanum lycopersicum (Experimental); Solanum melongena (Experimental); Solanum tuberosum (Experimental); Sorghum bicolor (Experimental); Zea mays (Experimental)*

Pest name (family, order)	Pest EPPO-code	Host plants
Spodoptera littoralis (Noctuidae, Lepidoptera)	**SPODLI**	*Brassica oleracea (Major host); Brassica rapa (Major host); Capsicum annuum (Major host); Citrullus lanatus (Major host); Cucumis sativus (Major host); Gossypium barbadense (Major host); Gossypium hirsutum (Major host); Lactuca sativa (Major host); Malus domestica (Major host); Medicago sativa (Major host); Solanum lycopersicum (Major host); Solanum melongena (Major host); Solanum tuberosum (Major host); Zea mays (Major host); Abelmoschus esculentus (Host); Allium cepa (Host); Amaranthus sp. (Host); Arachis hypogaea (Host); Beta vulgaris (Host); Brassica rapa subsp. sylvestris (Host); Cannabis sativa (Host); Chrysanthemum (Host); Corchorus olitorius (Host); Cucumis melo (Host); Cucurbita maxima (Host); Cucurbita moschata (Host); Cynara scolymus (Host); Daucus carota (Host); Glycine max (Host); Gossypium (Host); Helianthus annuus (Host); Hibiscus cannabinus (Host); Ipomoea batatas (Host); Malva pusilla (Host); Mentha (Host); Mentha spicata (Host); Mentha x piperita (Host); Nicotiana tabacum (Host); Phaseolus lunatus (Host); Phaseolus vulgaris (Host); Pisum sativum (Host); Portulaca oleracea (Host); Psidium guajava (Host); Raphanus sativus (Host); Ricinus communis (Host); Sesbania sesban (Host); Spinacia oleracea (Host); Trifolium alexandrinum (Host); Urena lobata (Host); Vachellia nilotica (Host); Vicia faba (Host); Vicia sativa (Host); Vigna radiata (Host); Vigna unguiculata (Host); Vitis vinifera (Host)*
Strawberry latent C rhabdovirus Viruses (unclassified)	**STLCV0**	*Fragaria x ananassa (Major host); Fragaria (Host); Fragaria chiloensis (Wild/Weed); Fragaria nilgerrensis (Wild/Weed); Fragaria vesca (Experimental); Fragaria virginiana (Experimental); Potentilla anserina (Experimental); Potentilla canadensis (Experimental)*
Strawberry mottle virus (Secoviridae, NA)	**SMOV00**	*Fragaria*
Xanthomonas axonopodis pv. dieffenbachiae (Lysobacteraceae, Lysobacterales)	**XANTDF**	*Anthurium andraeanum (Major host); Philodendron hederaceum (Major host); Syngonium podophyllum (Major host); Aglaonema (Host); Aglaonema commutatum (Host); Aglaonema crispum (Host); Anthurium (Host); Anthurium crystallinum (Host); Anthurium scherzerianum hybrids (Host); Aroideae (Host); Caladium bicolor hybrids (Host); Colocasia esculenta (Host); Dieffenbachia maculata (Host); Epipremnum pinnatum (Host); Philodendron selloum (Host); Xanthosoma caracu (Host); Xanthosoma sagittifolium (Host); Aglaonema pictum (Experimental); Dracaena fragrans (Experimental)*
Xanthomonas vesicatoria **(Lysobacteraceae, Lysobacterales)**	**XANTVE**	*Capsicum annuum (Major host); Solanum lycopersicum (Major host); Solanum tuberosum (Host); Datura (Wild/Weed); Hyoscyamus niger (Wild/Weed); Lycium barbarum (Wild/Weed); Nicotiana rustica (Wild/Weed); Physalis (Wild/Weed); Solanum (Wild/Weed)*

1.3.2 Production value of vegetables, fruits and berries

Data on the value of the annual Norwegian production of selected agricultural crops were gathered from "Totalkalkylen" published by the Norwegian Institute of Bioeconomy Research (www.nibio.no/tjenester/totalkalkylen-statistikk#groups). All values were standardized to kg and for each crop we calculated the mean annual value for the past 10 years.

Table 3. Mean annual production of selected agricultural crops in Norway and their economic value over the past 10 years (source: NIBIO 2021).

Crop	Production (Kg)	Value (NOK)
Potato (*Solanum tuberosum*)	247,883,900	721,075,500
Apples (*Malus domestica*)	13,063,700	132,139,400
Tomato (*Solanum lycopersicum*)	12,085,300	247,028,300
Strawberries (*Fragaria* × *ananassa*)	8,362,500	370,632,500
Plums (*Prunus domestica*)	1,397,700	39,154,800
Sweet cherries (*Prunus avium*)	471,200	30,617,500
Pears (*Pyrus communis*)	286,500	4,404,800
Sour cherries (*Prunus cerasus*)	101,800	3,939,800

1.3.3 Production value of horticultural crops

Data on the value of the annual greenhouse production of horticultural crops in Norway were provided by The Norwegian Horticultural Growers Association (Norsk gartnerforbund). An estimated product value for each genus was calculated by multiplying the average price per plant (for all genera, collected from Totalkalkylen) with the number of produced plants (average for two years).

Table 4. Mean annual production of selected horticultural crops in Norway over a 2-year period and estimated economic value (source: Norsk gartnerforbund, personal communication).

Genus	Number of plants	Value (NOK)
Pelargonium	6,491,096	46,852,731
Rosa	4,919,068	35,505,836
Chrysanthemum	4,409,430	31,827,266
Euphorbia	3,551,790	25,636,820
Dianthus	2,673,138	19,294,710
Dendranthema	1,870,493	13,501,222
Dahlia	1,406,267	10,150,435
Fragaria	525,174	3,790,706
Fuchsia	209,453	1,511,832
Philodendron	97,650	704,838
Oxalis	33,444	241,399
Yucca	29,600	213,652
Ficus	25,000	180,450
Maranta	5,500	39,699
Dracaena	2,450	17,684
Anthurium	1,262	9,109
Amaranthus	950	6,857
Sinningia	550	3,970
Capsicum	15	108

1.3.4 Production value of Scots pine

Data on the value of the total annual harvest of Scots pine (*Pinus sylvestris*) in Norway were gathered from the Norwegian Agricultural Agency (Landbruksdirektoratet 2021). Mean annual value for the years 2018 and 2019 was estimated to be 1.085.319.339 NOK and includes sawn timber ("sagtømmer") and pulpwood ("massevirke").

2 Categorization results

2.1 FinnPRIO results

The risk score produced by FinnPRIO is the product of the two variables magnitude of impact and likelihood of invasion. The five highest-ranked pests based on overall risk score were *Clavibacter michiganensis* (CORBMI), Potato leafroll virus (PLRV00), Potato spindle tuber viroid (PSTVD0), *Monilinia fructicola* (MONIFC), and *Ophiostoma wageneri* (LEPGWA) (Table 5, Figure 1 and Figure 3). Based solely on the magnitude of impact, the highest-ranked pests were *Lecanosticta acicola* (SCIRAC), *O. wageneri* (LEPGWA), Candidatus phytoplasma pruni (PHYPPN), *M. fructicola* (MONIFC), *C. michiganensis* (CORBMI), and Strawberry mottle virus (SMOV00) (Table 5). Based solely on the likelihood of invasion, the four highest ranked pests were Potato leafroll virus (PLRV00), *C. michiganensis* (CORBMI), Potato Spindle Tuber Viroid (PSTVD0), and Cherry leafroll nepovirus (CLRV00). Five pests tied for the fifth highest invasion score (Table 5). Based solely on the likelihood of establishment, the highest ranked pests were *C. michiganensis* (CORBMI), Cherry leafroll nepovirus (CLRV00), Potato spindle tuber viroid (PSTVD0), *O. wageneri* (LEPGWA), *Dickeya dianthicola* (ERWICD), Strawberry mottle virus (SMOV00), and Strawberry latent C virus (STLCV0). Finally, based solely on the likelihood of entry, the four highest ranked pests were *Spodoptera littoralis* (SPODLI), *C. michiganensis* (CORBMI), Potato leafroll virus (PLRV00), and *Comstockaspis perniciosa* (QUADPE). Five pests tied for the fifth highest entry score (Table 5).

Table 5. Hypervolume ranking of FinnPRIO scores for the 33 assessed pest species, sorted by descending value of risk score. Pests were scored for four different risk categories as well as for overall risk score. The pests with the highest scores for each category are highlighted in red. For complete pest names, see Table 2. Entry_A = likelihood of entry, not taking into account current management measures; Establishment = likelihood of establishment; Invasion_A = likelihood of invasion, not taking into account current management measures; Impact = magnitude of economic impact; Risk score = Impact × Invasion_A.

EPPO code	Entry_A	Establish-ment	Invasion_A	Impact	Risk score
CORBMI	0.69	0.93	0.76	0.57	0.43
PLRV00	0.69	0.65	0.95	0.30	0.29
PSTVD0	0.48	0.73	0.76	0.35	0.26
MONIFC	0.35	0.65	0.38	0.66	0.25
LEPGWA	0.20	0.73	0.26	0.83	0.21
CLRV00	0.48	0.93	0.70	0.27	0.19
CHTSFR	0.35	0.35	0.26	0.48	0.12
ERWICD	0.20	0.73	0.26	0.48	0.12

EPPO code	Entry_A	Establish-ment	Invasion_A	Impact	Risk score
MELMME	0.35	0.62	0.38	0.30	0.12
PHYPPN	0.11	0.62	0.17	0.66	0.11
PHYPSO	0.20	0.67	0.17	0.48	0.08
ALTEMA	0.11	0.62	0.17	0.48	0.08
SPODLI	0.98	0.14	0.38	0.20	0.08
TORTPR	0.48	0.65	0.38	0.20	0.08
PSDMCA	0.11	0.62	0.17	0.35	0.06
QUADPE	0.69	0.35	0.38	0.15	0.06
XANTVE	0.11	0.53	0.17	0.27	0.04
ARDDTR	0.20	0.09	0.05	0.48	0.03
DICKCC	0.05	0.65	0.05	0.35	0.02
PHIACI	0.05	0.53	0.05	0.27	0.01
DIAPVA	0.05	0.62	0.05	0.27	0.01
OPOGSC	0.11	0.35	0.05	0.26	0.01
PUCCHN	0.48	0.03	0.05	0.15	0.01
SCIRAC	0.01	0.14	0	0.99	0
RADOSI	0.35	0.03	0.02	0.13	0
ENDOPA	0.05	0.14	0.02	0.13	0
ACUPFU	0.20	0.09	0.02	0.02	0
HELIAR	0.05	0.14	0	0.08	0
PUCCPZ	0.48	0	0	0.20	0
EPIOIO	0.11	0	0	0.15	0
XANTDF	0	0.09	0	0	0
SMOV00	0	0.73	0	0.57	0
STLCV0	0	0.73	0	0.27	0

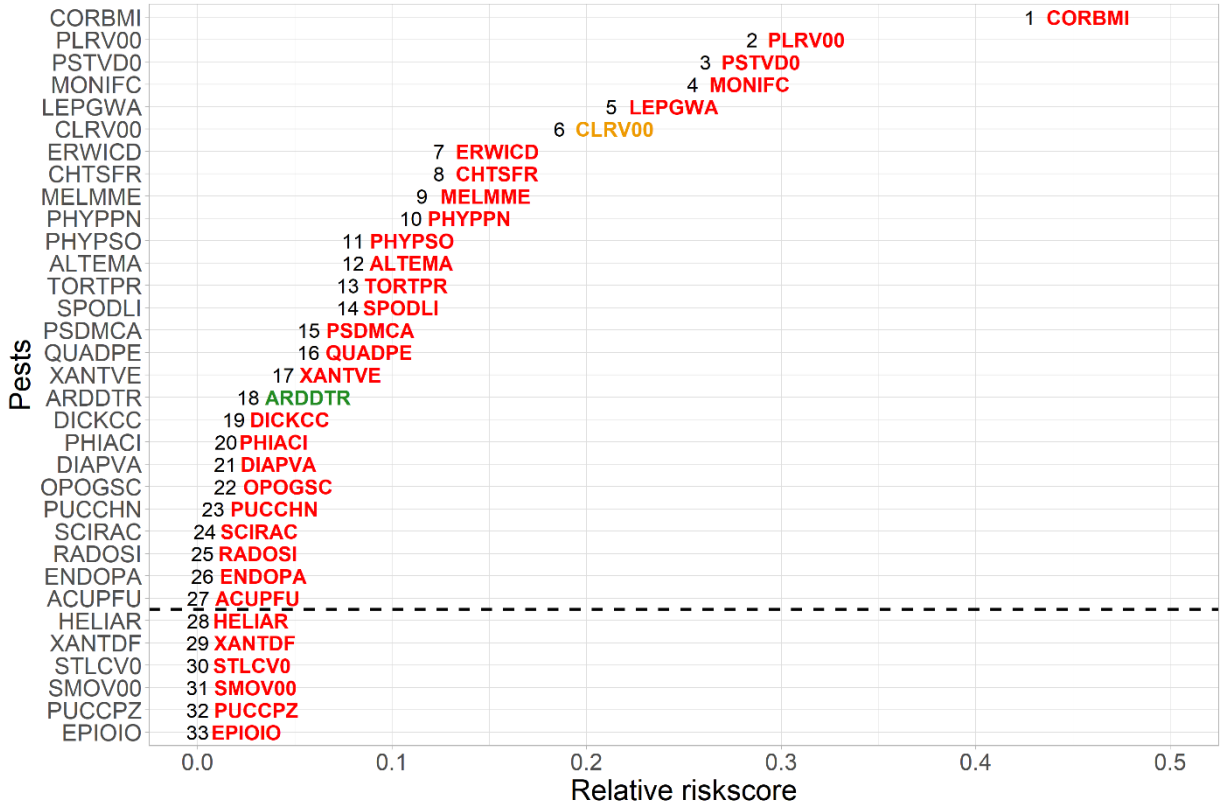

Figure 1. The 33 assessed pests sorted by their risk score (from highest to lowest). Pests in red are considered to be Quarantine Pests. The single orange and green pests are considered to be a Regulated Non-Quarantine Pest (cherry leafroll nepovirus; CLRV00), and a Non-Quarantine Pest (*Arthurdendyus triangulates*; ARDDTR), respectively. Pests below the hatched line have a risk score equal to zero and thus pose "no risk" due to current import bans. For full pest names, see Table 2.

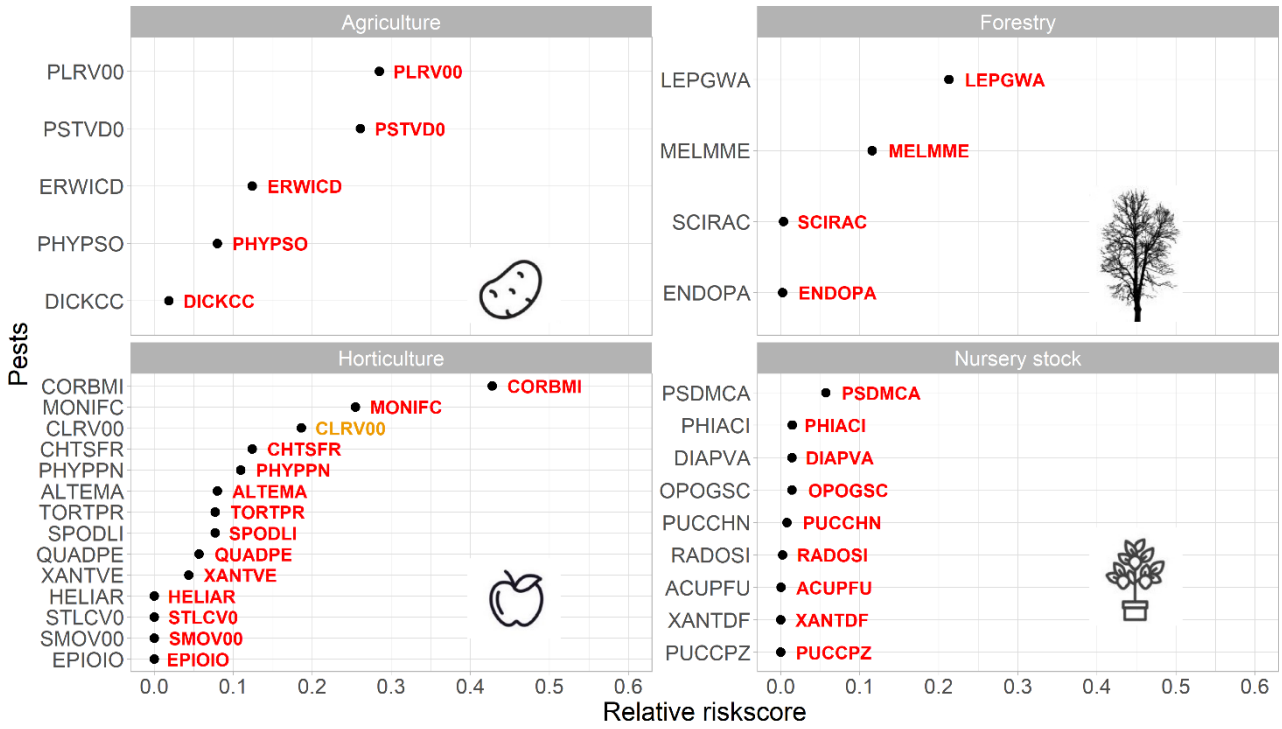

Figure 2. The 33 assessed pests sorted by relative risk score and grouped by the agricultural sector they are likely to impact. Pests in red are considered to be Quarantine Pests. The single orange pest is considered to be a Regulated Non-Quarantine Pest. For full pest names, see Table 2.

3 Uncertainties

The main sources of uncertainties associated with the risk categorizations made in this report are related to assessment inputs; the reliability of data, data gaps, reliability of assumptions, uncertainties relating to assessment modelling, statistical analysis, and finally the expert judgement.

There is uncertainty associated with the individual judgment of each risk assessor. Each organism was evaluated by a single person and revised input and review from the Panel. The FinnPRIO model attempts to handle uncertainties arising from the use of individual assessors by using Monte Carlo simulations, which draws from a PERT-distribution, so the percentiles of the distribution indicate the level of uncertainty associated with the assessment.

This report is a risk characterization and no full pest risk analyses were done by the Panel. Climate influences the distribution of most species and is an integral factor when assessing the likelihood of establishment and spread of alien species and plant pests in Norway. There is therefore an uncertainty connected to those assessments in this report.

It should be noted that the risk scores provided by FinnPRIO and the hypervolume approach are relative scores that are only directly comparable with other pests included in the same analysis. Thus, it cannot necessarily be concluded that pests with high scores in the analyses in the current report represents high risks compared to pests included in other FinnPRIO analyses.

The data that was used to assess the value of crops is reliable, except for greenhouse crops where the value of individual crops was estimated using the mean value of all greenhouse crops. This approach was used due to a lack of precise data. There are also most likely data gaps in both flower species and volumes of flower greenhouse production.

Since this is a risk caracterisation the available risk reduction options presented in chapter 4 are not evaluated up to today’s regulation.

4 Conclusion to the pest risk categorization (with answers to the terms of reference)

4.1 Species assessed as potential quarantine pests (QP) for Norway

Quarantine pests are species of potential ecological and economic importance to Norway, that are not yet present in the country, or are present but not widely distributed and under official control. The 33 pests assessed in this report are ranked by their relative estimated risk score (see Figure 1) and presented in descending order, from high to low risk.

4.1.1 *Clavibacter michiganensis subsp. michiganensis* (CORBMI)

Identity of the pest	Bacterium (Microbacteriaceae, Actinomycetales)
EPPO code	CORBMI
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner - Planter og formeringsmateriale av *Solanum lycopersicum* L. (tomat).
Conclusion of the pest categorization	QP - Quarantine Pest Comment: the pest has the highest risk score of all the pests assessed in this report (Figure 1) because of its high probability of invasion combined with a relative high magnitude of impact (Table 5).
Potential for establishment and spread in Norway	The pest will likely survive in tomato plants and soil in greenhouses used for tomato production. The pest will also likely survive in seed potatoes. No wild host plants occur in Norway.
Potential for economic consequences	We found no data on direct economic losses caused by this pest in other countries. However, the two crops that are at risk in Norway, tomato and potato, have an annual production value of about 250 and 720 million NOK, respectively (Table 3). Recent severe outbreaks of the pest have been recorded in potatoes in central and northwestern Russia. The close relative *Clavibacter sepedonicus* is evident but not common in Norwegian potato production.
Available risk reduction options	Using *Solanum lycopersicum* seeds that have been subjected to a suitable acid extraction method or equivalent methods is a possible risk reduction option. Another option is to only use tomato seeds from areas where the pest does not occur and to ban import of seeds from other areas. Supporting measures that do not directly affect pest abundance are

	laboratory testing of all imported plant material. However, this option seems unfeasible since some tomato seed that are used in Norway are imported.

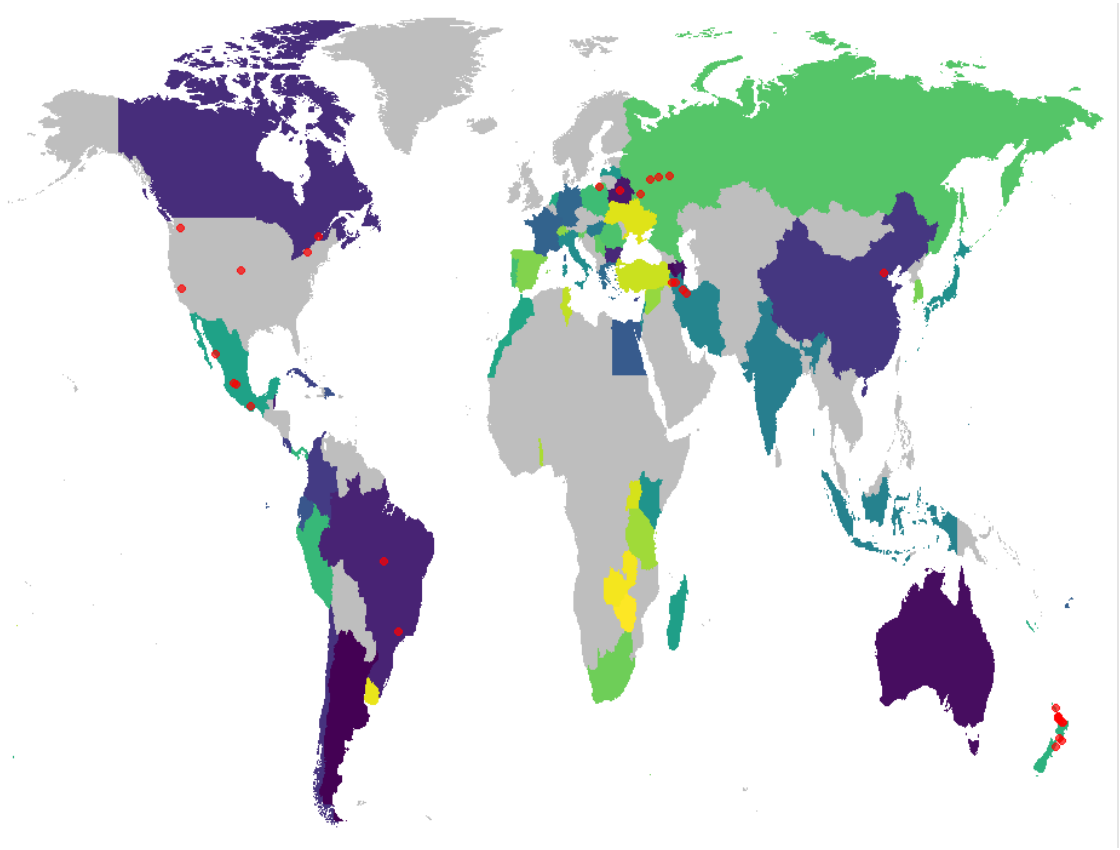

Figure 3. Worldwide distribution of *Clavibacter michiganensis*. Colored countries have confirmed presence of the pest according to CABI and red dots show occurrence records from the GBIF database.

4.1.2 Potato leafroll virus (European isolates) (PLRV00)

Identity of the pest	Virus (Luteoviridae)
EPPO code	PLRV00
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner - planter og formeringsmateriale av *Solanum tuberosum* L. (settepoteter) med opprinnelse i europeiske land."

Conclusion of the pest categorization	QP - Quarantine Pest Comment: the pest has the second highest risk score of all the pests assessed in this report (Figure 1), mainly because of its high probability of invasion (Table 5). Within the agricultural sector, it is the pest with the highest risk (Figure 2).
Potential for establishment and spread in Norway	Potato leafroll virus could be spread through infected seed tubers or spill tubers. Insect vectors could likewise spread the virus.
Potential for economic consequences	Potato leafroll virus is one of the most devastating virus diseases on potato where it is present, and may cause yield losses of up to 60-70%. Tomato and potato are the only two economically important host plants in Norway. These crops have an annual production value of about 250 and 720 million NOK, respectively.
Available risk reduction options	The most effective risk reducing option is to only use certified seed potatoes and to ban import of seed potatoes. Norway currently does not allow import of potato seed tubers for direct planting. Infected plant material can be detected using ELISA or PCR methods. Minimization of spill/overwintering tubers can reduce toverwintering tubers can reduce the risk of further spread if potato leafroll virus has entered an area. Elimination of potential insect vectors by e.g. insecticide application may also reduce the risk of spread.

4.1.3 Potato Spindle Tuber Viroid (PSTVD0)

Identity of the pest	Viroid (Pospiviroidae)
EPPO code	PSTVD0
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 1. Planteskadegjørere som det er forbudt å introdusere og spre i Norge; Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner - Punkt: 18.6: planter og formeringsmateriale av *Solanaceae* (søtvierfamilien), unntatt frø av *Solanum lycopersicum* L. (tomat), med opprinnelse i land der Potato spindle tuber viroid forekommer; Vedlegg 4A. Punkt 33: frø av *Solanum lycopersicum* L. (tomat)"
Conclusion of the pest categorization	QP - Quarantine Pest Comment: the pest has the third highest risk score of all the pests assessed in this report (Figure 1). It has the third highest probability of invasion and the fourth highest magnitude of impact (Table 5). Within the agricultural sector, it is the pest with the second highest risk (Figure 2).
Potential for establishment and spread in Norway	Potato spindle tuber viroid can survive in Norway. It may survive in seed tubers for a long time and overwinter as latent infection, when tubers are stored for the next growing season.
Potential for economic consequences	Tomato and potato are the most important host plants in Norway. These crops have an annual production value of about 250 and 720 million NOK, respectively. Potato spindle tuber viroid can cause yield losses of up to

	60-70% in potato, but losses are highly variable. In tomato, fruit setting may stop when plant growth is stunted as a result of infection.
Available risk reduction options	The most effective risk reducing option is to only use certified seed potatoes and to ban import of seed potatoes and tomatoes. It is also an option to consider regulation of petunias and other ornamentals. Norway currently does not allow import of potato seed tubers for direct planting. Infected plant material can be detected using PCR methods. Minimization of spill/overwintering tubers can reduce the risk of further spread if the viroid has entered an area. The viroid is easily transmitted mechanically, so care must be taken when handling potentially infected material.

4.1.4 *Monilinia fructicola* (MONIFC)

Identity of the pest	Fungus (Sclerotiniaceae, Helotiales)
EPPO code	MONIFC
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 1. Planteskadegjørere som det er forbudt å introdusere og spre i Norge; Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 11: planter og formeringsmateriale (unntatt frø) av *Choenomeles* Lindl. (eldkvede), *Crataegus* L. (hagtorn), *Cydonia* Mill. (kvede), *Eriobotrya* Lindl., *Malus* Mill. (eple), *Prunus* L. (prunus) og *Pyrus* L. (pære), med opprinnelse i ikke-europeiske land."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: the pest has the fourth highest risk score of all the pests assessed in this report (Figure 1), mainly because of its relatively high magnitude of impact (the third highest of all species; Table 5). Within the agricultural sector, it is the pest with the second highest risk (Figure 2).
Potential for establishment and spread in Norway	Other fungi in the same genus survive in Norway, and *Monilinia fructicola* will probably have no climatic barriers in Norway. It produces ascospores, a type of spores that generally can be distributed over long distances in a short time.
Potential for economic consequences	*Monilinia fructicola* is of potential economic importance in the production of wild cherry (*Prunus avium*), European plum (*Prunus domestica*), and apple (*Malus domestica*). The annual production value of these crops in Norway is about 30, 39, and 132 million NOK, respectively.
Available risk reduction options	The most common pathway for *Monilinia fructicola* is via imported plant material. However, there is also a risk of introduction with fruits, especially apple, pear and *Prunus* species. Import of these commodities from countries where *Monilinia fructicola* is present should be avoided. If the pathogen is detected infected plants should be eradicated. Use of fungicides is an option, but requires several applications per season and may cause build-up of resistance.

4.1.5 *Ophiostoma wageneri* (LEPGWA)

Identity of the pest	Fungus (Ophiostomataceae, Ophiostomatales)
EPPO code	LEPGWA
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 1. Planteskadegjørere som det er forbudt å introdusere og spre i Norge - (*Ophiostoma wageneri*)."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: the pest has the fifth highest risk score of all the pests assessed in this report (Figure 1), and the highest risk in the forestry sector (Figure 2). The high risk is mainly due to the high magnitude of impact (the second highest of all pests; Table 5).
Potential for establishment and spread in Norway	According to EPPO, *Ophiostoma wageneri* can survive for months in infected seedlings and international spread is most likely to occur by trade of living coniferous host plants. The potential host plant Scots pine (*Pinus sylvestris*) is widely distributed in Norway. Because most of Norway's pine forests have suitable climatic conditions for *Ophiostoma wageneri* the pest would probably be able to establish in Norway. Once established, it is likely to spread rather quickly.
Potential for economic consequences	*Ophiostoma wageneri* is considered to be one of the most damaging pathogens of pines in North America, and has a considerable potential to damage forests elsewhere in the northern hemisphere. The pest is of potential economic importance to stands of Scots pine. The total standing volume of Scots pine in Norway is about 300 million m^3 and the annual volume increment is 5.5 million m^3. More than half of the annual increment is harvested, with an estimated value of more than 1 billion NOK.
Available risk reduction options	Import of living conifer plants to Norway from non-European countries and Portugal is prohibited. *Ophiostoma wageneri* lives inside the wood and is thus difficult to detect during visual inspections of living plants for planting. Currently there are no effective survey methods for this pest and no available control methods based on chemical or biological products.

4.1.6 *Dickeya dianthicola* (ERWICD)

Identity of the pest	Bacterium (Pectobacteriaceae, Enterobacterales)
EPPO code	ERWICD
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated under a different name. FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner – Planter og formeringsmateriale (unntatt frø) av *Dianthus* L. (nellik) og *Dendranthema* (DC.) Des Moul.

	(krysantemum); Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 21: planter og formeringsmateriale (unntatt frø) av *Dianthus* L. nellik); Vedlegg 4B. Særskilte krav til innenlands produksjon og omsetning av visse planter og andre smittebærende emner – Punkt 9: planter og formeringsmateriale av *Dianthus* L. (nellik), unntatt frø."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: the pest has the seventh highest all the pests assessed in this report (Figure 1) and the third highest risk in the agricultural sector (Figure 2). It has a relatively high score for impact and establishment (Table 5).
Potential for establishment and spread in Norway	*Dickeya dianthicola* can probably survive in Norway. Like all related soft rot pathogens in the family Pectobacteriaceae, it may survive in seed tubers for a long time. It overwinters as latent infection when tubers are stored for the next growing season.
Potential for economic consequences	In the Netherlands, downgrading or rejection of potato seed tubers due to soft rot and blackleg disease caused an estimated 300 million NOK in annual losses in the early 2000's. These losses occurred at the height of an epidemic by *Dickeya solani*, and more recently by *Dickeya dianthicola*, and those pathogens were likely responsible for most of the losses. Because the Norwegian production of potato seed tubers is about 5% of that in the Netherlands, the direct economic losses from a severe *Dickeya dianthicola* epidemic in Norway can be expected to be correspondingly smaller (about 15 million NOK). However, because soft rot diseases already cause significant economic losses in Norway, it is difficult to estimate how much additional damage *Dickeya dianthicola* would cause.
Available risk reduction options	Continuing strict control of seed potato import to Norway is a crucial risk reduction measure. Norway currently does not allow import of potato seed tubers for direct planting. Potato material (primarily new cultivars) may only be imported by certified actors and must undergo testing and assessment in quarantine fields before they are grown in Norway. Planting of imported ware potatoes by private persons may present some risk and might be regulated more strictly. The presence of *Dickeya dianthicola* on other host plants, primarily ornamentals, could be tested upon import using molecular methods.

4.1.7 *Chaetosiphon fragaefolii* (CHTSFR)

Identity of the pest	Insect (Aphididae, Hemiptera)
EPPO code	CHTSFR
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner - Planter og formeringsmateriale (unntatt frø) av *Fragaria* L. (jordbær)."
Conclusion of the pest categorization	QP - Quarantine Pest

	Comment: the pest has the eight highest overall risk score of all the pests assessed in this report (Figure 1) and the fourth highest risk in the horticulture sector (Figure 2). It also has a relatively high impact score.
Potential for establishment and spread in Norway	*Chaetosiphon fragaefolii* has been reported once in Norway, but it has not been found in recent targeted searches. This species has a wide global distribution and may be transported with plants for planting. It survives the winters in Denmark, southern Sweden, the UK, and parts of Canada, suggesting that it also could survive in mild, coastal areas of southern Norway.
Potential for economic consequences	The direct losses inflicted by *Chaetosiphon fragaefolii* on garden strawberry is limited, especially at low aphid densities. However, the indirect damage is much larger and includes damage made by 25 aphid-vectored viruses that attack both wild and domesticated strawberry. The mean annual value of Norwegian strawberry production is about 370 million NOK.
Available risk reduction options	Prevention of all import of non-certified strawberry plants (including all *Fragaria* species) and inspection of imported commodities would reduce risk. Populations of *Chaetosiphon fragaefolii* that have established in cultivated fields might be eliminated using several systemic insecticides, although the aphid may find refuge in wild woodland strawberry populations.

4.1.8 *Melampsora medusae* (MELMME)

Identity of the pest	Fungus (Melampsoraceae, Pucciniales)
EPPO code	MELMME
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 1. Planteskadegjørere som det er forbudt å introdusere og spre i Norge; Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 7: planter og formeringsmateriale (unntatt frø) av *Abies* Mill. (edelgran), *Larix* Mill. (lerk), *Picea* A. Dietr. (gran), *Pinus* L. (furu), *Pseudotsuga* Carr. (douglasgran) og *Tsuga* Carr. (hemlokk); Vedlegg 4A. – Punkt 9: planter og formeringsmateriale (unntatt frø) av *Populus* L. (poppel)."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: the pest has the seventh highest risk score of all the pests assessed in this report (Figure 1) and the second highest risk in the forestry sector (Figure 2).
Potential for establishment and spread in Norway	*Melampsora medusae* has a low risk of introduction via plants, natural spread or hitchhiking. If introduced, it has a high potential for establishment and spread, as spores can be spread far by wind. *Melampsora medusae* can survive the winter as mycelium in poplar buds in areas with mild climates and could probably overwinter in southwestern Norway.
Potential for economic consequences	*Melampsora medusae* has little potential for economic impact. Although its main host balsam poplar (*Populus balsamifera*) is widespread in Norway it is not common or native, nor is it of importance in forestry.

Available risk reduction options	The only available risk reduction option is to not import balsam poplar plants or leaves from North America.

4.1.9 Candidatus phytoplasma pruni (PHYPPN)

Identity of the pest	Phytoplasma disease (Acholeplasmataceae, Acholeplasmatales)
EPPO code	PHYPPN
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated under a different name FOR-2000-12-01-1333: "Vedlegg 1. Planteskadegjørere som det er forbudt å introdusere og spre i Norge - Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 15.2: planter og formeringsmateriale av *Prunus* L. (prunus) - Peach X-disease phytoplasma a) med opprinnelse i land der Tomato ringspot nepovirus forekommer på *Prunus* L. (prunus), b) unntatt frø, med opprinnelse i land der følgende planteskadegjørere forekommer: Cherry rasp leaf nepovirus – Peach mosaic virus (amerikansk), Plum American line pattern ilavirus – Peach X-disease phytoplasma."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: Candidatus phytoplasma pruni fulfils the requirements for being a quarantine pest, since it is not present in Norway, and the pathogen may be of potential economic importance to plum (*Prunus* spp.) production in Norway.
Potential for establishment and spread in Norway	Candidatus phytoplasma pruni can probably survive in Norway. The pest is currently present in regions of North America and Canada with a similar climate as Norway. *Prunus* species are grown throughout Norway. Candidatus phytoplasma pruni can spread with infected plant material. Because phytoplasma diseases in general may have latent infections this could result in unnoticed spread.
Potential for economic consequences	We could not find any data on direct economic losses caused by this pest in other countries. Plum production is important in Norway, with an annual production value of about 39 million NOK. Establishment of Candidatus phytoplasma pruni in Norway could lead to increased production costs, but the effect would depend on the management strategy chosen.
Available risk reduction options	A possible risk reduction option is ban on import of *Prunus* from countries where Candidatus phytoplasma pruni is present. A supporting measure that does not directly affect pest abundance is laboratory testing of all imported plant material.

4.1.10 Candidatus Phytoplasma solani (PHYPSO)

Identity of the pest	Phytoplasma disease (Acholeplasmataceae, Acholeplasmatales)
EPPO code	PHYPSO
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner – (Potato stolbur phytoplasma) Planter og formeringsmateriale (unntatt frø) av *Solanaceae* (søtvierfamilien); Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 18.5: planter og formerings-materiale (unntatt frø) av *Solanaceae* (søtvierfamilien), med opprinnelse i land der Potato stolbur phytoplasma forekommer."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: Candidatus Phytoplasma solani fulfils the requirements for being a quarantine pest, since it is not present in Norway and it is of potential economic importance to potato (*Solanum tuberosum*) and strawberry (*Fragaria × ananassa*) production.
Potential for establishment and spread in Norway	The pest occurs widely and is transmitted with seed potatoes and planting material of strawberry. Phytoplasmas are often transmitted with insect vectors. Because phytoplasma diseases in general may have latent infections this could result in unnoticed spread.
Potential for economic consequences	We could not find any data on direct economic losses caused by this disease in other countries. However, the crops that might be affected by Candidatus Phytoplasma solani are important in Norway, with a mean annual production value of about 720 and 370 million NOK for potato and strawberry, respectively.
Available risk reduction options	A possible risk reduction option is ban on import of seed potatoes and strawberry plants and propagation material from countries that harbour Candidatus Phytoplasma solani. A supporting measure that does not directly affect pest abundance is laboratory testing of all imported plant material.

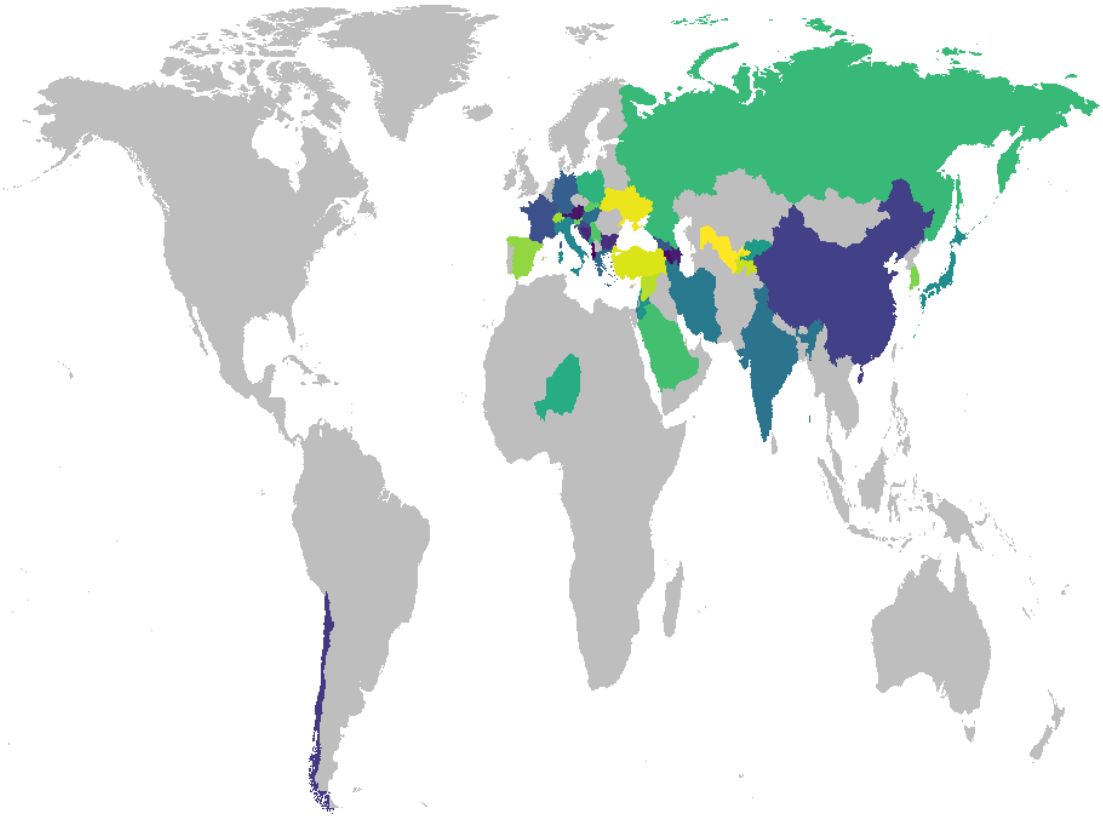

Figure 4. Worldwide distribution of Candidatus Phytoplasma solani. Colored countries have confirmed presence of the pest according to CABI and red dots show occurrence records from the GBIF database.

4.1.11 *Alternaria mali* (ALTEMA)

Identity of the pest	Fungus (Pleosporaceae, Pleosporales)
EPPO code	ALTEMA
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner - Planter og formeringsmateriale av *Cydonia* Mill. (kvede), *Malus* Mill. (eple) og *Pyrus* L. (pære)."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: *Alternaria mali* Roberts fulfils the requirements for being a quarantine pest, since it is not present in Norway and it is of potential economic importance to apple (*Malus* spp.) production in Norway.

Potential for establishment and spread in Norway	*Alternaria mali* was recently introduced from Asia to USA, showing that it has the potential to spread between continents. CABI distribution maps show that the pest has been recorded in parts of North America with a similar climate as Europe and perhaps Norway, but this is uncertain. *Alternaria mali* prefers much warmer and wetter conditions than those commonly found in apple-producing regions in Europe.
Potential for economic consequences	It is difficult to know if, or to what extent, apple cultivars grown in Norway are susceptible to *Alternaria mali*. The pest mainly damages certain susceptible cultivars, and current cultivar ratings mainly include cultivars grown in Asia or North America. In the most susceptible cultivar, 'Golden Delicious', up to 50% defoliation may occur. The mean annual value of Norwegian apple production is about 130 million NOK.
Available risk reduction options	*Alternaria mali* can be controlled through the use of resistant cultivars and fungicides.

4.1.12 *Cacoecimorpha pronubana* (TORTPR)

Identity of the pest	Insect (Tortricidae, Lepidoptera)
EPPO code	TORTPR
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 1. Planteskadegjørere som det er forbudt å introdusere og spre i Norge."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: *Cacoecimorpha pronubana* Hübner fulfils the requirements for being a quarantine pest, since it is not present in Norway and the pest is of potential economic importance to greenhouse production of tomato, carnation (*Dianthus* spp.), and chrysanthemum in Norway.
Potential for establishment and spread in Norway	*Cacoecimorpha pronubana* overwinters as larvae on the host plant. It can probably not survive the winter outdoors in Norway, but is a potential pest in greenhouses. The pest has been detected once in Norway according to Artsdatabanken.
Potential for economic consequences	Despite the polyphagous nature of this insect, serious damage has mainly been restricted to carnation crops in the Mediterranean area, where losses have been reported since the 1920s. Around Nice in France, 25-35% of all carnation plants were affected during 1972-1973. Further north in Europe (e.g. Poland), *Cacoecimorpha pronubana* is an important pest in greenhouses (EPPO). In Norway, the highest economic losses due to *Cacoecimorpha pronubana* are expected to be in tomato production. Tomato production in Norway has an annual production value of 250 million NOK, while carnation and chrysanthemum are valued at 19 and 32 million NOK, respectively.
Available risk reduction options	Control of *Cacoecimorpha pronubana* can be achieved by applying pyrethroid insecticides. Biological control has not yet been investigated. It is possible to monitor pest abundance using pheromone traps.

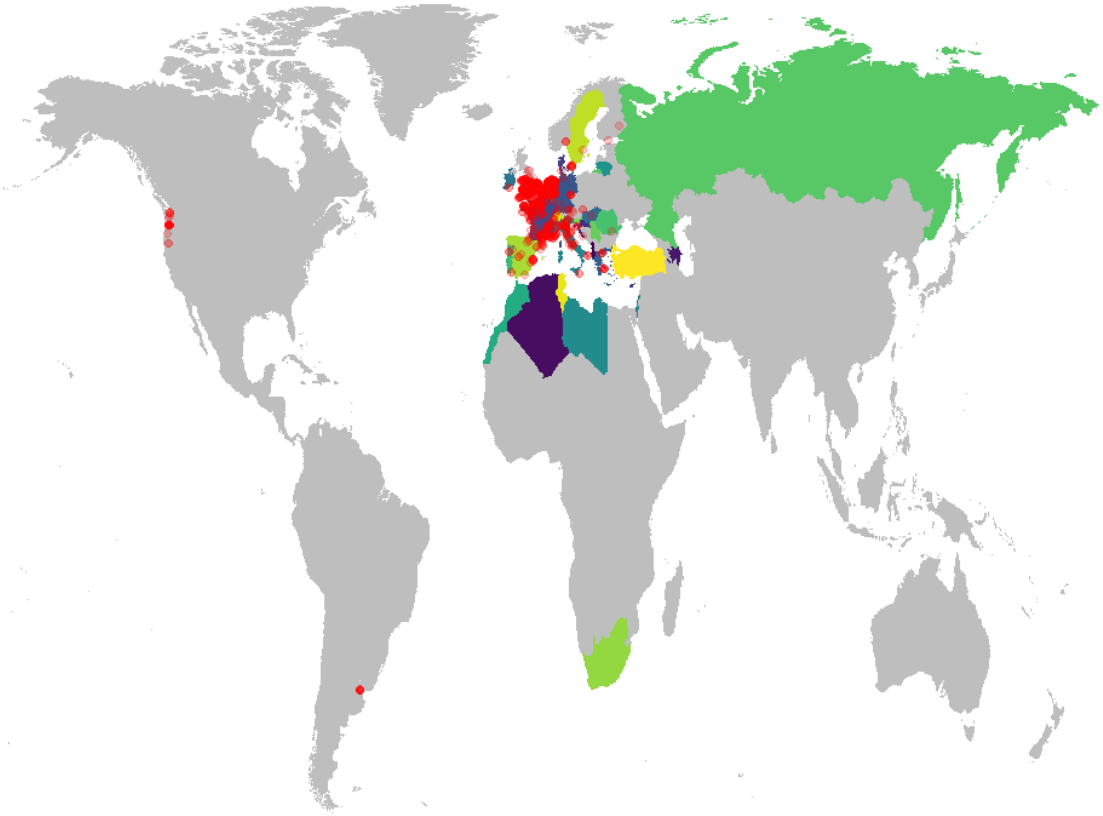

Figure 5. Worldwide distribution of *Cacoecimorpha pronubana*. Colored countries have confirmed presence of the pest according to CABI, and red dots show occurrence records from the GBIF database.

4.1.13 *Spodoptera littoralis* (SPODLI)

Identity of the pest	Insect (Noctuidae, Lepidoptera)
EPPO code	SPODLI
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 1. Planteskadegjørere som det er forbudt å introdusere og spre i Norge; Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 19.1: planter og formeringsmateriale (unntatt frø) av *Dendranthema* (DC.) Des Moul. (krysantemum), *Dianthus* L. (nellik) og *Pelargonium* L'Herit. ex Ait (pelargonium); Vedlegg 4B. Særskilte krav til innenlands produksjon og omsetning av visse planter og andre smittebærende emner – Punkt 7. Særskilte krav."
Conclusion of the pest categorization	*Spodoptera littoralis* (Boisduval) fulfils the requirements for being a quarantine pest, since it is not present in Norway and is of potential

	economic importance to greenhouse production of chrysanthemums, roses, and tomato (*Solanum lycopersicum*) in Norway.
Potential for establishment and spread in Norway	*Spodoptera littoralis* is not expected to survive outdoors in Norway since all developmental stages of the species are killed by exposure to temperatures below 1.7 °C for more than 10 days.
Potential for economic consequences	The estimated annual production value of chrysanthemums, roses and tomato in Norway is 32, 36 and 247 million NOK, respectively.
Available risk reduction options	Risk reducing measures include cultivation of plants for planting in pest-free areas and inspection of commodities prior to export. Examples of measures used for cut flowers include cold storage for chrysanthemum and carnation cuttings. Cold storage for at least 10 days at a temperature not exceeding 1.7°C kills all stages of *S. littoralis*, but may damage the plants (EPPO data sheet).

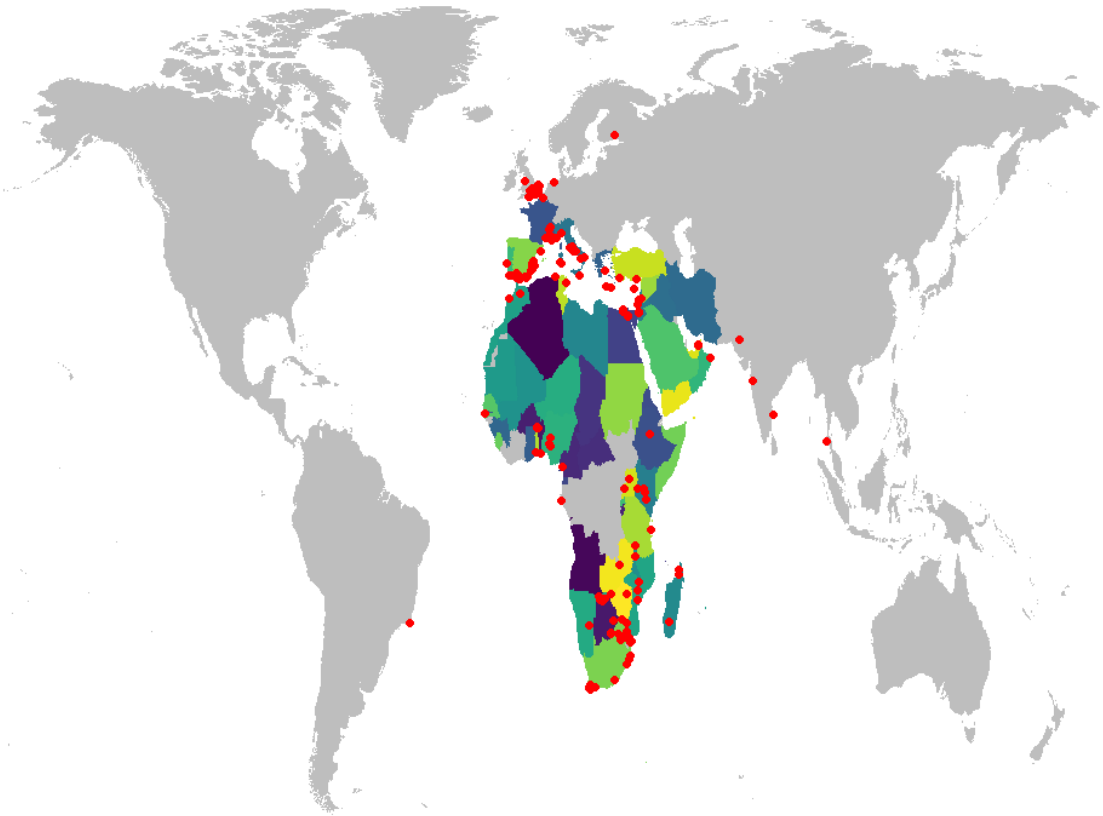

Figure 6. Worldwide distribution of *Spodoptera littoralis*. Colored countries have confirmed presence of the pest according to CABI and red dots show occurrence points from the GBIF database.

4.1.14 *Paraburkholderia caryophylli* (PSDMCA)

Identity of the pest	Bacterium (Burkholderiaceae, Burkholderiales)
EPPO code	PSDMCA

Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner - Planter og formeringsmateriale (unntatt frø) av *Dianthus* L. (nellik); Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 21: planter og formeringsmateriale (unntatt frø) av *Dianthus* L. nellik); Vedlegg 4B. Særskilte krav til innenlands produksjon og omsetning av visse planter og andre smittebærende emner – Punkt 9: planter og formeringsmateriale av Dianthus L. (nellik), unntatt frø."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: *Paraburkholderia caryophylli* fulfils the requirements for being a quarantine pest, since it is not present in Norway and it is of potential economic importance to carnation (*Dianthus* sp.) production in Norway.
Potential for establishment and spread in Norway	Host plants in the genus *Dianthus* (carnations) are cultivated or occur naturally throughout Norway, and *Paraburkholderia caryophylli* is expected to survive in perennial carnation plants. Carnation cultivars grown in Norway are sensitive to frost and do not survive in regions that experience temperatures below -5 °C.
Potential for economic consequences	Cultivated carnations are grown in Norway as an annual ornamental plant for gardens. The estimated annual production value of carnations in Norway is 19 million NOK. According to Statistics Norway about 427 metric tons of carnation were imported to Norway in 2014 (www.sbb.no).
Available risk reduction options	A possible risk reduction option is ban on import of *Dianthus* plants and propagation material from countries where *Paraburkholderia caryophylli* is present. A supporting measure that does not directly affect pest abundance is laboratory testing of all imported plant material.

4.1.15 *Comstockaspis perniciosa* (QUADPE)

Identity of the pest	Insect (Diaspididae, Hemiptera)
EPPO code	QUADPE
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated under a different name FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner - Planter og formeringsmateriale (unntatt frø) av *Acacia* Mill., *Acer* L. (lønn), *Amelanchier* Medik. (søtmispel), *Betula* L. (bjørk), *Cercidiphyllum* Sieb et Zucc. (katsura), *Choenomeles* Lindl. (eldkvede), *Cornus* L. (kornell), *Cotoneaster* Medik. (mispel), *Crataegus* L. (hagtorn), *Cydonia* Mill. (kvede), *Eriobotrya* Lindl., *Euonymus* L. (beinved), *Fagus* L. (bøk), *Juglans* L. (valnøtt), *Ligustrum* L. (liguster), *Lonicera* L. (leddved), *Malus* Mill. (eple), *Mespilus* L. (ekte mispel), *Maclura* Nutt., *Populus* L. (poppel), *Prunus* L. (prunus), *Ptelea* L. (humlebusk), *Pyracantha* M.J. Roem. (ildtorn), *Pyrus* L. (pære), *Ribes* L.

	(ribes), *Rosa* L. (rose), *Salix* L. (pil), *Sorbus* L. (rogn, asal), *Spiraea* L. (spirea), *Symphoricarpos* Duham. (snøbær), *Syringa* L. (syrin), *Tilia* L. (lind) og *Ulmus* L. (alm), *Vitis* L. (vin); Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 10: planter og formeringsmateriale (unntatt frø) av følgende planteslag, med opprinnelse i land hvor *Quadraspidiotus perniciosus* (Comstock) forekommer: *Acacia* Mill., *Acer* L. (lønn), *Amelanchier* Medik. (søtmispel), *Betula* L. (bjørk), *Cercidiphyllum* Sieb et Zucc. (katsura), *Choenomeles* Lindl. (eldkvede), *Cornus* L. (kornell), *Cotoneaster* Medik. (mispel), *Crataegus* L. (hagtorn), *Cydonia* Mill. (kvede), *Eriobotrya* Lindl., *Euonymus* L. (beinved), *Fagus* L. (bøk), *Juglans L.* (*valnøtt*), *Ligustrum* L. (liguster), *Lonicera* L. (leddved), *Malus* Mill. (eple), *Mespilus* L. (ekte mispel), *Maclura* Nutt., *Populus* L. (poppel), *Prunus* L. (prunus), *Ptelea* L. (humlebusk), *Pyracantha* M.J. Roem. (ildtorn), *Pyrus* L. (pære), *Ribes* L. (ribes), *Rosa* L. (rose), *Salix* L. (pil), *Sorbus* L. (rogn, asal), *Spiraea* L. (spirea), *Symphoricarpos* Duham. (snøbær), *Syringa* L. (syrin), *Tilia* L. (lind) og *Ulmus* L. (alm), *Vitis* L. (vin)."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: *Comstockaspis perniciosa* fulfils the requirements for being a quarantine pest, since it is not present in Norway and it is of potential economic importance in the production of apple (*Malus* spp.), plum (*Prunus* spp.), and pear (*Pyrus* spp.) in Norway. In addition, birch species (Betula spp.) are among the 150 known host species.
Potential for establishment and spread in Norway	Pathways for *Comstockaspis perniciosa* are movement of ornamental plants, fruit, vegetables, cut flowers or branches. *Comstockaspis perniciosa* has previously been intercepted on imports of plums to Norway. The species may be able to survive outdoors in the warmest coastal areas of Norway.
Potential for economic consequences	The mean annual production value of apple, plum and pear in Norway is about 130, 39, and 4 million NOK, respectively. Economic losses caused by *Comstockaspis perniciosa* could be due to direct losses and increased management costs.
Available risk reduction options	Plants for planting (of host plants) should not be imported from areas where the pest occurs during specified periods and host plants should be free from symptoms.

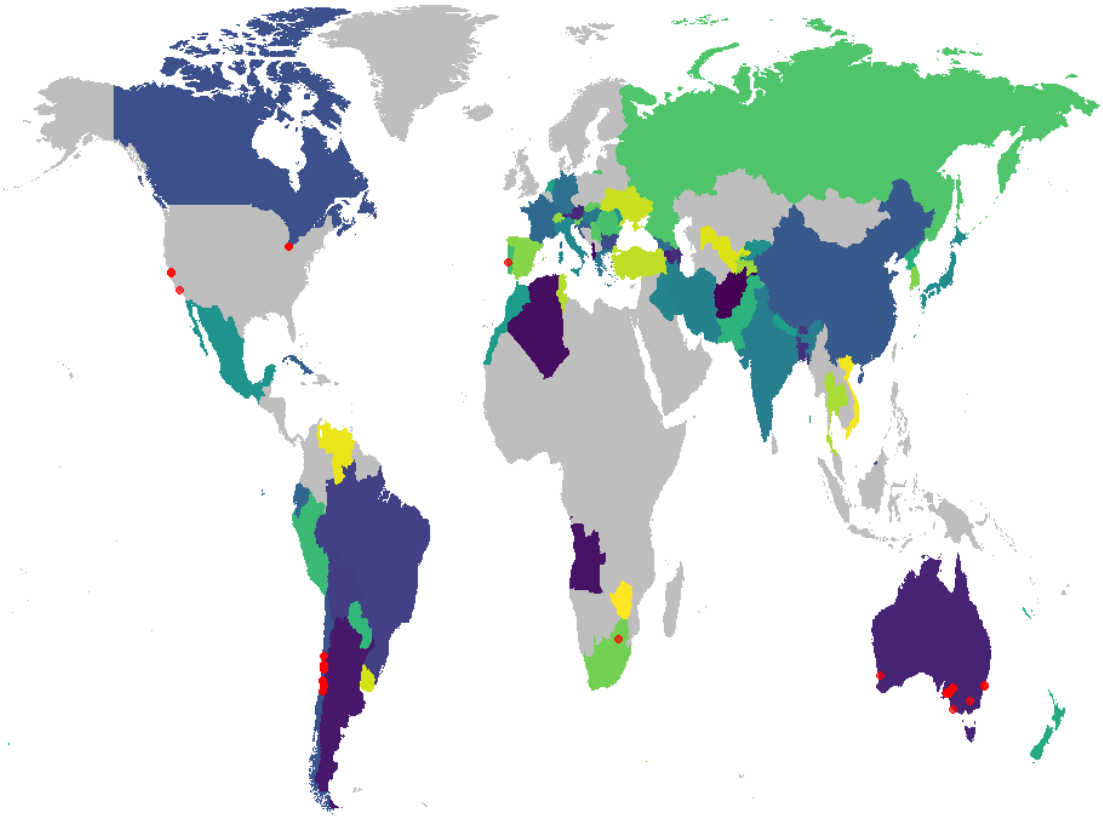

Figure 7. Worldwide distribution of *Comstockaspis perniciosa*. Colored countries have confirmed presence of the pest according to CABI and red dots show occurrence records from the GBIF database.

4.1.16 *Xanthomonas vesicatoria* (XANTVE)

Identity of the pest	Bacterium (Lysobacteraceae, Lysobacterales)
EPPO code	XANTVE
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner – Planter og formeringsmateriale av *Capsicum* L. og *Solanum lycopersicum* L. (tomat); Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 33: frø av *Solanum lycopersicum* L. (tomat)."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: *Xanthomonas vesicatoria* fulfils the requirements for being a quarantine pest, since it is not present in Norway and it is of potential

	economic importance to tomato (*Solanum lycopersicum*) production in Norway.
Potential for establishment and spread in Norway	Tomato production in Norwegian greenhouses is seasonal. Because the host plant is not present year-round, and it is unlikely that the pest can overwinter away from its host plant, the pest would probably not survive the winter in Norway. However, plant parts in the soil may provide suitable conditions for survival. Some wild host plants grow in Norway.
Potential for economic consequences	We could not find any data on direct economic losses caused by this disease in other countries. However, the mean annual production value of tomato, the crop at risk to *Xanthomonas vesicatoria*, is 247 million NOK in Norway.
Available risk reduction options	Strict enforcement of regulation of plants for planting (of host plants) and seeds, particularly regarding testing of representative samples, is an important risk reduction option. The EPPO diagnostic protocol for this pathogen, minimally PCR tests of random samples, should be applied to imported seeds and tomato/pepper plants intended for planting. Infected plant material should be destroyed immediately. The destruction method should ensure complete destruction of the bacteria (e.g. by heat treatment).

4.1.17 *Erwinia chrysanthemi* pv. *chrysanthemi* (DICKCC)

Identity of the pest	Bacterium (Pectobacteriaceae, Enterobacterales)
EPPO code	DICKCC
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner – Planter og formeringsmateriale (unntatt frø) av *Dianthus* L. (nellik) og *Dendranthema* (DC.) Des Moul. (krysantemum); Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 20: planter og formeringsmateriale (unntatt frø) av *Dendranthema* (DC.) Des Moul. (krysantemum); Vedlegg 4B. Særskilte krav til innenlands produksjon og omsetning av visse planter og andre smittebærende emner – Punkt 8: planter og formeringsmateriale av *Dendranthema* (DC.) Des. Moul (krysantemum), unntatt frø.
Conclusion of the pest categorization	QP - Quarantine Pest Comment: *Erwinia chrysanthemi* pv. *chrysanthemi* fulfils the requirements for being a quarantine pest, since it is not present in Norway and it is of potential economic importance for the production of *Dianthus*, *Dendranthema* and *Solanum tuberosum* in Norway.
Potential for establishment and spread in Norway	*Erwinia chrysanthemi* pv. *chrysanthemi* is expected to survive in Norway. Like all related soft rot pathogens in the Pectobacteriaceae family it can survive in seed tubers and other host tissues for a long time and overwinter as latent infection, when tubers are stored or kept in

	greenhouses over the winter. Taxonomic challenges make it difficult to assess the global distribution of true *Erwinia chrysanthemi* pv*. chrysanthemi*. Unlike the previously described variant *Erwinia chrysanthemi* pv. *dianthicola* (now known as the species *Dickeya dianthicola*), the new variant *Erwinia chrysanthemi* pv*. chrysanthemi* has not yet been responsible for any known epidemics in major crops.
Potential for economic consequences	If a more aggressive strain of *Erwinia chrysanthemi* pv*. chrysanthemi* should emerge on potato in Norway, similar considerations apply as for *Dickeya dianthicola* (see 4.1.6). In the Netherlands, downgrading or rejection of potato seed tubers due to soft rot and blackleg disease has caused an estimated 300 million NOK in annual losses. This happened at the height of an epidemic by *Dickeya solani*, and more recently *Dickeya dianthicola*, and these pathogens were likely responsible for most of the losses. Because the Norwegian production of seed potato tubers is about 5% of that in the Netherlands, the direct economic losses from a severe *Dickeya dianthicola* or *Erwinia chrysanthemi* pv*. chrysanthemi* epidemic in Norway can be expected to be correspondingly smaller (about 15 million NOK). However, because soft rot diseases already cause significant economic losses in Norway it is difficult to estimate how much additional damage an aggressive strain of *Erwinia chrysanthemi* pv*. chrysanthemi* could cause. The possible emergence of an aggressive *Erwinia chrysanthemi* pv. *chrysanthemi* strain is a very hypothetical scenario, since no such strains are presently known. The distribution and severity of *Erwinia chrysanthemi* pv*. chrysanthemi* infection on ornamental hosts has received little attention and is not routinely assessed. It is, therefore, impossible to estimate to what extent ornamentals infected with this pest are imported. Direct economic losses to the ornamental sector due to *Erwinia chrysanthemi* pv*. chrysanthemi* are highly unlikely to be larger than the worst case scenarios for potato farming.
Available risk reduction options	Continued strict control of seed potato imports to Norway is a crucial risk reduction measure. Norway currently does not allow import of potato seed tubers for direct planting. Potato material (primarily new cultivars) may only be imported by certified actors and must undergo testing and assessment in quarantine fields before being introduced for growing in Norway. Planting of imported ware potatoes by private persons may present some risk and might be regulated more strictly. The presence of *Erwinia chrysanthemi* pv*. chrysanthemi* on other host plants, primarily ornamentals, could be tested upon import using molecular methods. For most ornamental host species this requires strict enforcement of existing regulations.

4.1.18 *Phialophora cinerescens* (PHIACI)

Identity of the pest	Fungus (Herpotrichiellaceae, Chaetothyriales)
EPPO code	PHIACI
Presence or absence in Norway	Absent

Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner – Planter og formeringsmateriale (unntatt frø) av *Dianthus* L. (nellik); Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 21: planter og formeringsmateriale (unntatt frø) av *Dianthus* L. nellik); Vedlegg 4B. Særskilte krav til innenlands produksjon og omsetning av visse planter og andre smittebærende emner – Punkt 9: planter og formeringsmateriale av *Dianthus* L. (nellik), unntatt frø."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: *Phialophora cinerescens* fulfils the requirements for being a quarantine pest, since it is not present in Norway. The pathogen is of potential economic importance to greenhouse production of carnations (*Dianthus* spp.), and specifically *Dianthus caryophyllus*, in Norway.
Potential for establishment and spread in Norway	*Phialophora cinerescens* is indigenous to parts of Europe. It has formerly been introduced in Scandinavia, including Norway, but was successfully eradicated. Because *Phialophora cinerescens* has been present in Norway, and it is found in areas with climates similar to Norway, the pathogen can probably establish in the country again. The main means of spread of *Phialophora cinerescens* are movement of infected plant materials and the use of infested irrigation water. Wild host plants in the genus *Dianthus* are widespread in Norway, and these host plants are susceptible to infection throughout their growing cycle.
Potential for economic consequences	The production of carnations in Norway is modest, with an estimated annual production value of 19 million NOK.
Available risk reduction options	A possible risk reduction option is ban on import of *Dianthus* plants and propagation material from countries where *Phialophora cinerescens* is present. A supporting measure that does not directly affect pest abundance is laboratory testing of all imported plant material.

4.1.19 *Diaporthe vaccinii* (DIAPVA)

Identity of the pest	Fungus (Diaporthaceae, Diaporthales)
EPPO code	DIAPVA
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner – Planter og formeringsmateriale (unntatt frø) av *Vaccinium* spp."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: *Diaporthe vaccinii* fulfils the requirements for being a quarantine pest, since it is not present in Norway and it is of potential economic importance to greenhouse and outdoor production of northern highbush blueberry (*Vaccinium corymbosum*), American cranberry (*V.*

	macrocarpon), cranberry (*V. oxycoccos*), and rabbit-eye blueberry (*V. virgatum*).
Potential for establishment and spread in Norway	Several species in the genus *Diaporthe* thrive in Norway, and since *Diaporthe vaccinii* is present in Latvia, coastal regions in Southern Norway will most likely be climatically suitable for this pathogen. However, the current production of the main host plants in Norway is small or non-existent. The widespread and ecologically important native bilberry (*Vaccinium myrtillus*) has thus far not been found to be susceptible to *Diaporthe vaccinii.* Hence, the potential for establishment and spread of this pathogen in Norway is limited.
Potential for economic consequences	Very low
Available risk reduction options	A possible risk reduction option is ban on import of host plants from countries where the fungus is present. Infected plant material should be destructed immediately upon detection.

4.1.20 *Opogona sacchari* (OPOGSC)

Identity of the pest	Insect (Tineidae, Lepidoptera)
EPPO code	OPOGSC
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 1. Planteskadegjørere som det er forbudt å introdusere og spre i Norge."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: *Opogona sacchari* fulfils the requirements for being a quarantine pest, since it is not present in Norway and it is of potential economic importance to greenhouse production of several ornamental plants. Some food plants grown in Norway (e.g. maize, eggplant, pepper) can also be attacked, but are typically not the main hosts of *Opogona sacchari*.
Potential for establishment and spread in Norway	*Opogona sacchari* can feed and reproduce on many ornamental plants grown in greenhouses and garden centers, in addition to numerous vegetables. Natural spread by flight is possible between closely located greenhouses, but human vectoring is needed for long-distance spread. *Opogona sacchari* will probably not be able to complete its development or survive the winter outdoors in Central and Northern Europe. At 15 °C, it takes three months for it to complete one generation and the lower temperature threshold for development is 8.6 °C. Thus, maximum one generation per year can be completed in Norway outdoors. Heated greenhouses with continuous access to suitable host plants could be suitable for overwintering, but it is unclear if such conditions are available in Norway. Because all greenhouses in Norway probably have at least one short production break every year, long-term survival of *Opogona sacchari* is unlikely.
Potential for economic consequences	The total economic value of the main host plants in Norway is unknown, but total annual production amounts to several thousand tons. The main

	costs if *Opogona sacchari* was introduced in Norway would likely be associated with eradication and management. Successful eradication of *Opogona sacchari* in a greenhouse may take three months with repeated pesticide applications.
Available risk reduction options	It is difficult to intercept the pest during inspection, especially at early infection stages. Phytosanitary measures include treating infected cuttings with hot water (60 min at 47 °C). Eradication of the pest from infested greenhouses using chemical insecticides has been possible in some parts of Europe, but seems difficult in warm regions (e.g. Italy).

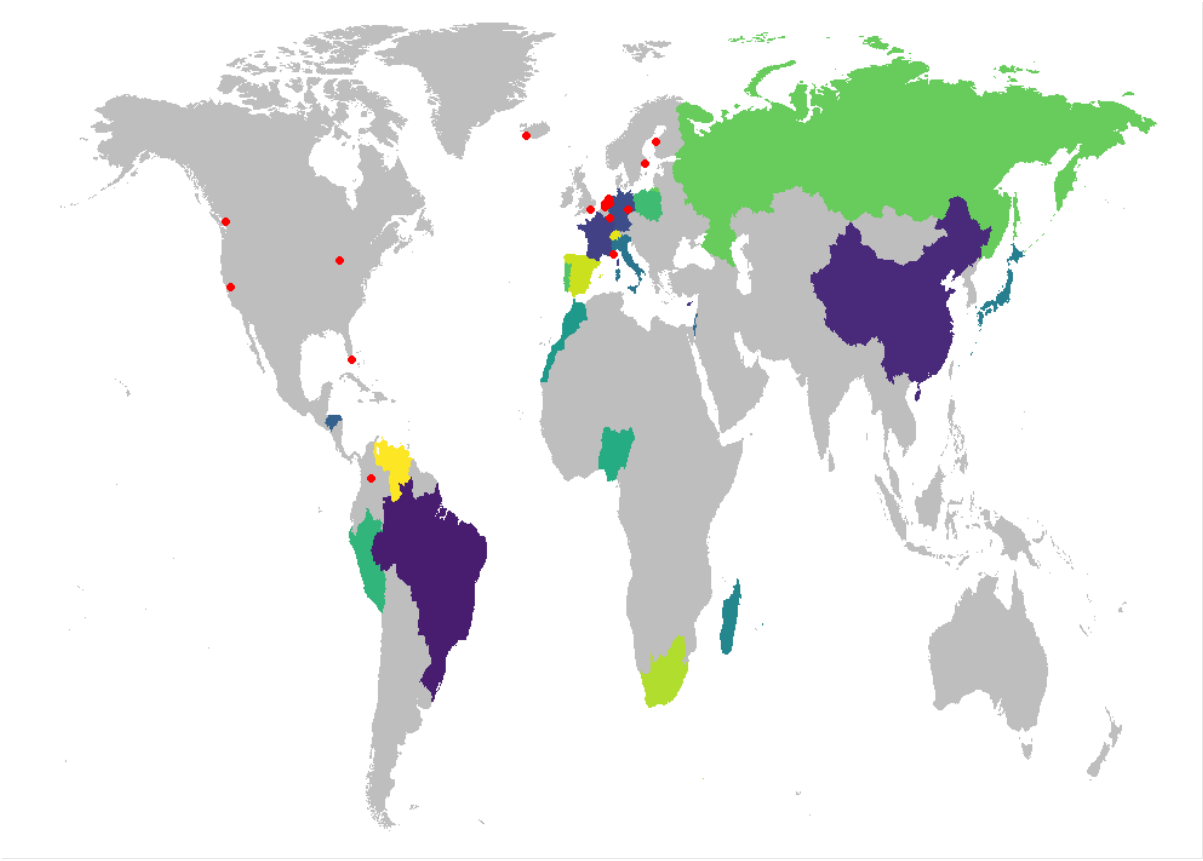

Figure 8. Worldwide distribution of *Opogona sacchari*. Colored countries have confirmed presence of the pest according to CABI and red dots show occurrence records from the GBIF database.

4.1.21 *Puccinia horiana* (PUCCHN)

Identity of the pest	Fungus (Pucciniaceae, Pucciniales)
EPPO code	PUCCHN
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse

	planter og andre smittebærende emner - planter og formeringsmateriale (unntatt frø) av *Dendranthema* (DC.) Des Moul. (krysantemum). Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 20: planter og formeringsmateriale (unntatt frø) av *Dendranthema* (DC.) Des Moul. (krysantemum); Vedlegg 4B. Særskilte krav til innenlands produksjon og omsetning av visse planter og andre smittebærende emner – Punkt 8: planter og formeringsmateriale av *Dendranthema* (DC.) Des. Moul (krysantemum), unntatt frø."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: *Puccinia horiana* fulfils the requirements for being a quarantine pest, since it is not present in Norway and it is of potential economic importance to greenhouse production of chrysanthemum (*Dendranthema x grandiflorum*).
Potential for establishment and spread in Norway	The ability of *Puccinia horiana* to overwinter outdoors is unknown. In experiments, spores survived for 8 weeks on detached leaves at 50% relative humidity, but at higher humidity or when buried in dry or moist compost, spores only survived for 3 weeks or less. It is therefore unlikely that infected debris would be important for the carry-over of the disease through the winter. Thus, *Puccinia horiana* will probably not establish outdoors in Norway, and the pathogen will probably not impact natural ecosystems. It has been Norwegian outbreaks. However *Puccinia horiana* is officilay eradicated.
Potential for economic consequences	*Puccinia horiana* has become a feared and serious disease in greenhouses and nurseries, frequently causing the complete loss of chrysanthemum crops.
Available risk reduction options	A possible risk reduction option is ban on import of host plants from countries where *Puccinia horiana* is present. If it is discovered early in production crops it may be possible to eradicate the disease. Frequent inspections for disease symptoms are therefore another risk reduction option.

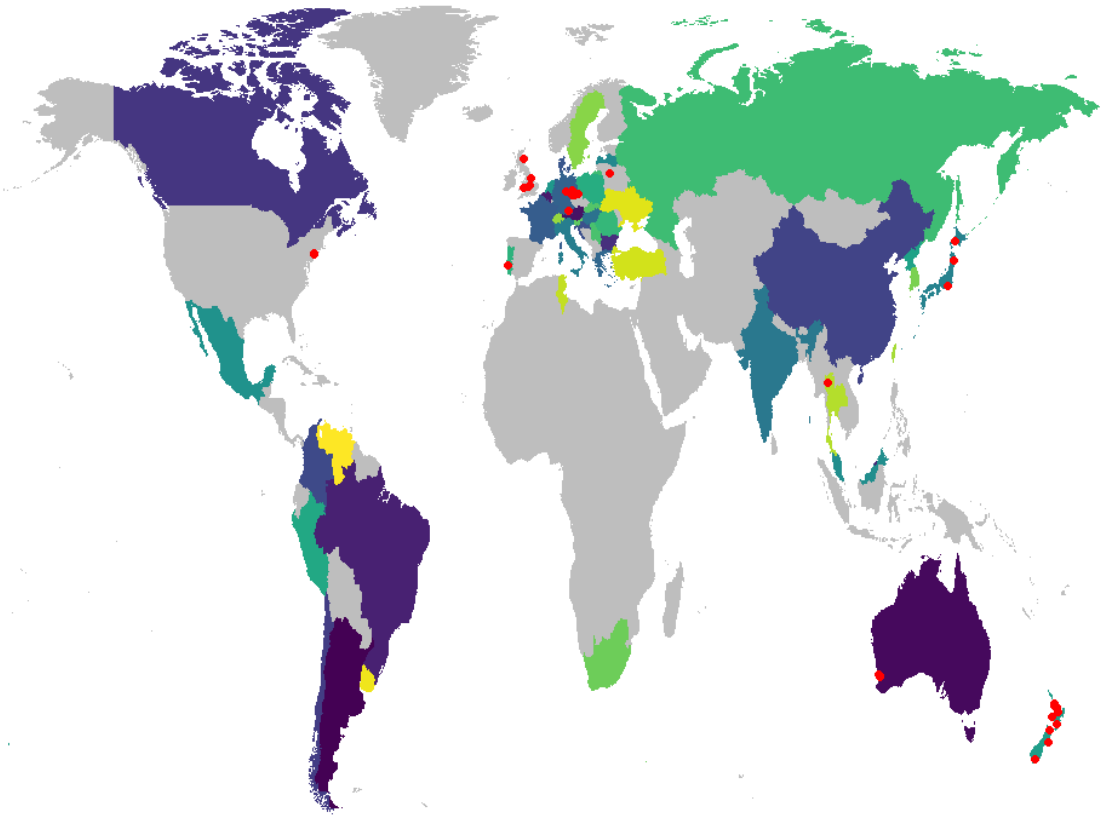

Figure 9. Worldwide distribution of *Puccinia horiana*. Colored countries have confirmed presence of the pest according to CABI and red dots show occurrence records from the GBIF database.

4.1.22 *Lecanosticta acicola* (SCIRAC)

Identity of the pest	Fungus (Mycosphaerellaceae, Capnodiales)
EPPO code	SCIRAC
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated under a different name FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner – planter og plantedeler (unntatt frukter og frø) av *Pinus* L. (furu); Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 6: planter og formeringsmateriale (unntatt frø) av *Pinus* L. (furu)."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: *Lecanosticta acicola* fulfils the requirements for being a quarantine pest, since it is not present in Norway and is of potential

	economic importance to pine (*Pinus* spp.) and specifically Scots pine (*Pinus sylvestris*), which is common in Norwegian forests.
Potential for establishment and spread in Norway	*Lecanosticta acicola* is associated with pine needles and can be introduced with plants for planting or cut branches. Another potential pathway is seed lots contaminated with infected needles. There is probably a low risk of entry, as import of pine plants, seeds and cut branches to Norway is fairly limited. Pine plants for forestry purposes (mainly Scots pine) are normally produced in Norway from local seed sources. However, pine species imported for amenity purposes may constitute a higher risk. If introduced, *Lecanosticta acicola* can probably establish, reproduce and overwinter in Norway. It would most probably survive as conidia that are spread locally, and not as ascospores that are spread by wind over longer distances. Long-distance spread with infected plant material is likely.
Potential for economic consequences	If *Lecanosticta acicola* becomes established and widespread in Norway the economic losses could be high, at least locally in places with suitable climatic conditions and susceptible host plants. Young plants would be most impacted, i.e. in forest nurseries, forest plantings and natural regenerations. The pathogen would be less important in older stands. The total standing volume of Scots pine in Norway is about 300 million m^3 and the annual volume increment is 5.5 million m^3. More than half of the annual increment is harvested, with an estimated value of more than 1 billion NOK.
Available risk reduction options	Possible risk reduction options are to only produce pine seedlings in Norway from local seed, to inspect forest nurseries for diseased plants, and to implement strict import control for pine plants (especially documentation for the production place being free of the pest).

4.1.23 *Radopholus similis* (RADOSI)

Identity of the pest	Nematode (Chromadorea, Rhabditida)
EPPO code	RADOSI
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner – Rota planter eller formerings-materiale med vedhengende/tilsatt vekstmedium av *Araceae* (myrkonglefamilien), *Marantaceae* (marantafamilien), *Musaceae* (bananfamilien), *Persea* spp., *Strelitziaceae*."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: *Radopholus similis* fulfils the requirements for being a quarantine pest, since it is not present in Norway and is of potential economic importance to greenhouse production of plants in the arum family (Araceae: *Anthurium* spp., *Epipremnum* spp., *Philodendron* spp., *Spathifillum* spp., *Syngonium* spp.) and arrowroot family (Marantaceae: *Calathea* spp., *Maranta* spp.) in Norway.

Potential for establishment and spread in Norway	Low
Potential for economic consequences	There appears to be no or very little commercial greenhouse production of any of the host plants of *Radopholus similis* in Norway. Inoculation studies under controlled conditions have suggested that potato may be an artificial host for *Radopholus similis*, but there are no records of infection of potato in the field or the environment.
Available risk reduction options	Possible risk reduction options are to use pest-free planting materials (bulbs and tubers) and pest-free growing medium (physical or chemical treatment) to keep production sites free from the pest.

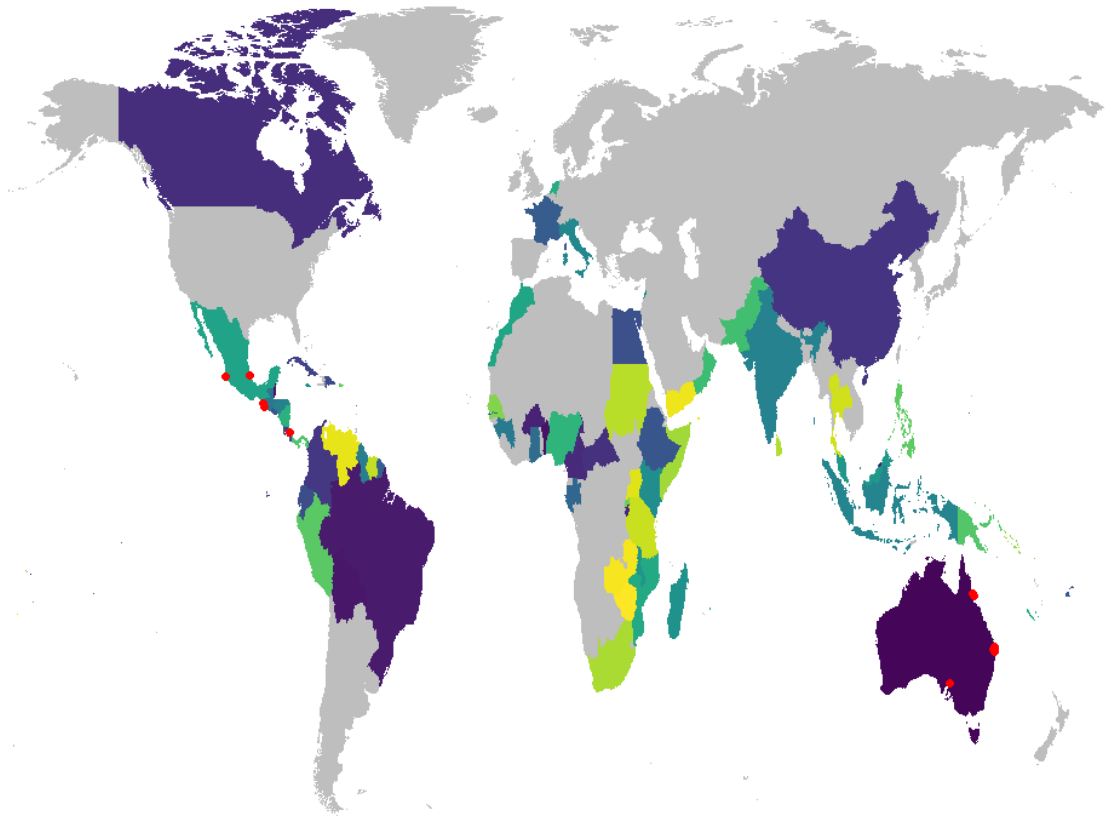

Figure 10. Worldwide distribution of *Radopholus similis*. Colored countries have confirmed presence of the pest according to CABI and red dots show occurrence records from the GBIF database.

4.1.24 *Cryphonectria parasitica* (ENDOPA)

Identity of the pest	Fungus (Cryphonectriaceae, Diaporthales)
EPPO code	ENDOPA
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner – Planter og formeringsmateriale (unntatt frø) av *Castanea* Mill. (kastanje) og *Quercus* L. (eik) og tre og isolert bark av *Castanea* Mill. (kastanje); Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 3: tre av *Castanea* Mill. (ekte kastanje), unntatt treemballasje i henhold til ISPM 15 som er i bruk eller har vært i bruk; Vedlegg 4A. Punkt 8: planter og formeringsmateriale (unntatt frø) av *Castanea* Mill. (ekte kastanje) og *Quercus* L. (eik)."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: *Cryphonectria parasitica* (Murrill) Barr fulfils the requirements for being a quarantine pest, since it is not present in Norway and it is of potential economic importance to chestnut (*Castanea* spp.) amenity trees in Norway.
Potential for establishment and spread in Norway	*Cryphonectria parasitica* has a small risk of establishment, but a high potential for spread via rain, wind and insects. *Cryphonectria parasitica* occurs in parts of North America with similar temperatures as parts of Norway. The climate is therefore not assumed to be a barrier for establishment of the pathogen in Norway.
Potential for economic consequences	*Cryphonectria parasitica* attacks and kills chestnut trees, both American chestnut *Castanea dentata* and sweet chestnut *Castanea sativa*. The potential impact on oak (*Quercus* spp.), which is a rare host, is considered to be of less importance. The main costs if *Cryphonectria parasitica* was introduced to Norway would probably be associated with felling, destroying and replacing infected trees in parks and other urban areas. In addition, presence of the fungus in Norway may impact export of plant material, especially nursery plants of oak and chestnut.
Available risk reduction options	A possible risk reduction option is ban on import of *Castanea* (and *Quercus*) plants from areas where the fungus is present. Rapid destruction of infected trees is important if the pest is detected.

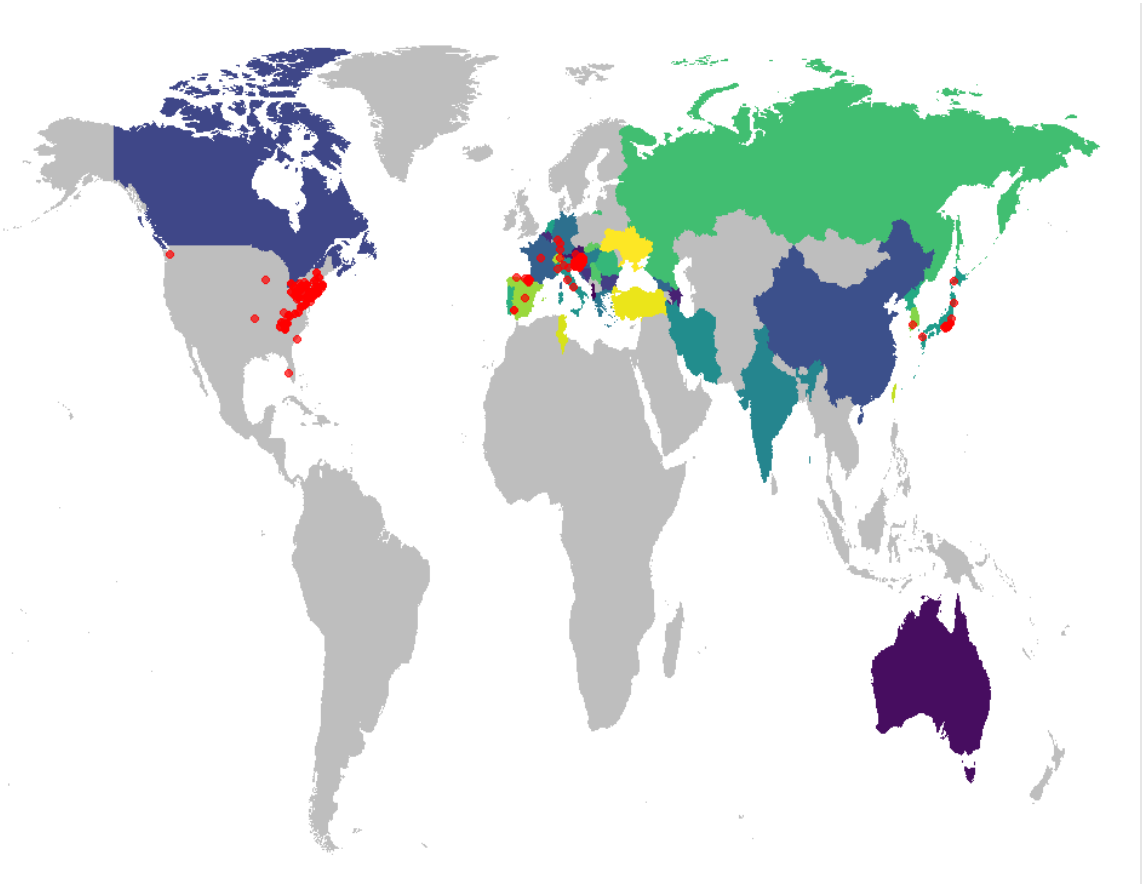

Figure 11. Worldwide distribution of *Cryphonectria parasitica*. Colored countries have confirmed presence of the pest according to CABI and red dots show occurrence records from the GBIF database.

4.1.25 *Aculops fuchsiae* (ACUPFU)

Identity of the pest	Insect (Eriophyidae, Acarida)
EPPO code	ACUPFU
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner – Planter og formeringsmateriale av *Fuchsia* L. (fuksia), unntatt frø; Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 24: planter og formeringsmateriale (unntatt frø) av *Fuchsia* (fuksia) med opprinnelse i USA og Brasil."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: *Aculops fuchsiae* fulfils the requirements for being a quarantine pest, since it is not present in Norway and is of potential

	economic importance to greenhouse production of *Fuchsia* spp. in Norway.
Potential for establishment and spread in Norway	Because fuchsia is produced in greenhouses and production is seasonal there are probably no suitable host plants for *Aculops fuchsia* in Norway during the winter. Outdoors, the host plant *Fuchsia magellanica* is said to mainly grow in plant hardiness zone H1 in Norway (mean annual temperature >7 °C, minimum temperature -10 °C), which covers parts of the southwestern coast.
Potential for economic consequences	The exact yearly production value of fuchsia in Norway is unknown, but it was estimated to be about 1.5 million NOK (Table 4).
Available risk reduction options	Phytosanitary measures for greenhouse productions could be to ensure that imported propagation material is free from the pest.

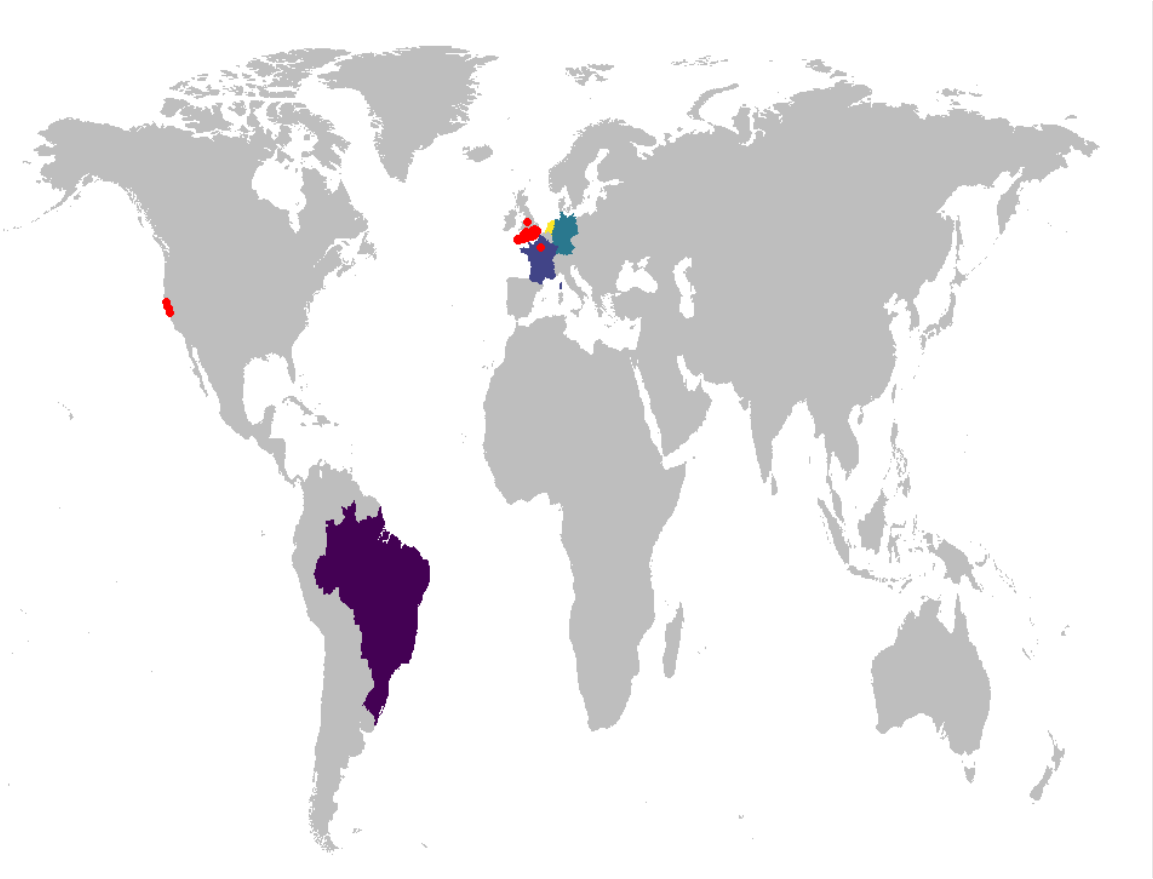

Figure 12. Worldwide distribution of *Aculops fuchsiae*. Colored countries have confirmed presence of the pest according to CABI and red dots show occurrence records from the GBIF database.

4.1.26 *Helicoverpa armigera* (HELIAR)

Identity of the pest	Insect (Noctuidae, Lepidoptera)
EPPO code	HELIAR
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 1. Planteskadegjørere som det er forbudt å introdusere og spre i Norge; Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 19.1: planter og formeringsmateriale (unntatt frø) av *Dendranthema* (DC.) Des Moul. (krysantemum), *Dianthus* L. (nellik) og *Pelargonium* L'Herit. ex Ait (pelargonium); Vedlegg 4B. Særskilte krav til innenlands produksjon og omsetning av visse planter og andre smittebærende emner – Punkt 7: planter og formeringsmateriale (unntatt frø) av: – *Dendranthema* (DC) Des. Moul. (krysantemum) – *Dianthus* L. (nellik) – *Pelargonium* L'Herit. ex Ait. (pelargonium)."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: *Helicoverpa armigera* fulfils the requirements for being a quarantine pest, since it is not present in Norway and is of potential economic importance to greenhouse production of tomato (*Solanum lycopersicum)* in Norway.
Potential for establishment and spread in Norway	*Helicoverpa armigera* thrives in tropical and subtropical climates and is unlikely to survive and cause significant damage on tomato outdoors in Norway. The pest has been found outdoors in Norway on a number of occasions (Figure 13) but has never become established in the country.
Potential for economic consequences	*Helicoverpa armigera* has been reported to cause serious losses to many crop plants throughout its range, in particular to cotton, tomato and maize. On tomato, *Helicoverpa armigera* enters the fruits, prevents normal development and causes fruit dropping. Economic losses due to *Helicoverpa armigera* are a result of direct yield reduction and costs of monitoring and control, particularly insecticide application
Available risk reduction options	Phytosanitary measures for greenhouse productions could be to ensure that imported propagation materials of tomato and other relevant host plants are free from the pest.

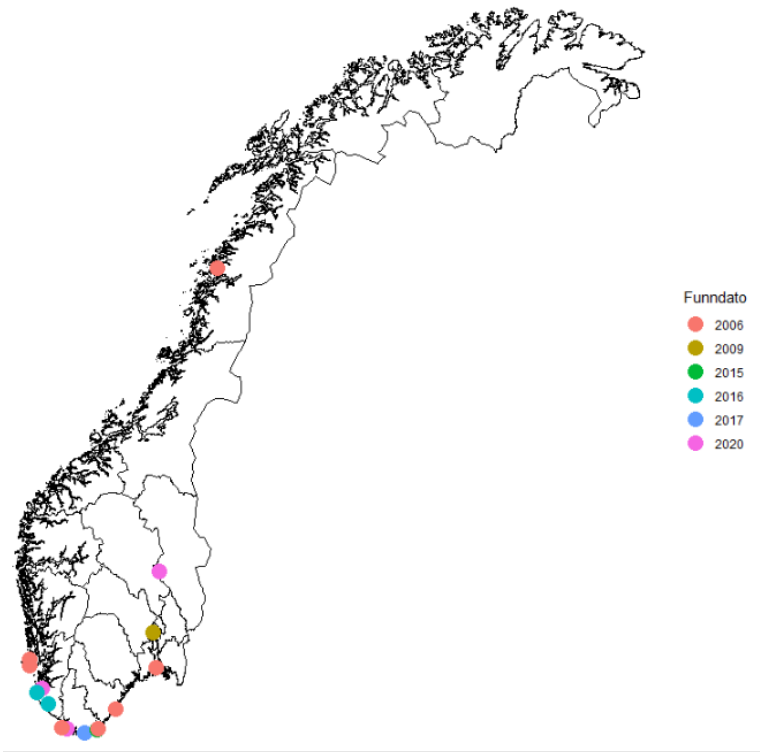

Figure 13. Known records of *Helicoverpa armigera* in Norway. The pest has been recorded several times between 2006 and 2020 (data from Artsdatabanken.no).

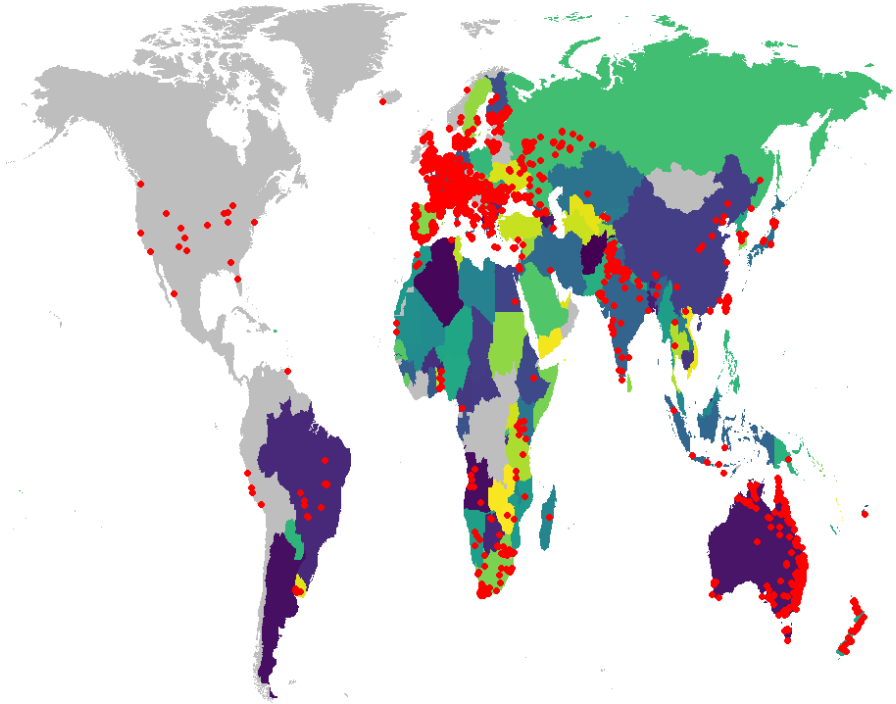

Figure 14. Worldwide distribution of *Helicoverpa armigera*. Colored countries have confirmed presence of the pest according to CABI and red dots show occurrence records from the GBIF database.

4.1.27 Xanthomonas axonopodis pv. dieffenbachiae (XANTDF)

Identity of the pest	Bacterium (Lysobacteraceae, Lysobacterales)
EPPO code	XANTDF
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner – Planter og formeringsmateriale (unntatt frø) av *Araceae* (myrkonglefamilien)."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: *Xanthomonas axonopodis* pv. *dieffenbachiae* fulfils the requirements for being a quarantine pest, since it is not present in Norway and is of potential economic importance to greenhouse production of aroids (*Anthurium* spp.) in Norway.
Potential for establishment and spread in Norway	The pest cannot overwinter without a host plant and there are no wild hosts of *Xanthomonas axonopodis* pv. *dieffenbachiae* in Norway. However, it is possible that maintained commercial populations of host plants exist in Norway.
Potential for economic consequences	There is no or very little commercial production of aroids in Norway. Any economic losses caused by *Xanthomonas axonopodis* pv. *dieffenbachiae* in Norway would probably be related to imports and are unlikely to exceed 0.5 million NOK annually.
Available risk reduction options	Imported host plants intended for planting should be subjected to the EPPO diagnostic protocol for this pathogen, minimally PCR tests of random samples. Infected plant material should be destroyed immediately. The destruction method should ensure complete destruction of the bacteria (e.g. by heat treatment). Since the aroid host plants are popular among hobbyists, a further risk reduction option is to raise awareness of disease symptoms and proper destruction of diseased or dead plants among these growers (e.g. heat treatment, do not discard plants in nature/open landfills).

4.1.28 Strawberry latent C virus (STLCV0)

Identity of the pest	Virus (unclassified)
EPPO code	STLCV0
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 1. Planteskadegjørere som det er forbudt å introdusere og spre i Norge."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: Strawberry latent C virus fulfils the requirements for being a quarantine pest since it is not present in Norway and is of potential

	economic importance to strawberry (*Fragaria × ananassa*) production in Norway.
Potential for establishment and spread in Norway	Strawberry latent C virus has a low potential for establishing in Norway, due to low transmission rates and the use of certified plant material. The virus could survive in strawberry plants in the field, but would be transmitted only very slowly from plant to plant. An insect vector (*Chaetosiphon fragaefolii)* is at present not common in Norway, and the wild relative of commercial strawberry, woodland strawberry (*Fragaria vesca*), is a poor alternative host for the vector.
Potential for economic consequences	Strawberry latent C virus is expected to have low impact on strawberry production in Norway. As the name indicates, infection is latent in most cases and usually causes losses only in combination with other viruses, such as strawberry mottle virus (see 4.1.29) or strawberry vein-banding virus. In North America, losses due to strawberry latent C virus have essentially disappeared. This is most probably because of the adoption of modern production practices such as systematic use of certified planting materials and short crop cycles. Similar practices are also used in Europe and have reduced the overall impact of strawberry viruses.
Available risk reduction options	Use of certified planting material is recommended. Field and in-transit inspections will detect only the presence of virus complexes, not strawberry latent C virus itself. Laboratory tests would therefore be essential to detect infection in imported material. However, currently no such tests exist. EPPO recommends that plants for planting must be from mother plants found to be free from strawberry latent C virus during the last three growing seasons. Infected plants should be destroyed.

4.1.29 Strawberry mottle virus (SMOV00)

Identity of the pest	Virus (unclassified)
EPPO code	SMOV00
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner – Planter og formeringsmateriale (unntatt frø) av *Fragaria* L. (jordbær); Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 37: planter og formeringsmateriale (unntatt frø) av *Fragaria* L. (jordbær); Vedlegg 4B. Særskilte krav til innenlands produksjon og omsetning av visse planter og andre smittebærende emner – Punkt 2: planter og formeringsmateriale (unntatt frø) av *Fragaria* L. (jordbær)."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: strawberry mottle virus fulfils the requirements for being a quarantine pest since it is not present in Norway and is of potential economic importance to strawberry (*Fragaria × ananassa*) production in Norway.

Potential for establishment and spread in Norway	The main route of spread would be by infected plantlets, as the main insect vector *Chaetosiphon fragaefolii* is absent from Norway
Potential for economic consequences	Strawberry mottle virus has recently caused serious damage to strawberry crops in North America. Most damaged plants were double infected with strawberry mottle virus and other viruses. On its own, strawberry mottle virus can cause yield losses of up to 30%. The virus is able to survive in living strawberry plants. Overall, strawberry mottle virus has a moderate potential for causing economic losses.
Available risk reduction options	Strawberry mottle virus can be detected using molecular methods. Virus-free planting material must be used. Control of insect vectors may be an option, however, the main vector is absent from Norway. Infected plants must be destroyed.

4.1.30 *Puccinia pelargonii-zonalis* (PUCCPZ)

Identity of the pest	Fungus (Pucciniaceae, Pucciniales)
EPPO code	PUCCPZ
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner: planter og formeringsmateriale (unntatt frø) av *Pelargonium* L'Hérit. ex Ait. (pelargonium); Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 23: planter og formeringsmateriale (unntatt frø) av *Pelargonium-zonale* (L.) L'Hérit.ex Ait. og hybrider av denne; Vedlegg 4B. Særskilte krav til innenlands produksjon og omsetning av visse planter og andre smittebærende emner – Punkt 10: planter og formeringsmateriale (unntatt frø) av *Pelargonium-zonale* (L.) L'Hérit.ex Ait. og hybrider av denne."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: *Puccinia pelargonii-zonalis* fulfils the requirements for being a quarantine pest since it is not present in Norway and is of potential economic importance to greenhouse production of pelargonium in Norway.
Potential for establishment and spread in Norway	*Puccinia pelargonii-zonalis* has a global distribution, but the Norwegian climate is assumed to be unsuitable for overwintering outdoors of this pathogen. There are no natural host plants for *Puccinia pelargonii-zonalis* in Norway. *Puccinia pelargonii-zonalis* has been found on pelargonium (*Pelargonium x hortorum*) in Norway several times but has been successfully eradicated.
Potential for economic consequences	*Pelargonium x hortorum* (pelargonium/geranium), the main host for *Puccinia pelargonii-zonalis*, is one of the major flower crops grown in greenhouses in Norway, with an annual production value of about 47 million NOK (Table 4). High costs of pest management and eradication

	are expected if *Puccinia pelargonii-zonalis* was introduced in Norway and had outbreaks in greenhouses.
Available risk reduction options	Possible risk reduction options are ban on import of pelargonium from areas where the fungus is present and frequent inspections for symptoms in the production. If the pathogen is discovered early, eradication costs may be lower.

4.1.31 *Epichoristodes acerbella* (EPIOIO)

Identity of the pest	*Insect* (Tortricidae, Lepidoptera)
EPPO code	EPIOIO
Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 1. Planteskadegjørere som det er forbudt å introdusere og spre i Norge."
Conclusion of the pest categorization	QP - Quarantine Pest Comment: *Epichoristodes acerbella* fulfils the requirements for being a quarantine pest since it is not present in Norway and is of potential economic importance to several greenhouse crops in Norway, such as carnations (*Dianthus* spp.), chrysanthemums, roses, and possibly strawberry (*Fragaria × ananassa*).
Potential for establishment and spread in Norway	*Epichoristodes acerbella* will probably not survive outdoors in Norway since the pest's optimal temperature range for development is 15-30 ºC.
Potential for economic consequences	*Epichoristodes acerbella* larvae damage the flower buds and leaves of the host plant. On carnations, the larvae spin the petals together and pierce them, before tunneling into the base of the flower bud. The annual production value of potential host plants to *Epichoristodes acerbella* in Norway exceeds 457 million NOK.
Available risk reduction options	Phytosanitary measures may include to allow imports only from pest-free areas. Detection could be possible trough inspection. Symptoms of infection are deformations, perforation, galls, mining of flowers, leaves and stems, and silk from the larvae. If detected, chemical control is possible (see EPPO Data Sheets on Quarantine Pest *Aculops fuchsiae*).

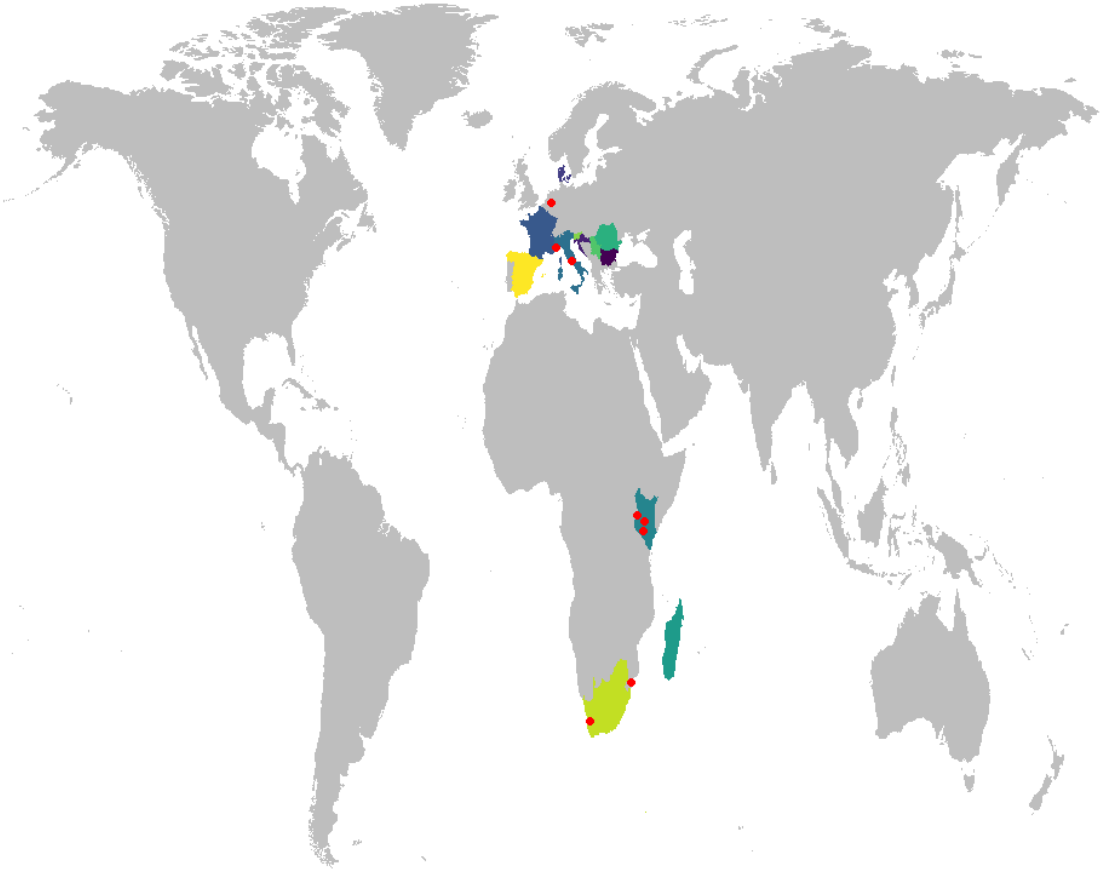

Figure 15. Worldwide distribution of *Epichoristodes acerbella*. Colored countries have confirmed presence of the pest according to CABI, and red dots show occurrence records from the GBIF database.

4.2 Species assessed as potential RNQP for Norway

Species that are classified as regulated non-quarantine pests (RNQP) are present in plants for planting and may affect the intended use of such plants in Norway with an economically unacceptable impact. RNQPs are pests that are already present in the regulated area.

4.2.1 Cherry leafroll nepovirus (CLRV00)

Identity of the pest	Virus (Secoviridae, Picornavirales)
EPPO code	CLRV00
Presence or absence in Norway	Present
Regulatory status in Norway	Regulated FOR-2000-12-01-1333:

	Vedlegg 2. Planteskadegjørere som det er forbudt å introdusere og spre i Norge dersom de forekommer på visse planter og andre smittebærende emner. - Planter og formeringsmateriale av *Rubus* L. (rubus) "Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 16.2: Planter og formeringsmateriale av *Rubus* L. a) med opprinnelse i land der følgende skadegjørere forekommer på *Rubus*: – Tomato ringspot nepovirus – Black raspberry latent virus – Cherry leafroll nepovirus – Apple mosaic ilavirus b) unntatt frø, med opprinnelse i ikke-europeiske land der følgende skadegjørere forekommer på *Rubus*: – Raspberry leaf curl luteovirus – Cherry rasp leaf 'nepovirus'."
Conclusion of the pest categorization	RNQP – Regulated Non-Quarantine Pest Comment: cherry leafroll nepovirus fulfils the requirements for being a regulated non-quarantine pest since it is most likely present in Norway already. Furthermore, the presence of cherry leafroll nepovirus in plants for planting may affect the intended use of those plants with an economically unacceptable impact
Potential for establishment and spread in Norway	The cherry leafroll nepovirus is most likely present in Norway.
Potential for economic consequences	The cherry leafroll nepovirus causes foliar symptoms in cherry trees and many other host trees, such as rubus. Symptoms may be mosaic, chlorotic or yellow ring patterns or ringspots on leaves, yellow vein netting and yellow spotting. However, in many host species it may be difficult to diagnose and evaluate the impact of cherry leafroll nepovirus infection. No direct damage has been documented, but the virus is expected to cause decline or death of host trees in Norway in combination with other viruses.
Available risk reduction options	Even though the cherry leafroll nepovirus is most likely present in Norway already the use of certified plant material may reduce spread of the virus. Virus can be detected using ELISA or PCR methods.

4.3 Species assessed as potential non-quarantine pests

Species classified as non-quarantine (NQ) pests are not yet present in Norway and are assessed to have no potential ecological or economic impact to Norway.

4.3.1 *Arthurdendyus triangulates* (ARDDTR)

Identity of the pest	Flatworm (Geoplanidae, Seriata)
EPPO code	ARDDTR

Presence or absence in Norway	Absent
Regulatory status in Norway	Regulated FOR-2000-12-01-1333: "Vedlegg 1. Planteskadegjørere som det er forbudt å introdusere og spre i Norge; Vedlegg 4A. Særskilte krav til import av visse planter og andre smittebærende emner – Punkt 29.2: Planter og formeringsmateriale, med dyrkingsmedium, omsatt i kar, med opprinnelse i land der *Arthurdendyus triangulatus* forekommer."
Conclusion of the pest categorization	Not considered as an plant pest. Comment: the New Zealand flatworm *Arthurdendyus triangulates* does not fulfil the requirements for being a quarantine pest because it would probably not cause direct damage to plants if it established. Neither does it fulfill the requirements for being a regulated non-quarantine pest (RNQP), because its potential presence in plants for planting does not directly affect the intended use of those plants with an economically unacceptable impact.
Potential for establishment and spread in Norway	*Arthurdendyus triangulates* is native to New Zeeland, but is introduced to England and Ireland and has later spread to the Faroe Islands and Iceland (climatics conditions similar to Norwegian)
Potential for economic consequences	*Arthurdendyus triangulates* is an invasive species that potentially may cause considerable ecological damage, as well as indirect economic damage trough reduced yields of crops caused by reduced soil quality.
Available risk reduction options	Not regulated under FOR-2000-12-01-1333 However possible reguluation as an invasive alien species

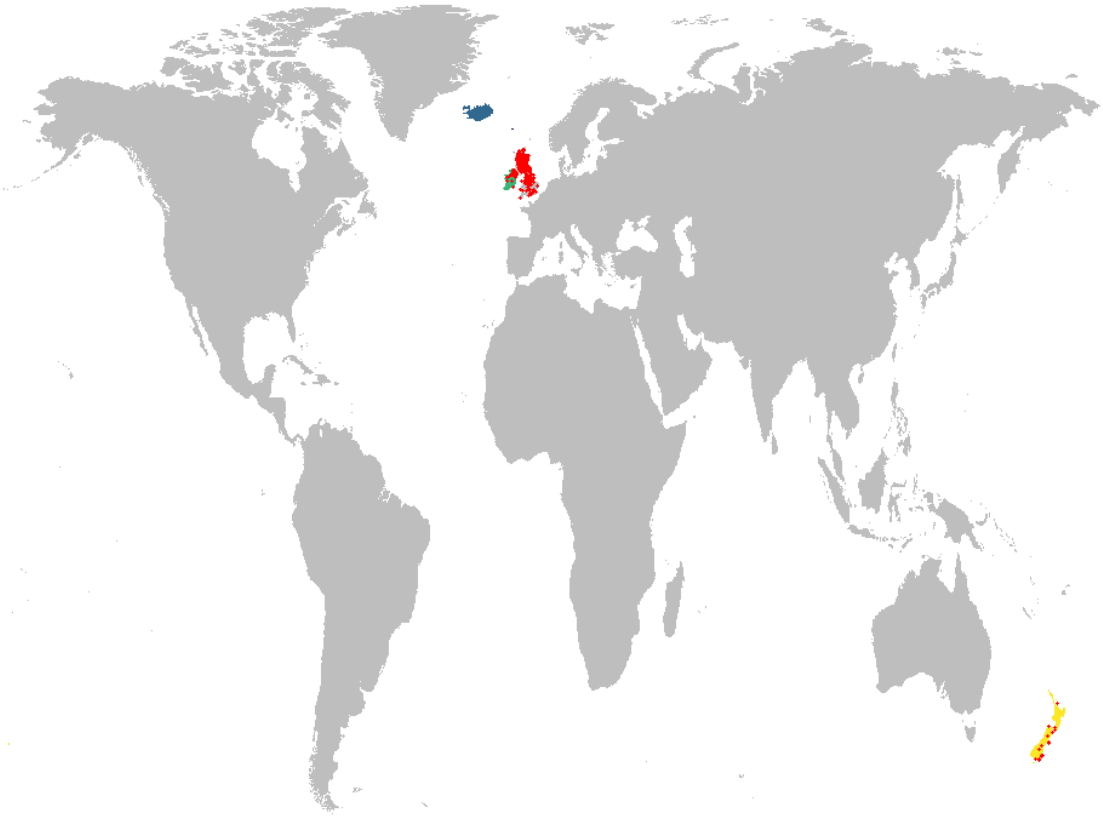

Figure 16. Worldwide distribution of *Arthurdendyus triangulatus*. Colored countries have confirmed presence of the pest according to CABI and red dots show occurrence records from the GBIF database.

References

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Heikkilä, J., Tuomola, J., Pouta, E. et al. FinnPRIO: a model for ranking invasive plant pests based on risk. Biol Invasions 18, 1827–1842 (2016). https://doi.org/10.1007/s10530-016-1123-4

Landbruksdirektoratet. (2021). Retrieved from https://www.landbruksdirektoratet.no/nb

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Yemshanov, D., Koch, F. H., Lu, B., Fournier, R., Cook, G., & Turgeon, J. J. (2017). A new hypervolume approach for assessing environmental risks. Journal of Environmental Management, 193, 188-200. doi:https://doi.org/10.1016/j.jenvman.2017.02.021

Appendix I

Appendix I from the terms of reference provided by The Norwegian Food Safety Authority.

Navn brukt i forskrift om plantehelse **Navn i uthevet skrift er der NIBIO i nov. 2019 har justert eller anbefalt annet navn**	**EPPO-kode anbefalt av NIBIO**	Kommentarer
Cacoecimorpha pronubana Hübner	TORTPR	
Epichoristodes acerbella Walker	EPIOIO	
*Helicoverpa armigera (*Hübner*)*	HELIAR	
*Spodoptera littoralis (*Boisduval*)*	SPODLI	
Arthurdendendyus triangulatus *Arthurdendendyus triangulatus* **(Dendy)**	ARDDTR	
***Melampsora medusae* Thümen** ***Melampsora medusae* vonThümen**	MELMME	
Monilinia fructicola (Winter) Honey *Monilinia fructicola* (**G**.Winter) Honey	MONIFC	
Ophiostoma wageneri (Goheen & Cobb) Harrington	LEPGWA	
Radopholus similis (Cobb) Thorne	RADOSI	
Alternaria mali Roberts	ALTEMA	
Phialophora cinerescens (Wollenweber) van Beyma	PHIACI	

Puccinia pelargonii-zonalis Doidge	PUCCPZ	
***Burkholderia caryophylli* (Burkholder) Yabuuchi et al.**	PSDMCA	
Erwinia chrysanthemi Burkholder et al. *pv. chrysanthemi*	*DICKCC*	Plantehelseforskriften regulerer *Erwinia chrysanthemi* Burkholder et al. pv. *chrysanthemi* og pv. *dianthicola*. Vi har på bakgrunn av informasjon fra NIBIO oppfattet at disse nå regnes som to arter, med de angitte kodene og navnene.
Erwinia chrysanthemi Burkholder et al. *pv pv.dianthicola* ***Dickeya dianthicola***	*ERWICD*	
Xanthomonas axonopodis pv. dieffenbachiae (McCulloch &Pirone) Vauterin et al.	XANTDF	
Strawberry latent C 'rhabdovirus' Strawberry latent C **virus**	STLCV0	
Potato spindle tuber viroid	PSTVD0	
Aculops fuchsiae (Keifer)	ACUPFU	
Quadraspidiotus perniciosus (Comstock)	QUADPE	NIBIO: uklarhet om riktig navn, må undersøkes nærmere
Chaetosiphon fragaefolii (Cockerell)	CHTSFR	
Cryphonectria parasitica (Murrill) Barr	ENDOPA	
iaporthe vaccinii Shear	DIAPVA	

Puccinia horiana P. Hennings *Puccinia horiana* **Hennings**	PUCCHN	
Potato stolbur phytoplasma	PHYPSO	Uavklart hvilket navn som anbefales
Xanthomonas vesicatoria (ex Doidge) Vauterin et al.	*XANTVE*	
Potato leafroll polerovirus Potato leafroll **virus**	PLRV00	Det er behov for å risikokategorisere europeiske isolater. (ikke-europeiske isolater forventes uansett å blir regulert som QP i kommende regelverk)
Strawberry mottle virus	SMOV00	
Mycosphaerella dearnessii M.E. Barr **Lecanosticta acicola (von Thümen) Sydow**	SCIRAC	
Clavibacter michiganensis subsp. michiganensis (Smith) Davis et al.	CORBMI	
Peach X-disease phytoplasma **Candidatus phytoplasma pruni**	PHYPPN	
Cherry leafroll virus nepovirus **Cherry leafroll virus**	CLRV00	
Opogona sacchari (Bojer)	OPOGSC	

Appendix II

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Linn Benjaminsen Hølvold; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**
Tidsbruk:

Art: ACUPFU **Antall treff til sammen etter dublettsjekk:** 14

Database: Agricola
Dato: 01.04.20
Antall treff: 1

1	exp FUCHSIA/ and ACULOPS/	1
2	("fuchsia gall mite" or "fuchsia mite" or "aculops fuchsiae").ti,ab,id,de.	1
3	1 or 2	1

Database: Biological abstracts
Dato: 01.04.20
Antall treff: 4

1	("fuchsia gall mite" or "aculops fuchsiae").tw.	4
2	("fuchsia gall mite" or "fuchsia mite" or "aculops fuchsiae").tw.	4
3	1 or 2	4
4	from 1 keep 1-4	4

Database: CAB abstracts
Dato: 01.04.20
Antall treff: 11

1	exp aculops fuchsiae/	11
2	("fuchsia gall mite" or "fuchsia mite" or "aculops fuchsiae").tw.	11
3	1 or 2	11
4	from 1 keep 1-11	11

Database: Web of Science
Dato: 01.04.20
Antall treff: 2

(("fuchsia gall mite" or "fuchsia mite" or "aculops fuchsiae"))

Database: Scopus
Dato: 01.04.20
Antall treff: 4

TITLE-ABS-KEY (("fuchsia gall mite" OR "fuchsia mite" OR "aculops fuchsiae"))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Linn Benjaminsen Hølvold; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**
Tidsbruk:

Art: ALTEMA **Antall treff til sammen etter dublettsjekk:** (før dublettsjekk 1757) 889

Database: Agricola 1970 to March 2020
Dato: 02.04.20
Antall treff: 265

1	Alternaria mali/	**25**
2	("Alternaria mali" or (("cork spot" or "leaf spot" or "storage rot" or "Alternaria blotch") adj2 apple*)).ti,ab,id,de.	**289**
3	1 or 2	**292**
4	limit 3 to (danish or english or norwegian or swedish)	**265**

Database: Biological abstracts 1985 to February 2020
Dato: 01.04.20
Antall treff: 367

1	("Alternaria mali" or (("cork spot" or "leaf spot" or "storage rot" or "alternaria blotch") adj2 apple*)).tw.	411
2	limit 1 to (danish or english or norwegian or swedish)	367

Database: CAB abstracts
Dato: 01.04.20
Antall treff: 11

1	alternaria mali/	219
2	("Alternaria mali" or (("cork spot" or "leaf spot" or "storage rot" or "alternaria blotch") adj2 apple*)).tw.	1187

3	1 or 2	1187
4	limit 3 to (danish or english or norwegian or swedish)	708

Database: Web of Science
Dato: 02.04.20
Antall treff: 365

(("Alternaria mali" or (("cork spot" or "leaf spot" or "storage rot" or "alternaria blotch") NEAR/1 apple*)))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 02.04.20
Antall treff: 417

TITLE-ABS-KEY (("Alternaria mali" OR (("cork spot" OR "leaf spot" OR "storage rot" OR "alternaria blotch") W/1 apple*))) AND (LIMIT-TO (LANGUAGE , "English"))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Linn Benjaminsen Hølvold; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**
Tidsbruk:

Art: ARDDTR

Antall treff til sammen etter dublettsjekk: 148 (før dublettsjekk 372)

Database: Agricola 1970 to March 2020
Dato: 02.04.20
Antall treff: 27

1	("Arthurdendyus triangulates" or "Artioposthia triangulata" or "New Zealand flatworm" or Artioposthia).ti,ab,id,de.	27
2	limit 1 to (danish or english or norwegian or swedish)	27

Database: Biological abstracts 1985 to February 2020

Dato: 01.04.20
Antall treff: 2

2	("Arthurdendyus triangulates" or "Artioposthia triangulata" or "New Zealand flatworm" or Artioposthia).tw.	68

Database: CAB abstracts
Dato: 01.04.20
Antall treff: 78

1	**exp arthurdendyus triangulatus/**	**68**
2	**("Arthurdendyus triangulates" or "Artioposthia triangulata" or "New Zealand flatworm" or Artioposthia).tw.**	**70**
3	**1 or 2**	**79**
4	**limit 3 to (danish or english or norwegian or swedish)**	**78**

Database: Web of Science
Dato: 02.04.20
Antall treff: 114

(("Arthurdendyus triangulates" or "Artioposthia triangulata" or "Artioposthia triangulata" or "New Zealand flatworm" or Artioposthia))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.
Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 02.04.20
Antall treff: 85

TITLE-ABS-KEY (("Arthurdendyus triangulates" or "Artioposthia triangulata" or "Artioposthia triangulata" or "New Zealand flatworm" or Artioposthia))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Linn Benjaminsen Hølvold; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**
Tidsbruk:

Art: CHTSFR

Antall treff til sammen etter dublettsjekk: 266 (før dublettsjekk 512)

Database: Agricola 1970 to March 2020
Dato: 03.04.20
Antall treff: 64

1	Chaetosiphon fragaefolii/	38
2	(((Chaetosiphon or Capitophorus or passerinia or pentatrichopus or capitophorus or Myzus) adj2 (fragaefoli* or fragariae)) or "strawberry aphid" or "myzus fragariae" or "Liten jordbærbladlus").ti,ab,id,de.	59
3	1 or 2	71
4	limit 3 to (danish or english or norwegian or swedish)	64

Database: Biological abstracts 1985 to February 2020
Dato: 01.04.20
Antall treff: 56

1	(((Chaetosiphon or Capitophorus or passerinia or pentatrichopus or capitophorus or Myzus) adj2 (fragaefoli* or fragariae)) or "strawberry aphid" or "myzus fragariae" or "Liten jordbærbladlus").tw.	59
2	limit 1 to (danish or english or norwegian or swedish)	56

Database: CAB abstracts 1910 to 2020 Week 11
Dato: 03.04.20
Antall treff: 259

1	Chaetosiphon fragaefolii/	400
2	(((Chaetosiphon or Capitophorus or passerinia or pentatrichopus or capitophorus or Myzus) adj2 (fragaefoli* or fragariae)) or "strawberry aphid" or "myzus fragariae" or "Liten jordbærbladlus").tw.	421
3	1 or 2	421
4	limit 3 to (danish or english or norwegian or swedish)	259

Database: Web of Science
Dato: 02.04.20
Antall treff: 69

TOPIC:
((((Chaetosiphon or Capitophorus or passerinia or pentatrichopus or capitophorus or Myzus) NEAR/1 (fragaefoli* or fragariae)) or "strawberry aphid" or "myzus fragariae" or "Liten jordbærbladlus"))
Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 02.04.20
Antall treff: 64

TITLE-ABS-KEY (((
(chaetosiphon OR capitophorus OR passerinia OR pentatrichopus OR capitophorus OR myzus) W/1 (fragaefoli* OR fragariae)) OR "strawberry
aphid" OR "myzus fragariae" OR "Liten jordbærbladlus")) AND (LIMIT-TO (
LANGUAGE , "English"))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Linn Benjaminsen Hølvold; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**
Tidsbruk:

Art: CLRV00

Antall treff til sammen etter dublettsjekk: 425 (før dublettsjekk 711)

Database: Agricola 1970 to March 2020
Dato: 03.04.20
Antall treff: 110

1	Cherry leaf roll virus/	56
2	((("Cherry leaf roll" or "Cherry leafroll virus" or "Ash mosaic" or "Berteroa ring spot" or "Berteroa ringspot" or "Birch ring and line pattern" or "Sambucus ringspot and yellow net" or "Walnut black line" or "Walnut line pattern and mosaic" or "Walnut yellow mosaic" or "golden elderberry") adj (virus or nepovirus)) or CLRV or "mosaic of ash" or "mosaic of elm" or "ring spot of walnut" or "black line of walnut").ti,ab,id,de.	105
3	1 or 2	125
4	limit 3 to (danish or english or norwegian or swedish)	110

Database: Biological abstracts 1985 to February 2020
Dato: 01.04.20
Antall treff: 113

1	((("Cherry leaf roll" or "Cherry leafroll virus" or "Ash mosaic" or "Berteroa ring spot" or "Berteroa ringspot" or "Birch ring and line pattern" or "Sambucus ringspot and yellow net" or "Walnut black line" or "Walnut line pattern and mosaic" or "Walnut yellow mosaic" or "golden elderberry") adj (virus or nepovirus)) or CLRV or "mosaic of ash" or "mosaic of elm" or "ring spot of walnut" or "black line of walnut").tw.	123
2	limit 1 to (danish or english or norwegian or swedish)	113

Database: CAB abstracts 1910 to 2020 Week 11
Dato: 03.04.20
Antall treff: 292

1	exp cherry leaf roll virus/	355
2	((("Cherry leaf roll" or "Cherry leafroll virus" or "Ash mosaic" or "Berteroa ring spot" or "Berteroa ringspot" or "Birch ring and line pattern" or "Sambucus ringspot and yellow net" or "Walnut black line" or "Walnut line pattern and mosaic" or "Walnut yellow mosaic" or "golden elderberry") adj (virus or nepovirus)) or CLRV or "mosaic of ash" or "mosaic of elm" or "ring spot of walnut" or "black line of walnut").tw.	426
3	1 or 2	426
4	limit 3 to (danish or english or norwegian or swedish)	292

Database: Web of Science
Dato: 03.04.20
Antall treff: 141

TOPIC: ((((("Cherry leaf roll" or "Cherry leafroll virus" or "Ash mosaic" or "Berteroa ring spot" or "Berteroa ringspot" or "Birch ring AND line pattern" or "Sambucus ringspot AND yellow net" or "Walnut black line" or "Walnut line pattern AND mosaic" or "Walnut yellow mosaic" or "golden elderberry") NEAR/0 (virus or nepovirus)) or CLRV or "mosaic of ash" or "mosaic of elm" or "ring spot of walnut" or "black line of walnut"))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 03.04.20
Antall treff: 168

(TITLE-ABS-KEY ((("Cherry leaf roll" OR "Cherry leafroll virus" OR "Ash mosaic" OR "Berteroa ring spot" OR "Berteroa ringspot" OR "Birch ring AND line pattern") W/0 (virus OR nepovirus))) OR TITLE-ABS-KEY ((("Sambucus ringspot AND yellow net" OR "Walnut black line" OR "Walnut line pattern AND mosaic" OR "Walnut yellow mosaic" OR "golden elderberry") W/0 (virus OR nepovirus))) OR TITLE-ABS-KEY ((clrv OR "mosaic of ash" OR "mosaic of elm" OR "ring spot of walnut" OR "black line of walnut"))) AND (LIMIT-TO (LANGUAGE , "English"))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Linn Benjaminsen Hølvold; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**
Tidsbruk:

Art: CORBMI

Antall treff til sammen etter dublettsjekk: 2515 (før dublettsjekk 4900)

Database: Agricola 1970 to March 2020
Dato: 05.04.20
Antall treff: 555

1	exp clavibacter michiganensis/	109

2	(((Clavibacter or pseudomonas or corynebacterium or bacterium or Erwinia or Mycobacterium or Phytomonas or Aplanobacter) adj2 michiganens*) or (("bacterial canker" or "bird's eye" or "vascular wilt") adj2 tomato*)).ti,ab,id,de.	570
3	1 or 2	605
4	limit 3 to (danish or english or norwegian or swedish)	555

Database: Biological abstracts 1985 to February 2020
Dato: 05.04.20
Antall treff: 880

1	(((Clavibacter or pseudomonas or corynebacterium or bacterium or Erwinia or Mycobacterium or Phytomonas or Aplanobacter) adj2 michiganens*) or (("bacterial canker" or "bird's eye" or "vascular wilt") adj2 tomato*)).tw.	984
2	limit 1 to (danish or english or norwegian or swedish)	880

Database: CAB abstracts 1910 to 2020 Week 13
Dato: 05.04.20
Antall treff: 78

1	exp clavibacter michiganensis/	2541
2	(((Clavibacter or pseudomonas or corynebacterium or bacterium or Erwinia or Mycobacterium or Phytomonas or Aplanobacter) adj2 michiganens*) or (("bacterial canker" or "bird's eye" or "vascular wilt") adj2 tomato*)).tw.	2887
3	1 or 2	2888
4	limit 3 to (danish or english or norwegian or swedish)	1772

Database: Web of Science
Dato: 05.04.20
Antall treff: 874

TOPIC: ((((Clavibacter or pseudomonas or corynebacterium or bacterium or Erwinia or Mycobacterium or Phytomonas or Aplanobacter) NEAR/1 michiganens*) or (("bacterial canker" or "bird's eye" or "vascular wilt") NEAR/1 tomato*)))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 05.04.20
Antall treff: 819

TITLE-ABS-KEY (((
(clavibacter OR pseudomonas OR corynebacterium OR bacterium OR erwinia OR myco bacterium OR phytomonas OR aplanobacter) W/1 michiganens*) OR (("bacterial canker" OR "bird's eye" OR "vascular wilt") W/1 tomato*))) AND (LIMIT-TO (LANGUAGE , "English"))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Linn Benjaminsen Hølvold; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**
Tidsbruk:

Art: DICKCC

Antall treff til sammen etter dublettsjekk: (5674 før dublettsjekk)

Database: Agricola 1970 to March 2020
Dato: 06.04.20
Antall treff: 559

1	((dickeya or Erwinia or "bacterial wilt" or Pectobacterium) adj2 (chrysanthem* or parthenii)).ti,ab,id,de.	575
2	limit 1 to (danish or english or norwegian or swedish)	559

Database: Biological abstracts 1985 to February 2020
Dato: 06.04.20
Antall treff: 1158

1	((dickeya or Erwinia or "bacterial wilt" or Pectobacterium) adj2 (chrysanthem* or parthenii)).tw.	1243
2	limit 1 to (danish or english or norwegian or swedish)	1158

Database: CAB abstracts 1910 to 2020 Week 13
Dato: 06.04.20
Antall treff: 985

1	Dickeya chrysanthemi/	1175
2	((dickeya or Erwinia or "bacterial wilt" or Pectobacterium) adj2 (chrysanthem* or parthenii)).tw.	1288
3	1 or 2	1288
4	limit 3 to (danish or english or norwegian or swedish)	985

Database: Web of Science
Dato: 06.04.20
Antall treff: 1825

TOPIC: (((dickeya or Erwinia or "bacterial wilt" or Pectobacterium) NEAR/1 (chrysanthem* or parthenii)))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 06.04.20
Antall treff: 1147

TITLE-ABS-KEY (((dickeya OR erwinia OR "bacterial wilt" OR pectobacterium) W/1 (chrysanthem* OR parthenii))) AND (LIMIT-TO (LANGUAGE , "English"))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Linn Benjaminsen Hølvold; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**
Tidsbruk:

Art: ENDOPA

Antall treff til sammen etter dublettsjekk: (før dublettsjekk 6180)

Database: Agricola 1970 to March 2020
Dato: 06.04.20
Antall treff: 859

1	exp Cryphonectria parasitica/	564
2	(((blight or canker) adj2 (chestnut or oak)) or ((Diaporthe or Endothia or cytospora or Valsonectria or Cryphonectria) adj2 parasitica)).ti,ab,id,de.	789
3	1 or 2	895

4	limit 3 to (danish or english or norwegian or swedish)	859

Database: Biological abstracts 1985 to February 2020
Dato: 06.04.20
Antall treff: 1028

1	(((blight or canker) adj2 (chestnut or oak)) or ((Diaporthe or Endothia or cytospora or Valsonectria or Cryphonectria) adj2 parasitica)).tw.	1083
2	limit 1 to (danish or english or norwegian or swedish)	1028

Database: CAB abstracts 1910 to 2020 Week 13
Dato: 06.04.20
Antall treff: 1574

1	exp Cryphonectria parasitica/	2213
2	(((blight or canker) adj2 (chestnut or oak)) or ((Diaporthe or Endothia or cytospora or Valsonectria or Cryphonectria) adj2 parasitica)).tw.	2408
3	1 or 2	2408
4	limit 3 to (danish or english or norwegian or swedish)	1574

Database: Web of Science
Dato: 06.04.20
Antall treff: 1611

TOPIC: ((((blight or canker) NEAR/1 (chestnut or oak)) or
((Diaporthe or Endothia or cytospora or Valsonectria or Cryphonectria) NEAR/1 parasitica)))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 06.04.20
Antall treff: 1108

TITLE-ABS-KEY ((((blight OR canker) W/1 (chestnut OR oak)) OR (
(diaporthe OR endothia OR cytospora OR valsonectria OR cryphonectria) W/1 parasiti ca))) AND (LIMIT-TO (LANGUAGE , "English"))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Linn Benjaminsen Hølvold; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**
Tidsbruk:

Art: EPIOIO

Antall treff til sammen etter dublettsjekk: (før dublettsjekk 100)

Database: Agricola 1970 to March 2020
Dato: 06.04.20
Antall treff: 11

1	Epichoristodes/	4
2	(((carnation or "South African" or iocoma) adj2 (worm* or tortrix or "leaf roller*" or leafroller*)) or ((Depressaria or tubula or Epichorist* or Proselena or Tubula) adj2 (galeata or acerbella or ionephela))).ti,ab,id,de.	28
3	1 or 2	30
4	limit 3 to (danish or english or norwegian or swedish)	11

Database: Biological abstracts 1985 to February 2020
Dato: 06.04.20
Antall treff: 19

1	(((carnation or "South African" or iocoma) adj2 (worm* or tortrix or "leaf roller*" or leafroller*)) or ((Depressaria or tubula or Epichorist* or Proselena or Tubula) adj2 (galeata or acerbella or ionephela))).tw.	22
2	limit 1 to (danish or english or norwegian or swedish)	19

Database: CAB abstracts 1910 to 2020 Week 13
Dato: 06.04.20
Antall treff: 127

1	Epichoristodes acerbella/	**87**

2	(((carnation or "South African" or iocoma) adj2 (worm* or tortrix or "leaf roller*" or leafroller*)) or ((Depressaria or tubula or Epichorist* or Proselena or Tubula) adj2 (galeata or acerbella or ionephela))).tw.	**127**
3	1 or 2	**127**
4	limit 3 to (danish or english or norwegian or swedish)	**38**

Database: Web of Science
Dato: 06.04.20
Antall treff: 15

TOPIC: ((((carnation or "South African" or iocoma) NEAR/1 (worm* or tortrix or "leaf roller*" or leafroller*)) or ((Depressaria or tubula or Epichorist* or Proselena or Tubula) NEAR/1 (galeata or acerbella or ionephela))))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 06.04.20
Antall treff: 17

TITLE-ABS-KEY ((((carnation OR "South African" OR iocoma) W/1 (worm* OR tortrix OR "leaf roller*" OR leafroller*)) OR ((depressaria OR tubula OR epichorist* OR proselena OR tubula) W/1 (galeata OR acerbella OR ionephela)))) AND (LIMIT-TO (LANGUAGE , "English"))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Linn Benjaminsen Hølvold; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**
Tidsbruk:

Art: ERWICD

Antall treff til sammen etter dublettsjekk: (13530 i Endnote før dublettsjekk)

Database: Agricola 1970 to March 2020
Dato: 08.04.20
Antall treff: 1541

1	exp pectobacterium chrysanthemi/	413
2	((("slow wilt" or "bacterial stunt" or "bacterial wilt") adj2 (carnation* or dahlia* or chrysanthemum or ornamentals)) or ("stalk rot" adj1 bacterial) or "dickeya	1578

	chrysanthemi" or "Erwinia chrysanthemi" or "erwinia carotovora" or "blackleg of potato" or "fruit collapse of pineapple" or "bacterial soft rot of tobacco" or "wet rot of the pseudostem of plantain" or "bacterial head rot of banana" or "Dickeya dianthicola" or "Pectobacterium parthenii*" or ("Pectobacterium carotovorum" adj2 chrysanthemi) or "Pectobacterium chrysanthemi").ti,ab,id,de.	
3	1 or 2	1669
4	limit 3 to (danish or english or norwegian or swedish)	1541

Database: Biological abstracts 1985 to February 2020
Dato: 08.04.20
Antall treff: 2701

1	((("slow wilt" or "bacterial stunt" or "bacterial wilt") adj2 (carnation* or dahlia* or chrysanthemum or ornamentals)) or ("stalk rot" adj1 bacterial) or "dickeya chrysanthemi" or "Erwinia chrysanthemi" or "erwinia carotovora" or "blackleg of potato" or "fruit collapse of pineapple" or "bacterial soft rot of tobacco" or "wet rot of the pseudostem of plantain" or "bacterial head rot of banana" or "Dickeya dianthicola" or "Pectobacterium parthenii*" or ("Pectobacterium carotovorum" adj2 chrysanthemi) or "Pectobacterium chrysanthemi").tw.	3009
2	limit 1 to (danish or english or norwegian or swedish)	2701

Database: CAB abstracts 1910 to 2020 Week 13
Dato: 08.04.20
Antall treff: 3385

1	exp dickeya chrysanthemi/	1181
2	((("slow wilt" or "bacterial stunt" or "bacterial wilt") adj2 (carnation* or dahlia* or chrysanthemum or ornamentals)) or ("stalk rot" adj1 bacterial) or "dickeya chrysanthemi" or "Erwinia chrysanthemi" or "erwinia carotovora" or "blackleg of potato" or "fruit collapse of pineapple" or "bacterial soft rot of tobacco" or "wet rot of the pseudostem of plantain" or "bacterial head rot of banana" or "Dickeya dianthicola" or "Pectobacterium parthenii*" or ("Pectobacterium carotovorum" adj2 chrysanthemi) or "Pectobacterium chrysanthemi").tw.	5322
3	1 or 2	5322
4	limit 3 to (danish or english or norwegian or swedish)	3385

Database: Web of Science
Dato: 08.04.20

Antall treff: 3942

TOPIC: ((((("slow wilt" or "bacterial stunt" or "bacterial wilt") NEAR/1 (carnation* or dahlia* or chrysanthemum or ornamentals)) or ("stalk rot" NEAR/0 bacterial) or "dickeya chrysanthemi" or "Erwinia chrysanthemi" or "erwinia carotovora" or "blackleg of potato" or "fruit collapse of pineapple" or "bacterial soft rot of tobacco" or "wet rot of the pseudostem of plantain" or "bacterial head rot of banana" or "Dickeya dianthicola" or "Pectobacterium parthenii*" or ("Pectobacterium carotovorum" NEAR/1 chrysanthemi) or "Pectobacterium chrysanthemi"))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 08.04.20
Antall treff: 2740 (bare 2000 eksportert til Endnote – restriksjoner på eksport i Scopus)

(TITLE-ABS-KEY ((("slow wilt" OR "bacterial stunt" OR "bacterial wilt") W/1 (carnation* OR dahlia* OR chrysanthemum OR ornamentals)))) OR (TITLE-ABS-KEY ((("stalk rot" W/0 bacterial) OR "dickeya chrysanthemi" OR "Erwinia chrysanthemi" OR "erwinia carotovora" OR "blackleg of potato" OR "fruit collapse of pineapple" OR "bacterial soft rot of tobacco"))) OR (TITLE-ABS-KEY (("wet rot of the pseudostem of plantain" OR "bacterial head rot of banana" OR "Dickeya dianthicola" OR "Pectobacterium parthenii*"))) OR (TITLE-ABS-KEY ((("Pectobacterium carotovorum" W/1 chrysanthemi) OR "Pectobacterium chrysanthemi"))) AND (LIMIT-TO (LANGUAGE , "English"))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Linn Benjaminsen Hølvold; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**
Tidsbruk:

Art: LEPGWA

Antall treff til sammen etter dublettsjekk: (289 i Endnote før dublettsjekk)

Database: Agricola 1970 to March 2020
Dato: 13.04.20
Antall treff: 58

1	Ceratocystis wageneri/	13
2	(((Ceratocystis or Leptographium or Ophiostoma or Verticicladiella or grosmannia) adj2 wageneri) or "Black-stain root disease*" or "wilt of conifer*").ti,ab,id,de.	55
3	1 or 2	58

4	limit 3 to (danish or english or norwegian or swedish)	58

Database: Biological abstracts 1985 to February 2020
Dato: 13.04.20
Antall treff: 53

1	(((Ceratocystis or Leptographium or Ophiostoma or Verticicladiella or grosmannia) adj2 wageneri) or "Black-stain root disease*" or "wilt of conifer*").tw.	53
2	limit 1 to (danish or english or norwegian or swedish)	53
3	1 and 2	53

Database: CAB abstracts 1910 to 2020 Week 13
Dato: 13.04.20
Antall treff: 85

1	exp Grosmannia wageneri/	72
2	(((Ceratocystis or Leptographium or Ophiostoma or Verticicladiella or grosmannia) adj2 wageneri) or "Black-stain root disease*" or "wilt of conifer*").tw.	94
3	1 or 2	94
4	limit 3 to (danish or english or norwegian or swedish)	85

Database: Web of Science
Dato: 13.04.20
Antall treff: 67

TOPIC: ((((Ceratocystis or Leptographium or Ophiostoma or Verticicladiella or grosmannia) NEAR/1 wageneri) or "Black-stain root disease*" or "wilt of conifer*"))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI. **Database:**

Scopus
Dato: 13.04.20
Antall treff: 26

TITLE-ABS-KEY ((((ceratocystis OR leptographium OR ophiostoma OR verticicladiella OR grosmannia) near/1 AND wageneri) OR "Black-stain root disease*" OR "wilt of conifer*")) AND (LIMIT-TO (LANGUAGE , "English"))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Linn Benjaminsen Hølvold; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**
Tidsbruk:

Art: MELMME

Antall treff til sammen etter dublettsjekk: (1007 i Endnote før dublettsjekk)

Database: Agricola 1970 to March 2020
Dato: 13.04.20
Antall treff: 144

1	Melampsora medusae/	42
2	((rust adj3 (poplar or cottonwood)) or ((melampsora or uredo) adj2 (medusae or albertensis)) or "caeoma faulliana").ti,ab,id,de.	131
3	1 or 2	144

Database: Biological abstracts 1985 to February 2020
Dato: 13.04.20
Antall treff: 168

1	((rust adj3 (poplar or cottonwood)) or ((melampsora or uredo) adj2 (medusae or albertensis)) or "caeoma faulliana").tw.	180
2	limit 1 to (danish or english or norwegian or swedish)	168

Database: CAB abstracts 1910 to 2020 Week 13
Dato: 13.04.20
Antall treff: 311

1	exp Melampsora medusae/	194
2	((rust adj3 (poplar or cottonwood)) or ((melampsora or uredo) adj2 (medusae or albertensis)) or "caeoma faulliana").tw.	429
3	1 or 2	429
4	limit 3 to (danish or english or norwegian or swedish)	311

Database: Web of Science
Dato: 13.04.20
Antall treff: 206

TOPIC: (((rust NEAR/2 (poplar or cottonwood)) or ((melampsora or uredo) NEAR/1 (medusae or albertensis)) or "caeoma faulliana"))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 13.04.20
Antall treff: 184

TITLE-ABS-KEY (((rust W/2 (poplar OR cottonwood)) OR ((melampsora OR uredo) W/1 (medusae OR albertensis)) OR "caeoma faulliana")) AND (LIMIT-TO (LANGUAGE , "English"))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Linn Benjaminsen Hølvold; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**
Tidsbruk:

Art: MONIFC

Antall treff til sammen etter dublettsjekk: (4104 i Endnote før dublettsjekk)

Database: Agricola 1970 to March 2020
Dato: 13.04.20
Antall treff: 589

1	Monilinia fructicola/	365
2	((("brown rot" or "twig canker") adj2 (stone fruit* or cherr* or apple*)) or ((monilinia or monilia or sclerotinia or ciboria) adj2 fructicola) or "sclerotinia Americana").ti,ab,id,de.	509
3	1 or 2	598
4	limit 3 to (danish or english or norwegian or swedish)	589

Database: Biological abstracts 1985 to February 2020
Dato: 13.04.20
Antall treff: 576

1	((("brown rot" or "twig canker") adj2 (stone fruit* or cherr* or apple*)) or ((monilinia or monilia or sclerotinia or ciboria) adj2 fructicola) or "sclerotinia Americana").tw.	603
2	limit 1 to (danish or english or norwegian or swedish)	576

Database: CAB abstracts 1910 to 2020 Week 13
Dato: 13.04.20
Antall treff: 1437

1	exp Monilinia fructicola/	1700
2	((("brown rot" or "twig canker") adj2 (stone fruit* or cherr* or apple*)) or ((monilinia or monilia or sclerotinia or ciboria) adj2 fructicola) or "sclerotinia Americana").tw.	1868
3	1 or 2	1975
4	limit 3 to (danish or english or norwegian or swedish)	1437

Database: Web of Science
Dato: 13.04.20
Antall treff: 865

TOPIC: ((((("brown rot" or "twig canker") NEAR/1 ("stone fruit*" or cherr* or apple*)) or ((monilinia or monilia or sclerotinia or ciboria) NEAR/1 fructicola) or "sclerotinia Americana"))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 13.04.20
Antall treff: 637

(((("brown rot" OR "twig canker") W/1 ("stone fruit*" OR cherr* OR apple*)) OR ((monilinia OR monilia OR sclerotinia OR ciboria) W/1 fructicola) OR "sclerotinia Americana")) AND (LIMIT-TO (LANGUAGE , "English"))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Linn Benjaminsen Hølvold; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**
Tidsbruk:

Art: OPOGSC

Antall treff til sammen etter dublettsjekk: (3552 i Endnote før dublettsjekk)

Database: Agricola 1970 to April 2020
Dato: 20.04.20
Antall treff: 498

1	(((Opogona or Alucita) adj2 sacchari) or ((Opogona or Tinea) adj2 subcervinella) or ((banana or sugarcane) adj2 (borer or moth)) or ((Gelechia or Hieroxestis or Laverna or Opogona or Tinea) adj1 (ligniferalla or sanctaehelenae or plumipes or subcervinella))).ti,ab,id,de.	561
2	limit 1 to (danish or english or norwegian or swedish)	498

Database: Biological abstracts 1985 to April 2020
Dato: 20.04.20
Antall treff: 572

1	(((Opogona or Alucita) adj2 sacchari) or ((Opogona or Tinea) adj2 subcervinella) or ((banana or sugarcane) adj2 (borer or moth)) or ((Gelechia or Hieroxestis or Laverna or Opogona or Tinea) adj1 (ligniferalla or sanctaehelenae or plumipes or subcervinella))).tw.	653
2	limit 1 to (danish or english or norwegian or swedish)	572

Database: CAB abstracts 1910 to 2020 Week 15
Dato: 20.04.20
Antall treff: 1216

1	opogona sacchari/	115
2	(((Opogona or Alucita) adj2 sacchari) or ((Opogona or Tinea) adj2 subcervinella) or ((banana or sugarcane) adj2 (borer or moth)) or ((Gelechia or Hieroxestis or Laverna or Opogona or Tinea) adj1 (ligniferalla or sanctaehelenae or plumipes or subcervinella))).tw.	1601
3	1 or 2	1601
4	limit 3 to (danish or english or norwegian or swedish)	1216

Database: Web of Science
Dato: 20.04.20
Antall treff: 678

TOPIC: ((((Opogona or Alucita) NEAR/1 sacchari) or ((Opogona or Tinea) NEAR/1 subcervinella) or ((banana or sugarcane) NEAR/1 (borer or moth)) or ((Gelechia or Hieroxestis or Laverna or Opogona or Tinea) NEAR/0 (ligniferalla or sanctaehelenae or plumipes or subcervinella))))
Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 20.04.20
Antall treff: 588

TITLE-ABS-KEY ((((opogona OR alucita) W/1 sacchari) OR ((opogona OR tinea) W/1 subcervinella) OR ((banana OR sugarcane) W/1 (borer OR moth)) OR ((gelechia OR hieroxestis OR laverna OR opogona OR tinea) W/0 (ligniferalla OR sanctaehelenae OR plumipes OR subcervinella)))) AND (LIMIT-TO (LANGUAGE , "English"))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Linn Benjaminsen Hølvold; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**
Tidsbruk:

Art: PHIACI

Antall treff til sammen etter dublettsjekk: (242 i Endnote før dublettsjekk)

Database: Agricola 1970 to March 2020
Dato: 13.04.20
Antall treff: 52

1	Phialophora cinerescens/	8
2	(((phialophora or verticillium) adj2 (cinerescens or cinerascens)) or "wilt of carnation").ti,ab,id,de.	80
3	1 or 2	85
4	limit 3 to (danish or english or norwegian or swedish)	52

Database: Biological abstracts 1985 to February 2020
Dato: 13.04.20
Antall treff: 41

1	(((phialophora or verticillium) adj2 (cinerescens or cinerascens)) or "wilt of carnation").tw.	51
2	limit 1 to (danish or english or norwegian or swedish)	41

Database: CAB abstracts 1910 to 2020 Week 13
Dato: 13.04.20
Antall treff: 146

1	exp Phialophora cinerescens/	248
2	(((phialophora or verticillium) adj2 (cinerescens or cinerascens)) or "wilt of carnation").tw.	388
3	1 or 2	389
4	limit 3 to (danish or english or norwegian or swedish)	146

Database: Web of Science
Dato: 13.04.20
Antall treff: 40

TOPIC: ((((phialophora or verticillium) NEAR/1 (cinerescens or cinerascens)) or "wilt of carnation"))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 13.04.20
Antall treff: 44

TITLE-ABS-KEY ((((phialophora OR verticillium) W/1 (cinerescens OR cinerascens)) OR "wilt of carnation")) AND (LIMIT-TO (LANGUAGE , "English"))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Linn Benjaminsen Hølvold; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**
Tidsbruk:

Art: PHYPPN

Antall treff til sammen etter dublettsjekk: (741 i Endnote før dublettsjekk)

Database: Agricola 1970 to March 2020

Dato: 13.04.20
Antall treff: 107

1	Peach yellow leafroll phytoplasma/	3
2	((("X-disease*" or "x disease*" or "yellow leafroll*" or "yellow leaf roll*" or "leaf casting yellows" or "albino" or "buckskin" or "X-disease*") adj2 (peach* or cherr*)) or (("western X disease" or peach or pruni) adj3 phytoplasma) or "leaf casting").ti,ab,id,de.	104
3	1 or 2	107
4	limit 3 to (danish or english or norwegian or swedish)	107

Database: Biological abstracts 1985 to February 2020
Dato: 13.04.20
Antall treff: 98

1	((("X-disease*" or "x disease*" or "yellow leafroll*" or "yellow leaf roll*" or "leaf casting yellows" or "albino" or "buckskin" or "X-disease*") adj2 (peach* or cherr*)) or (("western X disease" or peach or pruni) adj3 phytoplasma) or "leaf casting").tw.	103
2	limit 1 to (danish or english or norwegian or swedish)	98

Database: CAB abstracts 1910 to 2020 Week 13
Dato: 13.04.20
Antall treff: 389

1	exp Phytoplasma pruni/	24
2	((("X-disease*" or "x disease*" or "yellow leafroll*" or "yellow leaf roll*" or "leaf casting yellows" or "albino" or "buckskin" or "X-disease*") adj2 (peach* or cherr*)) or (("western X disease" or peach or pruni) adj3 phytoplasma) or "leaf casting").tw.	389
3	1 or 2	389
4	limit 3 to (danish or english or norwegian or swedish)	256

Database: Web of Science
Dato: 13.04.20
Antall treff: 155

TOPIC: ((((("X-disease*" or "x disease*" or "yellow leafroll*" or "yellow leaf roll*" or "leaf casting yellows" or "albino" or "buckskin" or "X-disease*") NEAR/1 (peach* or cherr*)) or (("western X disease" or peach or pruni) NEAR/2 phytoplasma) or "leaf casting"))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus

Dato: 13.04.20
Antall treff: 125

TITLE-ABS-KEY ((("X-disease*" OR "x disease*" OR "yellow leafroll*" OR "yellow leaf roll*" OR "leaf casting yellows" OR "albino" OR "buckskin" OR "X-disease*") W/1 (peach* OR cherr*)) OR (("western X disease" OR peach OR pruni) W/2 phytoplasma) OR "leaf casting")) AND (LIMIT-TO (LANGUAGE , "English"))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Linn Benjaminsen Hølvold; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**
Tidsbruk:

Art: PHYPSO

Antall treff til sammen etter dublettsjekk: (1378 i Endnote før dublettsjekk)

Database: Agricola 1970 to March 2020
Dato: 14 .04.20
Antall treff: 118

1	Stolbur phytoplasma/	48
2	((stolbur adj2 (potato or tobacco or tomao or phytoplasma)) or parastolbur or metabolbur or "phytoplasma solani" or "maize redness" or (grapevine adj2 ("black wood" or blackwood or "bois noir"))).ti,ab,id,de.	116
3	1 or 2	120
4	limit 3 to (danish or english or norwegian or swedish)	118

Database: Biological abstracts 1985 to February 2020
Dato: 14.04.20
Antall treff: 321

1	((stolbur adj2 (potato or tobacco or tomao or phytoplasma)) or parastolbur or metabolbur or "phytoplasma solani" or "maize redness" or (grapevine adj2 ("black wood" or blackwood or "bois noir"))).tw.	338
2	limit 1 to (danish or english or norwegian or swedish)	321

Database: CAB abstracts 1910 to 2020 Week 13
Dato: 14.04.20
Antall treff: 345

1	exp Phytoplasma solani/	329
2	((stolbur adj2 (potato or tobacco or tomao or phytoplasma)) or parastolbur or metabolbur or "phytoplasma solani" or "maize redness" or (grapevine adj2 ("black wood" or blackwood or "bois noir"))).tw.	583
3	1 or 2	597
4	limit 3 to (danish or english or norwegian or swedish)	345

Database: Web of Science
Dato: 14.04.20
Antall treff: 301

TOPIC: (((stolbur NEAR/1 (potato or tobacco or tomao or phytoplasma)) or parastolbur or metabolbur or "phytoplasma solani" or "maize redness" or (grapevine NEAR/1 ("black wood" or blackwood or "bois noir"))))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 14.04.20
Antall treff: 293

TITLE-ABS-KEY (((stolbur W/1 (potato OR tobacco OR tomao OR phytoplasma)) OR parastolbur OR metabolbur OR "phytoplasma solani" OR "maize redness" OR (grapevine W/1 ("black wood" OR blackwood OR "bois noir")))) AND (LIMIT-TO (LANGUAGE , "English"))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Linn Benjaminsen Hølvold; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**
Tidsbruk:

Art: PUCCPZ

Antall treff til sammen etter dublettsjekk: (145 i Endnote før dublettsjekk)

Database: Agricola 1970 to March 2020
Dato: 15.04.20
Antall treff: 16

1	((rust adj2 pelargonium) or "puccinia pelargonii-zonalis" or "aecidium violaceum" or "uredo geranii" or "uromyces puccinioides").ti,ab,id,de.	27
2	limit 1 to (danish or english or norwegian or swedish)	16

Database: Biological abstracts 1985 to February 2020
Dato: 15.04.20
Antall treff: 15

1	((rust adj2 pelargonium) or "puccinia pelargonii-zonalis" or "aecidium violaceum" or "uredo geranii" or "uromyces puccinioides").tw.	18
2	limit 1 to (danish or english or norwegian or swedish)	15

Database: CAB abstracts 1910 to 2020 Week 13
Dato: 15.04.20
Antall treff: 77

1	exp Puccinia pelargonii-zonalis/	122
2	((rust adj2 pelargonium) or "puccinia pelargonii-zonalis" or "aecidium violaceum" or "uredo geranii" or "uromyces puccinioides").tw.	171
3	1 or 2	171
4	limit 3 to (danish or english or norwegian or swedish)	77

Database: Web of Science
Dato: 15.04.20
Antall treff: 19

TOPIC: (((rust NEAR/1 pelargonium) or "puccinia pelargonii-zonalis" or "aecidium violaceum" or "uredo geranii" or "uromyces puccinioides"))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI. **Database:**

Scopus
Dato: 15.04.20
Antall treff: 18

TITLE-ABS-KEY (((rust W/1 pelargonium) OR "puccinia pelargonii-zonalis" OR "aecidium violaceum" OR "uredo geranii" OR "uromyces puccinioides")) AND (LIMIT-TO (LANGUAGE , "English"))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**

Art: RADOSI

Database: Agricola 1970 to March 2020
Dato: 02.04.20
Antall treff: 366

1	Radopholus similis/	228
2	((burrowing* or "banana toppling disease*" or "root rot*" or "banana root*" or "banana burrowing*" or "citrus burrowing*" or "mid-country specie*" or "pepper yellow*" or "slow wilt*") adj2 nematode*) or ((radopholus* or tylenchus* or rotylenchus* or anguillulina* or Anguina*) adj2 (similis* or granulosus*)) or "black head disease of banana*".tw.	332
3	1 or 2	392
4	limit 3 to (danish or english or norwegian or swedish)	366

Database: Biological abstracts 1985 to February 2020
Dato: 02.04.20
Antall treff: 465

1	((burrowing* or "banana toppling disease*" or "root rot*" or "banana root*" or "banana burrowing*" or "citrus burrowing*" or "mid-country specie*" or "pepper yellow*" or "slow wilt*") adj2 nematode*) or ((radopholus* or tylenchus*	502

	or rotylenchus* or anguillulina* or Anguina*) adj2 (similis* or granulosus*)) or "black head disease of banana*".tw.	
2	limit 1 to (danish or english or norwegian or swedish)	465

Database: CAB abstracts
Dato: 02.04.20
Antall treff: 1604

1	Radopholus similis.od.	1793
2	((burrowing* or "banana toppling disease*" or "root rot*" or "banana root*" or "banana burrowing*" or "citrus burrowing*" or "mid-country specie*" or "pepper yellow*" or "slow wilt*") adj2 nematode*) or ((radopholus* or tylenchus* or rotylenchus* or anguillulina* or Anguina*) adj2 (similis* or granulosus*)) or "black head disease of banana*".tw.	2227
3	1 or 2	2227
4	limit 3 to (danish or english or norwegian or swedish)	1604

Database: Web of Science
Dato: 02.04.20
Antall treff: 805

TS=(((burrowing* or "banana toppling disease*" or "root rot*" or "banana root*" or "banana burrowing*" or "citrus burrowing*" or "mid-country specie*" or "pepper yellow*"or "slow wilt*") NEAR/1 nematode*) or ((radopholus* or tylenchus* or rotylenchus* or (anguillulina* or Anguina*) NEAR/1 (similis* or granulosus*)) or ("black head disease of banana*")))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 02.04.20
Antall treff: 427

TITLE-ABS-KEY (((burrowing* OR "banana toppling disease*" OR "root rot*" OR "banana root*" OR "banana burrowing*" OR "citrus burrowing*" OR "mid-country specie*" OR "pepper yellow*" OR "slow

wilt*") W/1 nematode*) OR ((radopholus* OR tylenchus* OR rotylenchus* OR anguil lulina* OR Anguina*) W/1 (similis* OR granulosus*)) OR ("black head disease of banana*")))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years.

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**

Art: SCIRAC

Database: Agricola 1970 to March 2020
Dato: 02.04.20
Antall treff: 107

1	conifer needles/	3533
2	BLIGHT/	3917
3	1 and 2	29
4	Mycosphaerella dearnessii/	8
5	((("brown spot*" or "needle blight*" or lecanosticta*) adj2 (pine* or pini*)) or ((lecanosticta* or scirrhia* or septoria* or systremma* or cryptosporium* or dothiostroma* or oligostroma* or Dothidea*) adj2 acicola*) or "mycosphaerella dearnessi*").tw.	88
6	3 or 4 or 5	111
7	limit 6 to (danish or english or norwegian or swedish)	107

Database: Biological abstracts 1985 to February 2020
Dato: 02.04.20
Antall treff: 76

1	((("brown spot*" or "needle blight*" or lecanosticta*) adj2 (pine* or pini*)) or ((lecanosticta* or scirrhia* or septoria* or systremma* or cryptosporium* or dothiostroma* or oligostroma* or Dothidea*) adj2 acicola*) or "mycosphaerella dearnessi*").tw.	83

2	limit 1 to (danish or english or norwegian or swedish)	76

Database: CAB abstracts
Dato: 02.04.20
Antall treff: 311

1	Mycosphaerella dearnessii.od.	270
2	((("brown spot*" or "needle blight*" or lecanosticta*) adj2 (pine* or pini*)) or ((lecanosticta* or scirrhia* or septoria* or systremma* or cryptosporium* or dothiostroma* or oligostroma* or Dothidea*) adj2 acicola*) or "mycosphaerella dearnessi*").tw.	455
3	1 or 2	455
4	limit 3 to (danish or english or norwegian or swedish)	311

Database: Web of Science
Dato: 02.04.20
Antall treff: 83

TS=((("brown spot*" or "needle blight*" or lecanosticta*) NEAR/1 (pine* or pini*)) or ((lecanosticta* or scirrhia* or septoria* or systremma* or cryptosporium* or dothiostroma* or oligostroma* or Dothidea*) NEAR/1 acicola*) or mycosphaerella dearnessi*)

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 02.04.20
Antall treff: 84

TITLE-ABS-KEY ((("brown spot*" OR "needle blight*" OR lecanosticta*) W/1 (pine* OR pini*)) OR ((lecanosticta* OR scirrhia* OR septoria* OR systremma* OR cryptosporium* OR dothiostroma* OR oligostroma* OR Dothidea*) W/1 acicola*) OR "mycosphaerella dearnessi*")

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years.

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn. Ikke avgrenset til språk pga. få treff.**

Art: SMOV

Antall treff til sammen etter dublettsjekk: 140

Database: Agricola 1970 to March 2020
Dato: 02.04.20
Antall treff: 22

1	STRAWBERRIES/ or FRAGARIA/	6024
2	MOTTLES/	33
3	1 and 2	0
4	(smov or (("mottle strawberr*" or "strawberr* mottle" or "mild crinkle") adj2 (virus* or sadwavirus*))).tw.	22

Database: Biological abstracts 1985 to February 2020
Dato: 02.04.20
Antall treff: 54

1	(smov or (("mottle strawberr*" or "strawberr* mottle" or "mild crinkle") adj2 (virus* or sadwavirus*))).tw.	54

Database: CAB abstracts
Dato: 02.04.20
Antall treff: 205

1	Strawberry mottle virus.od.	171
2	Fragaria/ or strawberries/	37025
3	Sadwavirus/	93
4	2 and 3	8
5	(smov or (("mottle strawberr*" or "strawberr* mottle" or "mild crinkle") adj2 (virus* or sadwavirus*))).tw.	205

6	1 or 4 or 5	205

Database: Web of Science
Dato: 02.04.20
Antall treff: 64

TS=(smov or (("mottle strawberr*" or "strawberr* mottle" or "mild crinkle") NEAR/1 (virus* or sadwavirus*)))

Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 02.04.20
Antall treff: 74

TITLE-ABS-KEY (smov OR (("mottle strawberr*" OR "strawberr* mottle" OR "mild crinkle") W/1 (virus* OR sadwavirus*)))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**

Art: SPODLI

Database: Agricola 1970 to March 2020
Dato: 02.04.20
Antall treff: 1215

1	Spodoptera littoralis/	977
2	COTTON/	13448
3	noctuidae/	460
4	2 or 3	2
5	("cotton worm" or cottonworm or ((egyptian or african) adj1 "cotton leafworm") or Bomullssteppefly or Egyptiskbomullsfly or (Prodenia adj1 (retina or testaceoides or ciligera or declinate or evanescens or glaucistriga or litura or subterminalis or tasmanica)) or ((tobacco or "tobacco leaf" or tomato* or cluster* or taro) adj1 caterpillar)).tw.	326
6	1 or 4 or 5	1233
7	limit 6 to (danish or english or norwegian or swedish)	1215

Database: Biological abstracts 1985 to February 2020
Dato: 02.04.20
Antall treff: 385

1	("cotton worm" or cottonworm or ((egyptian or african) adj1 "cotton leafworm") or Bomullssteppefly or Egyptiskbomullsfly or (Prodenia adj1 (retina or testaceoides or ciligera or declinate or evanescens or glaucistriga or litura or subterminalis or tasmanica)) or ((tobacco or "tobacco leaf" or tomato* or cluster* or taro) adj1 caterpillar)).tw.	431
2	limit 1 to (danish or english or norwegian or swedish)	385

Database: CAB abstracts
Dato: 01.04.20
Antall treff: 7288

1	Spodoptera littoralis.od.	3471
2	Spodoptera litura.od.	5064

3	("cotton worm" or cottonworm or ((egyptian or african) adj1 "cotton leafworm") or Bomullssteppefly or Egyptiskbomullsfly or (Prodenia adj1 (retina or testaceoides or ciligera or declinate or evanescens or glaucistriga or litura or subterminalis or tasmanica)) or ((tobacco or "tobacco leaf" or tomato* or cluster* or taro) adj1 caterpillar)).tw.	1457
4	1 or 2 or 3	8652
5	limit 4 to (danish or english or norwegian or swedish)	7288

Database: Web of Science
Dato: 02.04.20
Antall treff: 403

TS=("cotton worm" or cottonworm or ((egyptian or african) NEAR/1 "cotton leafworm") or Bomullssteppefly or "Egyptisk bomullsfly" or (Prodenia NEAR/1 (retina or testaceoides or ciligera or declinate or evanescens or glaucistriga or litura or subterminalis or tasmanica)) or ((tobacco or "tobacco leaf" or tomato* or cluster* or taro) NEAR/1 caterpillar))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 02.04.20
Antall treff: 469

TITLE-ABS-KEY (("cotton worm" or cottonworm or ((egyptian or african) W/1 "cotton leafworm") or Bomullssteppefly or "Egyptisk bomullsfly"
or (prodenia W/1 (retina OR testaceoides OR ciligera OR declinate OR evanescens OR glaucistriga OR litura OR subterminalis OR tasmanica)) OR ((tobacco OR "tobacco leaf" OR tomato* OR cluster* OR taro) W/1 caterpillar))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years.

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn. Ikke avgrenset til språk pga. få treff.**

Art: STLCVO

Database: Agricola 1970 to March 2020
Dato: 02.04.20
Antall treff: 1

1	STRAWBERRIES/ or FRAGARIA/	6024
2	RHABDOVIRIDAE/	164
3	1 and 2	1
4	((strawberr* or fragaria*) adj2 (rhabdoviridae* or stlcv or "latent c rhabdovirus*" or "latent c virus*")).tw.	0

Database: Biological abstracts 1985 to February 2020
Dato: 02.04.20
Antall treff: 4

1	((strawberr* or fragaria*) adj2 (rhabdoviridae* or stlcv or "latent c rhabdovirus*" or "latent c virus*")).tw.	4

Database: CAB abstracts
Dato: 02.04.20
Antall treff: 14

1	Strawberry latent C virus/	13
2	((strawberr* or fragaria*) adj2 (rhabdoviridae* or stlcv or "latent c rhabdovirus*" or "latent c virus*")).tw.	14

Database: Web of Science

Dato: 02.04.20
Antall treff: 3

TS=((strawberr* or fragaria*) NEAR/1 (rhabdoviridae* or stlcv or "latent c rhabdovirus*" or "latent c virus*"))

Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 02.04.20
Antall treff: 4

TITLE-ABS-KEY ((strawberr* OR fragaria*) W/1 (rhabdoviridae* OR stlcv OR "latent c rhabdovirus*" OR "latent c virus*"))

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**

Art: TORTPR

Database: Agricola 1970 to March 2020
Dato: 02.04.20
Antall treff: 384

1	Cacoecimorpha pronubana/	11
2	leafrollers/	237
3	(((carnation or mediterranean) adj2 (tortrix* or moth* or "leaf roller*" or leafroller*)) or (cacoecimorpha* adj2 (pronubana* or ambustana* or hermineana* or insolatana*)) or (pronubana* adj2 (tortrix* or cacoecia*)) or "nellikvikler").tw.	164
4	1 or 2 or 3	404
5	limit 4 to (danish or english or norwegian or Swedish)	384

Database: Biological abstracts 1985 to February 2020
Dato: 02.04.20

Antall treff: 286

1	(((carnation or mediterranean) adj2 (tortrix* or moth* or "leaf roller*" or leafroller*)) or (cacoecimorpha* adj2 (pronubana* or ambustana* or hermineana* or insolatana*)) or (pronubana* adj2 (tortrix* or cacoecia*)) or "nellikvikler").tw.	305
2	limit 1 to (danish or english or norwegian or swedish)	286

Database: CAB abstracts
Dato: 02.04.20
Antall treff: 1633

1	Cacoecimorpha pronubana.od.	169
2	(((carnation or mediterranean) adj2 (tortrix* or moth* or "leaf roller*" or leafroller*)) or (cacoecimorpha* adj2 (pronubana* or ambustana* or hermineana* or insolatana*)) or (pronubana* adj2 (tortrix* or cacoecia*)) or "nellikvikler").tw.	2561
3	1 or 2	2561
4	limit 3 to (danish or english or norwegian or swedish)	1633

Database: Web of Science
Dato: 02.04.20
Antall treff: 257

TS=(((carnation or mediterranean) NEAR/1 (tortrix* or moth* or "leaf roller*" or leafroller*)) or (cacoecimorpha* NEAR/1 (pronubana* or ambustana* or hermineana* or insolatana*)) or (pronubana* NEAR/1 (tortrix* or cacoecia*)) or "nellikvikler")

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 02.04.20
Antall treff: 248

TITLE-ABS-KEY (((carnation OR mediterranean) W/1 (tortrix* OR moth* OR "leaf roller*" OR leafroller*)) OR (cacoecimorpha* W/1 (pronubana* OR ambustana* OR "h

ermineana*" OR "insolatana*")) OR (pronubana* W/1 (tortrix* OR cacoecia*)) OR "n ellikvikler")

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years.

Kontaktperson: Daniel Flø
Søk: Johanne Longva; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**

Art: XANTDF

Database: Agricola 1970 to March 2020
Dato: 02.04.20
Antall treff: 60

1	"Xanthomonas axonopodis pv. dieffenbachiae"/	1
2	blight/	3917
3	ANTHURIUM/	209
4	2 and 3	10
5	(((xanthomonas* or axonopodis* or campestris* or pv* or pathovar* or subsp* or citri* or Bacterium* or Phytomonas*) adj2 dieffenbachiae*) or ((bacterial* or blight*) adj2 (anthurium* or aroids*)) or ("tip burn*" adj2 philodendron*)).tw.	59
6	1 or 4 or 5	60
7	limit 6 to (danish or english or norwegian or swedish)	60

Database: Biological abstracts 1985 to February 2020
Dato: 02.04.20
Antall treff: 81

1	(((xanthomonas* or axonopodis* or campestris* or pv* or pathovar* or subsp* or citri* or Bacterium* or Phytomonas*) adj2 dieffenbachiae*) or ((bacterial* or blight*) adj2 (anthurium* or aroids*)) or ("tip burn*" adj2 philodendron*)).tw.	86
2	limit 1 to (danish or english or norwegian or swedish)	81

Database: CAB abstracts
Dato: 02.04.20

Antall treff: 143

1	"Xanthomonas axonopodis pv. dieffenbachiae".od.	120
2	"bacterial blight of anthurium".sh.	22
3	tipburn.sh.	631
4	Philodendron/	601
5	3 and 4	1
6	(((xanthomonas* or axonopodis* or campestris* or pv* or pathovar* or subsp* or citri* or Bacterium* or Phytomonas*) adj2 dieffenbachiae*) or ((bacterial* or blight*) adj2 (anthurium* or aroids*)) or ("tip burn*" adj2 philodendron*)).tw.	165
7	1 or 2 or 5 or 6	165
8	limit 7 to (danish or english or norwegian or swedish)	143

Database: Web of Science
Dato: 02.04.20
Antall treff: 81

TS=(((xanthomonas* or axonopodis* or campestris* or pathovar* or subsp* or citri* or Bacterium* or Phytomonas*) NEAR/1 dieffenbachiae*) or ((bacterial* or blight*) NEAR/1 (anthurium* or aroids*)) or ("tip burn*" NEAR/1 philodendron*))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 02.04.20
Antall treff: 74

TITLE-ABS-KEY (((xanthomonas* OR axonopodis* OR campestris* OR pv OR pathovar* OR subsp* OR citri* OR Bacterium* OR Phytomonas*) W/2 dieffenbachiae*) OR ((bacterial* OR blight*) W/1 (anthurium* OR aroids*)) OR ("tip burn*" W/1 philodendron*))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years.

Kontaktperson: Daniel Flø

Søk: Johanne Longva; Beate Fønhus
Kommentar: **Søkeordene: bare artsnavn**

Art: XANTVE

Database: Agricola 1970 to March 2020
Dato: 02.04.20
Antall treff: 877

1	scab diseases/	770
2	"bacterial diseases of plants"/	2035
3	1 or 2	2775
4	TOMATOES/	17157
5	"Lycopersicon esculentum var. esculentum"/	6
6	4 or 5	17158
7	3 and 6	233
8	leaf spotting/	1425
9	stem cankers/	233
10	8 or 9	1652
11	6 and 10	57
12	Xanthomonas vesicatoria/	108
13	(((bacterial* or scab* or "leaf spot*" or "black spot*" or "stem canker*") adj1 tomato*) or ((xanthomonas* or pseudomonas* or axonopodis* or pv* or subsp* or pathovar* or campestris*) adj1 vesicatoria*) or ((pseudomonas* or Bacterium* or Xanthomonas*) adj1 exitios*)).tw.	677
14	7 or 11 or 12 or 13	923
15	limit 14 to (danish or english or norwegian or swedish)	887

Database: Biological abstracts 1985 to February 2020
Dato: 02.04.20
Antall treff: 1169

1	(((bacterial* or scab* or "leaf spot*" or "black spot*" or "stem canker*") adj1 tomato*) or ((xanthomonas* or pseudomonas* or axonopodis* or pv* or subsp* or pathovar* or campestris*) adj1 vesicatoria*) or ((pseudomonas* or Bacterium* or Xanthomonas*) adj1 exitios*)).tw.	1259
2	limit 1 to (danish or english or norwegian or swedish)	1169

Database: CAB abstracts
Dato: 02.04.20

Antall treff: 1786

1	Xanthomonas vesicatoria.od.	1509
2	leaf spotting.sh.	7616
3	stem canker/	15
4	2 or 3	7631
5	tomatoes/	111605
6	Solanum lycopersicum.od.	11605
7	5 or 6	11605
8	4 and 7	645
9	(((bacterial* or scab* or "leaf spot*" or "black spot*" or "stem canker*") adj1 tomato*) or ((xanthomonas* or pseudomonas* or axonopodis* or pv* or subsp* or pathovar* or campestris*) adj1 vesicatoria*) or ((pseudomonas* or Bacterium* or Xanthomonas*) adj1 exitios*)).tw.	2154
10	1 or 8 or 9	2733
11	limit 10 to (danish or english or norwegian or swedish)	1786

Database: Web of Science
Dato: 02.04.20
Antall treff: 1476

TS=(((bacterial* or scab* or "leaf spot*" or "black spot*" or "stem canker*") NEAR/1 tomato*) or ((xanthomonas* or pseudomonas* or axonopodis* or subsp* or pathovar* or campestris*) NEAR/1 vesicatoria*) or ((pseudomonas* or Bacterium* or Xanthomonas*) NEAR/1 exitios*))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

Database: Scopus
Dato: 02.04.20
Antall treff: 1138

TITLE-ABS-KEY((bacterial* OR scab* OR "leaf spot*" OR "black spot*" OR "stem canker*") W/1 tomato*) OR ((xanthomonas* OR pseudomonas* OR axonopodis* OR pv* OR subsp* OR pathovar* OR campestris*) W/1 vesicatoria*) OR ((pseudomonas* OR Bacterium* OR Xanthomonas*) W/1 exitios*))

Refined by: LANGUAGES: (ENGLISH)
Timespan: All years.

Appendix III

The evaluations from the FinnPRIO model

Species DIAPVA Diaporthe vaccinii Shear

Date 07.01.2021

Name of the assessor Venche Talgø

Quarantine status in the PRA area Quarantine

Taxonomic group Fungi and fungus-like

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large	X	X	X	Current distribution (EPPO 2020): Canada (British Columbia, Nova Scotia, Québec), Chile, USA (Arkansas, Illinois, Indiana, Maine, Maryland, Massachusetts, Michigan, Montana, New Jersey, North Carolina, Oregon,
Pathway 1	**Plants for planting**				*Specify*

ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X		X	EPPO 2020
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot				EPPO 2020

Question	Answer options				Justification

i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely	X	
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely		
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely	X	
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely	X	
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	The comercial production of highbush blueberries is small in Norway, but it is often found in private gardens.
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely	X X X	It may get transferred to areas growing high bush blueberries. However, the native blueberry in Norway, Vaccinium myrtillus, is not on the host list.

	It can, and it is very likely		
Pathway 2			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				

iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 3		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small	X X X	Justification

annually? (pathways A-E)	Medium Large				

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	Several Diaporthe spp. survive well in Norway, and since D. vaccinii is present in Latvia, the Norwegian climate is most likely suitable for this pathogen.
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small	X X X	Mainly in costal regions in Southern Norway

Question	Answer options				Justification
	Medium Large				
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	How rapid the spread may become is depending on the spore production. In general, asexual spores (conidia) only spread within a planting. For larger distribution, sexual spores (ascospores) must be present. The latter normally forms on dead wood. Thus, good field hygiene, including sanitation of dead material, would keep the disease pressure down.
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X	X	 X	Ascospores as explained under EST3
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year	X	X	X	Currently there is no or a very small production of Vaccinium

	1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year		

Question	Answer options				Justification
	l. 25-50 million € per year				

Question	Answer options				Justification

	m. > 50 million €per year		
IMP2: Would the pest cause the following indirect economic impacts in the PRA area?	No Yes	2 2 2	Since it is a quarantine organism in Norway it would impact the international trade. It would have an impact for nurseries trading high bush blueberry plants and the few ongoing commercial productions
1. Would the pest impact foreign trade?		X X X	

Question	**Answer options**				**Justification**
Is the pest a vector for other pests? Would the pest have a significant impact on		X	X	X	

the profitability of some			
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X X X	Unless Vaccinium myrtillus proves susceptible, it will have no impact on natural vegetation.
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0 0 0*	Since the host plants are not native to Norway, the pest would have no cultural or environmental impact
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture			
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X X X	Only in Latvia

MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible		X X X		It may be possable to find it om dead shoots, but laboratory tests would be required.
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible		X X X		Since it does not persists in soil, it could be erredicated by sanitation (e.g. burning) of diseased plants.

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X X		X	Since the host plants are distributed to many private gardens, a survey would be laboriously
References					EPPO. 2020. https://gd.eppo.int/taxon/DIAPVA

DICKCC Erwinia chrysanthemi

Species Burkholder et al. pv. chrysanthemi

Date 07.01.2021

Name of the assessor Simeon Rossmann

Quarantine status in the PRA area Quarantine

Taxonomic group Bacterium and phytoplasma

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large		X	 X	Taxonomic situation makes the assessment of global distribution for true Dickeya christanthemi pv. chrysanthemi difficult. Unlike the previous E. chrysanthemi pv. dianthicola (now Dickeya dianthicola), Dickeya christanthemi
Pathway 1	**Plants for planting**				*Ornamentals, primarily Chrysanthemum spp.*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	 X	Distribution and severity of D. chrysanthemi pv. chrysanthemi on ornamental hosts is not routinely assessed and receives little focus. The frequency of events where ornamentals infected with D. chrysanthemi pv. chrysanthemi are imported is therefore hard to estimate.

than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			

Question	Answer options				Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	There are no specific management measures controlling the import of D. chrysanthemi pv. chrysanthemi infected ornamentals beyond the general requirements for plant import (phytosanitary certificate, plantesunnhetssertifikat). Latently infected plants are likely to escape detection in visual assessment.

spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Total import of ornamentals in categories including chrysanthemum but excluding cut plants for direct sale may exceed 1 million kg annualy in the recent past [SSB]. Import registered as purely chrysantemum, however, is only 10 000 tonnes annually in recent years [SSB].
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	While D. christanthemi pv. chrysanthemi is likely to spread in ornamental cultures, it is not shown that it may successfully establish itself in a meaningful manner from ornamentals to a host with large spread in Norway (i.e. potato).
Pathway 2	Plants for planting		*Potato seed tubers for planting*
ENT2A: Not taking into account current management measures, can the pest	a. No it cannot		D. chrysanthemi pv. chrysanthemi, like other soft rot/blackleg pathogens from the Pectobacteriaceae family survives in seed tubers for long periods of time and may spread in storage and the field. However, D. chrysanthemi pv.

Question	Answer options				Justification
be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	chrysanthemi strains are not known to cause very severe symptoms on potato [Toth et al., 2011]. It is likely outcompeted by other soft rot pathogens that spread more effectively, although more agressive strains with a greater potential to spread with potato may eventually arise (as has happened for other Dickeya species).
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Norway currently does not import seed tubers for direct planting [Forskrift om settepoteter, §14]. Potato material (primarily new cultivars) may only be imported by certified actors and must undergo testing and assessment in quarantine fields before being introduced for growing in Norway. Planting of imported ware potatoes by private persons may present some risk.

another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			

Question	Answer options				Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	According to Statistics Norway (statistisk sentralbyrå, SSB), import of potato seed tubers has only occured in amounts of approx. 5 t per year, if at all over the last ten years [SSB].
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	If imported via seed tubers and not intercepted, D. christanthemi pv. chrysanthemi could establish itself in Norway due to the widespread cultivation of potato. However, its competitive performance against other soft rot pathogens is not known and it is therefore hard to estimate whether it would be able to establish itself in potato agriculture successfully.
Pathway 3		*Specify*			

ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot	X	X	X	Justification

Question	Answer options				Justification

i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	b. It can, but it is very unlikely c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification

Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

Question	Answer options				Justification

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 5		*Specify*	
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	D. chrysanthemi pv. chrysanthemi, like all related soft rot pathogens from the Pectobacteriaceae family can survive in seed tubers and other host tissue for a long time and overwinters as latent infection in hosts stored or kept in greenhouses over the winter.
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small		Potatoes were grown on 11 000 ha in 2018. There has been a decline in potato farming, so the area may decrease under 10 000 ha (medium). Although not the primary host of D. chrysanthemi pv. chrysanthemi, potato is the host with

Question	**Answer options**				**Justification**
	Medium Large		X X		the largest cultivation area om Norway.

EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X X X	D. chrysanthemi pv. chrysanthemi likely survives in host tissue asymptomatically for long periods and can be transported in association with hosts. In potato farming it may be transported via smears on farm machinery, farm to farm spread may occur if undetected or not counteracted. In ornamental cultures similar considerations apply. In potato, current strains of D. chrysanthemi pv. chrysanthemi are likely outcompeted by other soft rot pathogens under Norwegian conditions.
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X X X	Reproduces potentially rapidly and asexually, several host plants from different plant families, closely related pathogens from the same genus have been observed to rapidly acclimate or adapt.
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year	X X X	Economic damage for D. chrysanthemi pv. chrysanthemi is hard to assess because there are no known occurences of large epidemics caused by strains of this pathogen in potato, the most economically relevant host in Norway. However, in the case of a major epidemic after a more aggressive strain emerges on potato, similar considerations apply as for D. dianthicola: In the Netherlands, losses following downgrading or rejection of potato seed tubers as a result of soft rot and blackleg disease were reported with an estimate of about 30 million € annually, at the height of the Dickeya solani and more recently D. dianthicola epidemic, those pathogens were likely responsible for the majority of those losses [Toth et al., 2011]. Norway produces about one 20th of the potatoes than the Netherlands [FAOSTAT]. In proportion, direct economic losses as a result a severe D. chrysanthemi pv. chrysanthemi

	12-25 million € per year		

Question	Answer options				Justification
	l. 25-50 million € per year				epidemic may therefore be around one 20th of the Netherlands at about 1.5 million €. However, soft rot diseases already cause significant economic losses in Norway. An agressive strain of D. chrysanthemi pv. chrysanthemi may potentially aggreviate those and become responsible for already occurring losses when established. This is a very hypothetical scenario since there are no such strains as of now. Direct economic damages to the ornamentals sector are highly unlikely to be larger than the worst case in potato farming.

Question	Answer options				Justification

	m. > 50 million €per year		
IMP2: Would the pest cause the following indirect economic impacts in the PRA area?	No Yes	1 0 2	D. chrysanthemi pv. chrysanthemi emergence in Norway would likely impact profitability of affected ornamentals most severely.
1. Would the pest impact foreign trade?		X	

Question	Answer options				Justification
Is the pest a vector for other pests? Would the pest have a significant impact on		X		X	

the profitability of some			
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X X X	There are no known wild hosts of D. chrysanthemi pv. chrysanthemi in Norway.
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0 0 0*	In its current recognized form, D. chrysanthemi pv. chrysanthemi does not have the potential for such an impact.
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture			
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X X X	There are few reports of definite D. chrysanthemi pv. chrysanthemi detection. Previously, Erwinia chrysanthemi biovar 5, which likely corresponds to D. chrysanthemi pv. chrysanthemi was detected in the Netherlands and Spain

MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible		X	X	X	Infeciton is frequently latent and there are no symptoms that distinguish D. chrysanthemi pv. chrysanthemi from other soft rot pathogens of the Pectobacteriaceae family. Due to its relatively low prominence compared to
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible		X		X	There are no chemical or biological control methods in use to control D. chrysanthemi pv. chrysanthemi. Eradication would require extensive molecular testing, destruction of all affected plant material (incl. in agricultural soil) and disinfection of all machinery. While ornamental hosts may be mostly confined

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	Large scale Molecular (PCR/qPCR) or more labor intensive biochemical detection methods are required for definitive detection of D. chrysanthemi pv. chrysanthemi and distinction from closely related species. The extent of potato cultivation would make sufficient testing rather difficult.

References		Samson R, Legendre JB, Christen R, Fischer-Le Saux M, Achouak W, Gardan L. Transfer of Pectobacterium chrysanthemi (Burkholder et al. 1953) Brenner et al. 1973 and Brenneria paradisiaca to the genus Dickeya gen. nov. as Dickeya chrysanthemi comb. nov. and Dickeya paradisiaca comb. nov. and delineation of four novel species, Dickeya dadantii sp. nov., Dickeya dianthicola sp. nov., Dickeya dieffenbachiae sp. nov. and Dickeya zeae sp. nov. Int J Syst Evol Microbiol. 2005;55(Pt 4):1415-27. Epub 2005/07/15. doi: 10.1099/ijs.0.02791-0 Toth IK, van der Wolf JM, Saddler G, Lojkowska E, Hélias V, Pirhonen M, et al. Dickeya species: an emerging problem for potato production in Europe. Plant Pathol. 2011;60(3):385-99. doi:10.1111/j.1365-3059.2011.02427.x SSB. 08801: Utenrikshandel med varer, etter varenummer, import/eksport, land, statistikkvariabel og år SSB Database (available online) [cited 2020 08/29]. Available from: https://www.ssb.no/statbank/table/08801/ FAOSTAT. Food and Agriculture Organization Corporate Statistical Database (FAOSTAT) FAOSTAT Global Database (available online) [cited 2020 08/31]. Available from: http://www.fao.org/faostat/en/#data

Species ENDOPA Cryphonectria parasitica

Date 07.01.2021

Name of the assessor Iben Margrete Thomsen

Quarantine status in the PRA area Quarantine

Taxonomic group Fungi and fungus-like

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large	X	X	X	Distributed in geographically limited areas in Asiea Noth Amerika and Europe
Pathway 1	**Wood and wood products**				*Specify*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Import of chestnut timber from Asia and North Amerika would probably be limited even with no restrictiions.

current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot	X	X		If the wood is debarked or dried.

Question	**Answer options**				**Justification**
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely				
ii) be transported from one country to another with other than host plant commodity, transport	c. It can, but it is unlikely			X	

or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Unless insect vectors arrive togetehr with the timber, it is unlikely that local insects visit the wood and acquire the fungus. However, conidia and ascosores can be sread by wind and water.
Pathway 2	Plants for planting		*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international	No it cannot It can, but it is very unlikely	X	Import and planting of chestnut in Norway is probably limited. Largest risk may be private import of plants not bought via nurseries.

trade with the host plant commodity considered in the pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely	X		X	
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	If plants are only imported from nurseries, which are outside the known distribution area in Europe.
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely		X X 	 X	Assuming there are other suitable hosts nearby
Pathway 3	Seeds	*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Not if seeds (edible chestnuts) are impoted withouut the seed coat

be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Not if seeds (edible chestnuts) are impoted withouut the seed coat

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Unless people bring back seeds with seed coats and throw the seed coats away outside near a host.
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the	No it cannot It can, but it is very unlikely	X X X	Justification

pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

Question	Answer options				Justification

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 5		*Specify*	
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	Has been found in climates in North America which are similar to Norway in temperature.
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small	X X X	Natural distribution in Sourthern Europe. Planted as ornamental trees in parks and gardens here and there in Northern Europa.

Question	**Answer options**				**Justification**
	Medium Large				

EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X X X	The typical host plant (chestnut) is spread out as single trees or a few trees in each location
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X X X	Spreads both via spores with wind and water, and with insects as vectors. Rapid spread after introduction in USA and fairly rapid in Europe.
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X X X	Feling and replacing infected trees

Question	Answer options				Justification
	l. 25-50 million € per year				

Question	Answer options				Justification

	m. > 50 million €per year		
IMP2: Would the pest cause the following indirect economic impacts in the PRA area?	No Yes	0 0 2	Only if there are nurseries in Norway which produce chestnut plants for sale.
1. Would the pest impact foreign trade?		X	

Question	Answer options				Justification
Is the pest a vector for other pests? Would the pest have a significant impact on				X	

the profitability of some			
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X X X	Chestnut is not native to Norway.
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0 0 1*	If there are any large specimens of chestnut in places where they have a special value as ornamental or for histpric reasons.
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture		X	
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X X X	Permanent presence is in a smaller area in Southern Europe corresponding to

MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible		X X		X	Relarively easy om stems of susceptible trees
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X		If the fungus only infects chestnut and other non-native hosts (eg Alnus cordata and Quercus pubescens), and not Q. petraea

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	Easy if chestnut trees are registered by owners, but rather difficult, if distribution is unknown.
References					

EPIOIO Epichoristodes acerbella

Species (Walker)

Date 07.01.2021

Name of the assessor Daniel Flø

Quarantine status in the PRA area Quarantine

Taxonomic group Insects

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large	X	X	X	Indigenous to South Africa, but also in Kenya and Madagascar. Present in Bulgaria, Croatia, France, Italy, Romania, Serbia, Slovenia, Spain. Probably not present in Denmark (pers com Lis T. Stenstrup lst@lbst.dk).
Pathway 1	**Plants for planting**				*plants for planting and cut flowers*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	In international trade, this pest is liable to be carried, in any of its stages, on plants and cut flowers of carnations, chrysanthemums, pelargoniums and roses. Apperently there was an attack before 1965 in Norway Fjelddalen, J. (1965).

than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot		Justification

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely				
ii) be transported from one country to another with other than host plant commodity, transport	c. It can, but it is unlikely				

or passengers (pathway F)?			
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely		
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely	X X X	
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Unknown - however, large amounts of p4p enters Norway, probably from the Netherlands. "The vast majority of imported P4Ps to the EU are unrooted cuttings (48.2%). The data from The Netherlands and France revealed that these were mainly lots with unrooted cuttings of Chrysanthemum, Pelargonium
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 2			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international	No it cannot It can, but it is very unlikely	X X X	Justification

trade with the host plant commodity considered in the pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

Question	Answer options				Justification

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 3		*Specify*	
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small	X X X	Justification

annually? (pathways A-E)	Medium Large				

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	Probably not, optimal temp range for development is 15-30 ºC.
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small	X X X	Unknown - greenhouse production. "BLOMSTER I GARTNERIER" valuead at 1 130 745 000 kr (totalkalkylen)

Question	Answer options				Justification
	Medium Large				
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	Adult flight is responsible only for local dispersal. In international trade, the pest is liable to be carried, in any of its stages, on plants and cut flowers of carnations, chrysanthemums, pelargoniums and roses.
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X	X	X	max 700 eggs
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year	X	X	 X	Greenhouse Dianthus, Pelargonium, Oxalis, chrysanthemums, Fragaria and Rosa, may be of economic importance. Possibly strawberries. The larvae damage the flower buds and leaves. On carnations, they spin the petals together and pierce them, before drilling into the base of the flower bud. "BLOMSTER I GARTNERIER" valuead at 1 130 745 000 kr (totalkalkylen). Present in carnation greengouses in Danmark pre 1981 (Andersen 1981)

	3-6 million € per year 6-12 million € per year 12-25 million € per year		

Question	Answer options				Justification
	l. 25-50 million € per year				

Question	Answer options				Justification

	m. > 50 million €per year		
IMP2: Would the pest cause the following indirect economic impacts in the PRA area? 1. Would the pest impact foreign trade?	No Yes	*0 0 0*	E. acerbella was taken of the A2 list in 1999

Question	**Answer options**				**Justification**
Is the pest a vector for other pests? Would the pest have a significant impact on					

the profitability of some			
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X X X	Not expected to survive outdoors. Developmental temp between 15-30 celcius
IMP4: Would the pest have the following environmental or social impacts in the PRA area? Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture	No Yes	*0 0 0*	Justification
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X X X	Bulgaria, Croatia, France, Italy, Romania, Serbia, Slovenia, Spain

MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X X X	Eggs and pupa difficult to detect
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X X X	Justification

Question	Answer options				Justification
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	Justification
References					1. Fjelddalen, J. (1965) (Angrep av sydafrikansk nellikvikler i Norge) Gartneryrket 55(13), 340-342 2. Eschen, R., Douma, J.C., Grégoire, J. et al. A risk categorisation and analysis of the geographic and temporal dynamics of the 3. European import of plants for planting. Biol Invasions 19, 3243–3257 (2017). https://doi.org/10.1007/s10530-017-1465-6 4. totalkalkylen - https://www.nibio.no/tjenester/totalkalkylen-statistikk#groups/402/9888 EPPO 1981 https://doi.org/10.1111/j.1365-2338.1981.tb01741.x ANDERSEN 1981 https://onlinelibrary.wiley.com/doi/abs/10.1111/j.13652338.1981.tb01919.x

Species ERWICD Dickeya dianthicola

Date 07.01.2021

Name of the assessor Simeon Rossmann

Quarantine status in the PRA area Quarantine

Taxonomic group Bacterium and phytoplasma

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large		X	 X	Medium distribution according to EPPO per-country records, most reports indicate restricted distribution in affected countries [EPPO]. Relatively high global efforts to detect the pest with molecular methods make it unlikely that
Pathway 1	**Plants for planting**				*Potato seed tubers*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely		X X	 X	D. dianthicola, like other soft rot/blackleg pathogens from the Pectobacteriaceae family survives in seed tubers for long periods of time and spreads in storage and the field.

spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot		Norway currently does not import seed tubers for direct planting [Forskrift om settepoteter, §14]. Potato material (primarily new cultivars) may only be imported by certified actors and must undergo testing and assessment in

Question	**Answer options**				**Justification**
be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	quarantine fields before being introduced for growing in Norway. Planting of imported ware potatoes by private persons may present some risk.

spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	According to Statistics Norway (statistisk sentralbyrå, SSB), import of potato seed tubers has only occured in amounts of approx. 5 t per year, if at all over the last ten years [SSB].
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X X	If imported via seed tubers and not intercepted, D. dianthicola is likely to establish itself in Norway due to the widespread cultivation of potato.
Pathway 2	Plants for planting		*Ornamentals (Dianthus, Dahlia, Kalanchoe)*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the	No it cannot It can, but it is very unlikely	 X	Distribution and severity of D. dianthicola on ornamental hosts is not routinely assessed and receives little focus compared to potato. The frequency of events where ornamentals infected with D. dianthicola are imported is therefore hard to estimate

pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely	X			
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely			X	
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	There are no specific management measures controlling the import of D. dianthicola infected ornamentals beyond the general requirements for plant import (phytosanitary certificate, plantesunnhetssertifikat). Latently infected plants are likely to escape detection in visual assessment.
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	No current information for import volumes of the known ornamental hosts specifically could be obtained after 2010, when excluding cut plants for direct sales [SSB]. However, the total import volume of all ornamental roots and tubers for planting exceeded 3 million kg since 2015 but included species other

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	While D. dianthicola may spread in ornamental cultures, it is not shown that it may successfully establish itself in a meaningful manner from ornamentals to a host with large spread in Norway (i.e. potato).
Pathway 3		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

be intentionally introduced to the PRA area (pathway H)?						
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification	

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	**Answer options**				**Justification**
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			

ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X	X	X	D. dianthicola, like all related soft rot pathogens from the Pectobacteriaceae family can survive in seed tubers for a long time and overwinters as latent infection when seed tubers are stored for the next growing season.
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small				Potatoes were grown on 11 000 ha in 2018.

Question	**Answer options**				**Justification**
	d. Medium		X		
	e. Large	X		X	
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	Since D. dianthicola survives and can be transported via seed tubers, as well as via smears on farm machinery, farm to farm spread is likely to occur rather quickly if undetected or not counteracted.
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent	X	X	X	Reproduces potentially rapidly and asexually, several host plants from different plant families, has been observed to rapidly acclimate or adapt.

	It has characteristics that could assist to a very great extent				
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year			X X X	In the Netherlands, losses following downgrading or rejection of potato seed tubers as a result of soft rot and blackleg disease were reported with an estimate of about 30 million € annually, at the height of the Dickeya solani and more recently D. dianthicola epidemic, those pathogens were likely responsible for the majority of those losses [Toth et al., 2011]. Norway produces about 20 times fewer potatoes than the Netherlands [FAOSTAT]. In proportion, direct economic losses as a result a severe D. dianthicola epidemic may therefore be around 20 times lower than in the Netherlands at about 1.5 million €. However, soft rot diseases already cause significant economic losses in Norway. D. dianthicola may potentially aggreviate those and become responsible for already ocurring losses when established. This makes it hard to estimate how high (additional) direct economic losses would be.

Question	**Answer options**				**Justification**

	l. 25-50 million € per year		

Question	Answer options				Justification
	m. > 50 million €per year				

IMP2: Would the pest cause the following indirect economic impacts in the PRA area? 1. Would the pest impact foreign trade?	No Yes	*1*	*0*	*1*	1. Norway does not export significant amounts of potato seed tubers or ornamentals as of 2020. 3. Potato is one of the most important crops in Norwegian farming and domestic trade and processing are large sectors as well. An epidemic of D. dianthicola may aggreviate already significant losses in potato farming and seed

Question	**Answer options**				**Justification**
Is the pest a vector for other pests? Would the pest have a significant impact on the profitability of some		X		X	tuber production due to soft rot and blackleg diseases in Norway.
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X	X	X	There are no known wild hosts of D. dianthicola endemic to Norway.
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0*	*0*	*2*	D. dianthicola may reduce availability of domestically grown potatoes to some extent. Potato, both as a crop and ingredient, is culturally important in Norway. However, a D. dianthicola outbreak in Norway is not very likely to affect

Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture				X X	domestic potato production to such a heavy degree that it would impact the culture.
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X	X	 X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X	X	X	Present at least to some extent in Belgium, Bulgaria, Finland, France, Germany, Romania and the UK [EPPO]
MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	 X	X	 X	Like other soft rot/blackleg pathogens from the Pectobacteriaceae family, D. dianthicola may remain latent in the host for long periods. Symptoms are not visually distinguishable from other soft rot/blackleg pathogens in potato.
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	 X	X	 X	Potato is cultivated in large, open areas and there are no chemical or biological control methods in use to control D. dianthicola. Eradication would require extensive molecular testing, destruction of all affected plant material (incl. in agricultural soil) and disinfection of all machinery.

Question	**Answer options**				**Justification**

MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X X X	Molecular (PCR/qPCR) or more labor intensive biochemical detection methods are required for definitive detection of D. dianthicola and distinction from closely related species. The extent of potato cultivation would make sufficient testing rather difficult.
References			EPPO. Dickeya dianthicola (ERWICD) EPPO Global Database (available online) [cited 2020 08/29]. Available from: https://gd.eppo.int/taxon/ERWICD. Toth IK, van der Wolf JM, Saddler G, Lojkowska E, Hélias V, Pirhonen M, et al. Dickeya species: an emerging problem for potato production in Europe. Plant Pathol. 2011;60(3):385-99. doi:10.1111/j.1365-3059.2011.02427.x. Ma X, Schloop A, Swingle B, Perry KL. Pectobacterium and Dickeya Responsible for Potato Blackleg Disease in New York State in 2016. Plant Dis. 2018;102(9):1834-40. doi: 10.1094/pdis-10-17-1595-re. Forskrift om settepoteter (seed potato regulation), FOR-1996-07-02-1447 (1996). SSB. 08801: Utenrikshandel med varer, etter varenummer, import/eksport, land, statistikkvariabel og år SSB Database (available online) [cited 2020 08/29]. Available from: https://www.ssb.no/statbank/table/08801/. FAOSTAT. Food and Agriculture Organization Corporate Statistical Database (FAOSTAT)

		FAOSTAT Global Database (available online) [cited 2020 08/31]. Available from: http://www.fao.org/faostat/en/#data.

HELIAR Helicoverpa armigera

Species (Hübner 1808)

Date 07.01.2021

Name of the assessor Daniel Flo

Quarantine status in the PRA area Quarantine

Taxonomic group Insects

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of	Small Medium Large			X X X	Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Congo, Cote d'Ivoire, Egypt, Ethiopia,

the pest? (pathways A-F)			Gabon, Gambia, Ghana, Guinea, Kenya, Lesotho, Libya, Madagascar, Malawi,
Pathway 1	**Plants for planting**		*cut flowers or branches, fruits or vegetables*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	The larvae may live inside the plants, in which case their detection requires destructive sampling. Can also be found in soil, which makes them hard to detect.
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot		The larvae may live inside the plants, in which case their detection requires the destruction of the plants.

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely		X		
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely	X			
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely			X	
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	 X	 X	 X	Total volum unknown
ENT4: Can the pest transfer to a suitable habitat after entering	It cannot It can, but it is very unlikely	X	X	X	risk of introduction into glasshouse crops e.g. tomato

the PRA area via the pathway?	It can, but it is unlikely It can, and it is likely It can, and it is very likely		
Pathway 2			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				

iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 3		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small	X X X	Justification

annually? (pathways A-E)	Medium Large				

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	Several potential host plants are available. But does not survive outdoors. Could potentially overvinter in greenhouses. Belongs in tropocal and subtropiocal climates. has been found outdors in southern Norway several times (Vestfold, Aust-Agder, Vest-Agder og Rogaland), but has not established.
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small	X X X	Tomato greenhouse production

Question	Answer options				Justification
	Medium Large				
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	Adults can migrate over long distances, and can be borne by wind over long distances, e.g. Danmark - Norway
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X	X	X	The oviposition period lasts for about 20 days, during which time each female lays 500-2700 eggs. Can Have six generations per year. Can overwinter in the soil
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year	X	X	X	Unlikely to cause significant damage outdoors. Would increse pest menagement costs in greenhouses. tomatoeas are valued to 284.412.480 kr in 2019 Totalkalkylen. H. armigera has been reported causing serious losses throughout its range, in particular to cotton, tomatoes and maize. on tomatoes, they invade fruits, preventing development and causing falling.Monetary losses result from the direct reduction of yields and from the cost of monitoring and control, particularly the cost of insecticide

	3-6 million € per year 6-12 million € per year 12-25 million € per year		

Question	Answer options				Justification
	l. 25-50 million € per year				

Question	Answer options				Justification
Is the pest a vector for other pests? Would the pest have a significant impact on					

the profitability of some			
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X X X	Justification
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0 0 0*	Justification
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture			
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X X X	Most of Europe. Eradicated from Denmark

MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X	X	X	The feeding larvae can be seen on the surface of plants but they are often hidden within plant organs (flowers, fruits etc.). Bore holes and heaps of frass (excreta) may be visible, but otherwise it is necessary to cut open the plant
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	Most likely unable to overwinter outdoors in Norway due to low winter temperatures. Eredication from greenhouses is possible by several means.

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	Justification
References					https://gd.eppo.int/taxon/PHIACI/ https://www.cabi.org/isc/datasheet/26757

Species LEPGWA Grosmannia wageneri

Date 07.01.2021

Name of the assessor Paal Krokene

Quarantine status in the PRA area Quarantine

Taxonomic group Fungi and fungus-like

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large		X	X	Present all over western USA and British Columbia, Canada (https://gd.eppo.int/taxon/LEPGWA/distribution)
Pathway 1	**Plants for planting**				*Import of seedlings/young trees of conifers*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely		X		EPPO factsheet says: "International spread would most readily occur by trade of living coniferous host plants". The fungus can survive for months in infected seedlings.

or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot	X X	Import of conifer plants from non-European countries are prohibited, but some import might still take place.

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely			X	
ii) be transported from one country to another with other than host plant commodity, transport	c. It can, but it is unlikely				

or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	 d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Import of conifer plants to the EU is prohibited
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X X	A UK study examining the possibilities of establishment of L. wageneri in Europe/UK concluded that "host plants as well as climatic conditions would permit the fungus to establish. Besides the host and climatic conditions, the fungus could be vectored by European Hylastes spp. and spread further. It could cause considerable economic and ecological damage in Europe if
Pathway 2	Wood and wood products		*Timber of conifer trees*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international	No it cannot It can, but it is very unlikely	X X X	EPPO fact sheet: "The fungus is not likely to be carried by wood"

trade with the host plant commodity considered in the pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Import of conifer wood from the area of origin is prohibited.
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Import of conifer timber from the area of origin is prohibited, but some import may still take place.

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely			X X X	A UK study examining the possibilities of establishment of L. wageneri in Europe/UK concluded that "host plants as well as climatic conditions would permit the fungus to establish. Besides the host and climatic conditions, the fungus could be vectored by European Hylastes spp. and spread further. It could cause considerable economic and ecological damage in Europe if
Pathway 3	Hitchhiking	*Vectoring of fungal spores by root-feeding bark beetles*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	EPPO fact sheet: "The fungus is not likely to be carried by wood, unless this is infested by bark beetles and weevils acting as vectors".

be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X X		Import of conifer wood is prohibited. Timber infected by bark beetles would probably be less likely to be shipped.

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Import of conifer timber from the area of origin is prohibited, but some import may still take place. The potential vectors are most likely to be imported together with timber.
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	A UK study examining the possibilities of establishment of L. wageneri in Europe/UK concluded that "host plants as well as climatic conditions would permit the fungus to establish. Besides the host and climatic conditions, the fungus could be vectored by European Hylastes spp. and spread further. It could cause considerable economic and ecological damage in Europe if
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the	No it cannot It can, but it is very unlikely	X X X	Justification

pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

Question	Answer options				Justification

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 5		*Specify*	
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	EPPO fact sheet: "host plants as well as climatic conditions would permit the fungus to establish"
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small		Scots pine, a potential host plant, is very widely distributed in Norway. Much of this area will have suitable climatic conditions for the pathogen.

Question	**Answer options**				**Justification**
	Medium Large	X	X	X	

EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X X X	EPPO fact sheet: "Natural spread of G. wageneri occurs locally via root grafts between adjacent trees and through the transport of the fungus by insects. Bark beetles (Hylastes spp.) and weevils (Pissodes spp. and Steremnius spp.) are the chief insect vectors. They breed readily in diseased roots and are able to create new infection courts by their feeding activities on healthy roots. The disease normally appears in patches or centres which can extend up to 7 m per year (Cobb, 1988)". The fungus would likely be able to find new vectors in the PRA area, since it has a non-specific relationship with bark- and root-feeding
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X X X	The pest can reproduce asexually. The pest has a high reproductive rate or output. The pest can survive without host plants for rather long periods.
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year	X X X	This is a very difficult question to answer. The total standing volume of pine in Norway is about 300 million m3, the annual volume increment is 5.5 mill. m3, and more than half of this is harvested. The value of this annual havest is probably > 1 billion NOK. From EPPO fact sheet: "The fungus colonizes the sapwood of the roots and lower stem. Affected trees grow poorly for several years and then usually die. ... Its potential for damage in the forest regions of the northern hemisphere is very considerable. It is thought to be potentially one of the most dangerous pathogens of Pinus in North America and losses due to O. wageneri are expected to increase in the future."

	6-12 million € per year 12-25 million € per year		

Question	Answer options				Justification
	l. 25-50 million € per year				

Question	Answer options				Justification

	m. > 50 million €per year		
IMP2: Would the pest cause the following indirect economic impacts in the PRA area?	No Yes	*2* *1* *2*	Export of timber would probably be banned. Timber export is currently of great importance for Norwegian forestry.
1. Would the pest impact foreign trade?		X X X	

Question	**Answer options**				**Justification**
Is the pest a vector for other pests? Would the pest have a significant impact on		X		X	

the profitability of some			
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X X X	The pathogen could cause forest decline and death of many trees, particularly of Scots pine and imported conifer species.
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*2 0 2*	Extensive tree death could occur.
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture		X X X X	
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X X X	As far as I know G. wageneri has not become established in the EU.

MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible		X X	X	EPPO fact sheet: "The disease is characterized by tangential bands or arcsof stain in the sapwood. G. wageneri is the only fungus which is likely to be found on microscopic inspection of the xylem tracheids of living or freshly felled
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible		X X	X	EPPO fact sheet: "Currently there are no control methods available based on chemical or biological products. However, certain cultural practices can limit the spread of the pathogen."

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible		X X	X	The pest spreads rather quickly, is difficult to detect, and no effective survey methods are available. ... its host plants are widely present, e.g. common forest trees.
References					Data Sheets on Quarantine Pests - Ophiostoma wageneri (https://gd.eppo.int/taxon/LEPGWA/documents)

Species MELMME Melampsora medusae

Date 07.01.2021

Name of the assessor Iben Margrete Thomsen

Quarantine status in the PRA area Quarantine

Taxonomic group Fungi and fungus-like

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large		X X X		Widespread in North America, scattered records from the rest of the world, including Europe
Pathway 1	**Plants for planting**				*Host plants*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely		X X X		Import of host plants from North America unlikely, even if no restrictions. Import of poplar plamts from Europe seems minor. The form of the fungus detected in Europe seems to be less aggressive.

or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot	X	X		Import of living conifers and poplars from North America not allowed in EU + Norway.

Question	**Answer options**				**Justification**
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely			X	
ii) be transported from one country to another with other than host plant commodity, transport	c. It can, but it is unlikely				

or passengers (pathway F)?			
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely		
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	No import of host plants from North America
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X X	Both aeciaspores and uredospores can travel far, so only the host distribution will limit spread.
Pathway 2	Natural spread		*Windborne spores*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international	No it cannot It can, but it is very unlikely	 X X	Rust spores can travel far if they get high into the atmosphere, and may cross the Atlantic ocean in a worst case scenario.

trade with the host plant commodity considered in the pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely			X	
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Same as above
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

Question	Answer options				Justification

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X X	Just one spore is enough to start the infection and only host distribution is a limiting factor
Pathway 3	Hitchhiking	*Specify*	
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Aecidiaspores and uredospores are robust and may survivie travel if they are transported on clothes or other items, especially coats worn on arrival by air. If suitable hosts are present eg at airports or in urban settings where many people return from North America, there is a small risk of transfer of spores.

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely		X	X	Same as above

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely			X	
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant	Non-existent Small	X	X	X	Justification

commodity is traded into the PRA area annually? (pathways A-E)	Medium Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X	Just one spore is enough to start the infection and only host distribution is a limiting factor
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity,	c. It can, but it is unlikely				

transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	 d. It can, and it is likely e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification

ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity,	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	Overwintering as mycelium in buds is only possible in mild climates, but could probably happen in southwestern Norway
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small	 X X X	Only Pine is common in Norway, compared to other hosts. Of the poplars considered as main hosts, only P. balsamifera seems common in Norway (Artsdatabanken). The damage on the alternate hosts is not important, only on

Question	Answer options				Justification
	Medium Large				poplar. The estimate is thus for the poplar host.
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	Spores are spread far by wind, but the main poplar host in Norway is P. balsamifera which is not that common, but is found in most of the country.
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent		X	X X	Robust summer spores which re-infect poplar and have high wind spread potential. May overwinter in buds and thus escape the need for the alternate host.
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year	X	X	X	Mainly loss of introduced P. balsamifera, which does not seem to be important.

	3-6 million € per year 6-12 million € per year 12-25 million € per year		

Question	Answer options				Justification
	l. 25-50 million € per year				

Question	Answer options				Justification

	m. > 50 million €per year				
IMP2: Would the pest cause the following indirect economic impacts in the PRA area?	No Yes	*2*	*1*	*2*	Growing poplars for energy wood, and nurseries making ornamental poplars (eg P. nigra 'Italica'). If there is no sale of poplar plants, there is probably no impact on foreign trade.
1. Would the pest impact foreign trade?		X		X	

Question	**Answer options**				**Justification**
Is the pest a vector for other pests? Would the pest have a significant impact on		X	X	X	

the profitability of some			
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X X X	Main poplar hosts are not native to Norway
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0 0 0*	Justification
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture			
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X X X	yes, but apparently not the aggressive types seen in North America.

MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X	X	X	Symptoms of rust are easy to see, but as there are native poplar rusts in Europe, laboratory analysis are required to check the species.
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	Would require removing of poplar hosts - ie P. balsamifera

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	Easy to see symptoms, but more difficult to determine species if the damage is not extensive.
References					EPPO Datasheet on Melampsora medusae

MONIFC Monilinia fructicola

Species (G.Winter) Honey

Date 07.01.2021

Name of the assessor Venche Talgø

Quarantine status in the PRA area Quarantine

Taxonomic group Fungi and fungus-like

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large		X	X X	Asia (India, Japan, Taiwan, Yemen), Afrika (South-Africa, Zimbabwe), North America (Canada, Mexico, USA), Central America and Caribbean (Guatemala, Panama), South Amerika (Argentina, Bolivia, Brazil, Ecuador, Paraguay, Peru,
Pathway 1	**Plants for planting**				*Specify*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely		X	X	The fungus overwinters on mummified fruits, infected twigs, peduncles and/or canker wounds on branches. Both asexual spores (conidia) and sexual spores (ascospores) are produced under humid conditions during spring. They infect flowers, leaves and young shoots. The fungus can be transported internationally and get introduced to Norway on such infected plantparts.

than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot		It may be difficult to detect infected plants at the time of import since it is normally just a visual inspection of dormant plants.

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely		X		
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely	X			
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely			X	
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent		X		From the host plants, especially Prunus avium is imported for fruit production in Norway.
	Small				
	Medium				
	Large	X		X	
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot				Once in the country it can spread by spores, conidia locally and ascospores over larger distances.
	It can, but it is very unlikely				
	It can, but it is unlikely		X		
	It can, and it is likely				
	It can, and it is very likely	X		X	
Pathway 2					*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot	X	X	X	Justification
	It can, but it is very unlikely				

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	**Answer options**				**Justification**
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 3		*Specify*			

ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 4					*Specify*

ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

Question	Answer options				Justification

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 5		*Specify*	
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	Fungi in the same genera survives fine in Norway. There should also not be any climate or production barriers for theis fungus.
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small		Mainly in fruit producing areas in South Norway.

Question	**Answer options**				**Justification**
	Medium Large	X	X	X	

EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X X X	Ascospores are in general capable of spreading over longer distances in a short time.
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X X X	Ascospores
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X X	Mainly belived to damage norwegian plum, apple and cherry production valued at 39.154.800, 132.139.400 and 34.557.300 mean/yearly NOK, respectivly

Question	Answer options				Justification
	l. 25-50 million € per year				

Question	Answer options				Justification

	m. > 50 million €per year				
IMP2: Would the pest cause the following indirect economic impacts in the PRA area?	No Yes	*2*	*2*	*2*	It is a quarantine pest, thus, an outbreak would impact the trade and especially the cherry production.
1. Would the pest impact foreign trade?		X	X	X	

Question	**Answer options**				**Justification**
Is the pest a vector for other pests? Would the pest have a significant impact on		X	X	X	

the profitability of some			
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X X X	Some non-native Prunus spp. have spread by birds into natural ecosystems, but thefungus will have no impact on the natural vegetation.
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*1 1 1*	May be some impact on old apple trees
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture		X X X	
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X X X	Yes, e.g. in France and Portugal

MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible		X X	X	It is very difficult to detect by visual inspection of imported fruit trees. At the time of import the trees are generally without folage and fruits.
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible		X X	 X	If it establish and spread in the major fruit producing areas, it would be difficult to erradicate: The windborne ascospores may cause an epidemic.

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible		X X	 X	Most fruit growing areas are easely assable. Besides most profesional growers inspect their trees regularly during the growing season and would be aware of major outbreaks. However, both Malus and Prunus are often present in private gardens, which would be very time concuming to cover in a survey.
References					EPPO. 2020 Data Sheets on Quarantine Pests: Monilinia fructicola. https://gd.eppo.int/taxon/MONIFC/documents

Species OPOGSC Opogona sacchari (Bojer)

Date 07.01.2021

Name of the assessor Johan Stenberg

Quarantine status in the PRA area Quarantine

Taxonomic group Insects

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large			X X X	O. sacchari is present in most parts the Americas (Cintra 1975; Heppner et al. 1987), Southern and Central Europe (Mourikis & Vassilaina-Alexopoulou. 1981), Africa (where it is native), and parts of Asia (Yoshimatsu et al. 2004).
Pathway 1	**Plants for planting**				*Ornamental plants imported from infected areas to Norwegian greenhouses and garden centers.*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely		X	X X	The pest has a history of spread resulting from trade shows that it has the capacity to transported to new areas. Larvae hide in e.g. stems of ornamental plants, making it very difficult to detect before and during transportation vulnerable (Davis & Peña 1990; EPPO 2009). The pest is present in several countries trading with Norway, including several European countries. However, it can only be successfully transported with living plants - thus fresh vegetables and fruits do not constitute a risk. The pest cannot spread naturally to Norway, as the current northern distribution (Germany, UK) is too distant. Furthermore, it is not very abundant in these countries as it is under eradication.

commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			

Question	Answer options				Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	As O. sacchari is difficult (almost impossible) to detect before and during transportation (Davis & Peña 1990; EPPO 2009). Thus, although it is under plant health legislation is difficult to stop it. As the larvae live inside plant stems, they are relatively protected from non-systemic pesticides and biocontrol agents.

spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Data for is not available for all individual host plants. However, several hundred tonnes of cuttings and potted Euphorbia (minor host plant) is imported from around the world every year. Several other host plants, incl. Dracaena (major host plant), together make up several thousand tonnes every year.
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	In central and northern Europe, O. Sacchari can only survive the winter and reproduce in heated greenhouses and garden centres. Thus, only heated areas with permanent access to host plants can be considered as suitable permanent habitats. It can only disperse over a few kilometres per year, and would thus in most cases be confined to single greenhouses or greenhouse complexes.
Pathway 2			*Specify*
ENT2A: Not taking into account current management measures, can the pest	a. No it cannot	X X X	Justification

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely				
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

Question	**Answer options**				**Justification**
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 3		*Specify*	
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT2B: As in ENT2A, but taking into account	a. No it cannot	X X X	Justification

current official entry management measures			

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely				
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during	d. It can, and it is likely				

the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	O. sacchari cannot survive the winter in Central and Northern Europe. At 15C, it takes three months for it to complete one generation, and the lower temperature threshold is 8.6C (Fonseca Lacerda et al. 2019). Thus, maximum one generation per year can be completed in Norway outdoors. Heated greenhouses with continuous access to suitable host plants could be suitable for overwintering, but it is unclear whether such greenhouses with permanent access to plants are available in Norway. Most (or all) greenhouses probably have at least a short production break every year, prohibiting the survival of O. sacchari.

EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small		X	X	The reported host plants do not occur naturally in Norway. Aubergine and Maize are cultivated outdoors in the summer, while most ornamental plants are grown in heated greenhouses. The size of the cultivated area is not known by

Question	**Answer options**				**Justification**
	Medium Large			X	the assessor, but likely not very large.
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	The pest can spread mainly from its permanent habitats, i.e. greenhouses and garden centers, as any outdoor populations will die during the winter. If greenhouses are well connected (short distance) then the pest may spread naturally between them in the summer.
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent		X		At optimal temperature the pest has a relatively high reproductive output, being able to produce c. 250 eggs per female (Fonseca Lacerda et al. 2019). Adults can fly several kilometers. Furthermore, as it can utilize several different host plant, incl. maize and aubergine, it could have one temporary generation in between two greenhouses in the summer.
		X		X	

IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X	X X		The total economical value of the focal host plants in Norway are not known to the assessor, but all in all several thousand tonnes are produced every year. However, although O. sacchari has spread over most parts of Europe the damage made is relatively small in Central and Northern Europe. (in Sweden and Finland it has only been intercepted, not established). The main cost in Norway would likely be associated with eradication once individual pest organisms have been observed. Successful eradication may take 3 months with repeated applications of pesticides (EPPO 2009).

Question	**Answer options**				**Justification**
	l. 25-50 million € per year				

Question	Answer options				Justification
	m. > 50 million €per year				
IMP2: Would the pest cause the following indirect economic impacts in the PRA area?	No Yes	*1*	*0*	*1*	The main cost is likely to be associated with eradication (e.g. pesticides and production breaks; Billen 1987). Large outbreaks could however have significant negative aestetical effects on ornamental plants in greenhouses as well as food
1. Would the pest impact foreign trade?					plants (aubergine) outdoors.

Question	Answer options				Justification

Is the pest a vector for other pests? Would the pest have a significant impact on the profitability of some		X		X	
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X	X	X	O. sacchari cannot survive the winter in Scandinavia and is therefore not likely to have significant direct impact on natural ecosystems.
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*1*	*1*	*1*	Aestatical damage to ornamental plants and aubergine would follow outbreaks.
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture		X	X	X	
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X	X	X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X	X	X	It is present in Central and Southern EU. However, wild populations have not been observed in Central Europe.

MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible		X X		X	It is very difficult to impossible to visually detect young larvae feeding in the stems, and it may take 4-6 weeks before damage is evident on some plants (Davis & Peña 1990).
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	Eradication has proven to be possible in most parts of EU (Italy may be an exception). Repeated chemical treatments over 3 months has so far led to eradication from infected greenhouses (Billen 1987). However, problems with pesticide resistance may emerge in the future.
Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	The pest is limited to greenhouses and garden centers in the winter. Thus, the total area to survey is rather small.

References		Billen. 1987. Information on the banana shoot borer (Opogona sacchari Bojer, 1856) (Lepidoptera: Tineidae). Gesunde Pflanzen 39:458-465. Cintra. 1975. Opogona sp. nova praga da bananicultura em São Paulo. Biológico 41: 223–231. Davis & Peña. 1990. Biology and morphology of the banana moth, Opogona sacchari (Bojer), and its introduction into Florida (Lepidoptera: Tineidae). Proceedings of the Entomological Society of Washington 92:593-618. Duncan & Torres. 1990. Dynamics and control of the banana moth on foliage plants. Proceedings of the Florida State Horticultural Society 103: 189–192. EPPO. 2009. Hot water treatment of Dracaena and Yucca cuttings against Opogona sacchari. EPPO Bulletin 39:28. doi: 10.1111/j.1365-2338.2009.02225.x Fonseca Lacerda et al. 2019. Biology at Different Temperatures, Thermal Requirements, and Ecological Zoning of Opogona sacchari (Lepidoptera: Tineidae). Journal of Economic Entomology 112: 1676–1682. doi: 10.1093/jee/toz103

		Heppner et al. 1987. The banana moth, Opogona sacchari (Bojer) (Lepidoptera: Tineidae), in Florida. Fla. Entomol. 75:1–28. Mourikis & Vassilaina-Alexopoulou. 1981. Data on the biology of the Opogona sacchari (Bojer 1856), a new pest for ornamental plants in Greece. Ann. Inst. Phytopathol. Benaki 13: 59–64.

PHIACI Phialophora cinerescens

Species (Wollenweber) van Beyma

Date 07.01.2021

Name of the assessor Micael Wendell

Quarantine status in the PRA area Quarantine

Taxonomic group Fungi and fungus-like

Question	Answer options				Justification

ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large	 X X X	Not present in Norway. P. cinerescens is an indigenous European species. Also in N Amrica and S America, possibly Asia (EPPO)
Pathway 1	**Plants for planting**		*rooted and unrooted cuttings of host plants*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	It is very likely that infected cuttings do not show visual symptoms of the disease unless they are inspected by peeling off the cortex or taking longitudinal or transverse sections of the stem to reveal the browning of the vascular zone. Where discoloration is present, it could be caused by the fungus F. oxysporum f. sp. dianthi or by the bacteria B. caryophylli and D. dianthicola, all of which induce similar symptoms.
ENT2B: As in ENT2A, but taking into account current	a. No it cannot	X X	Planter og formeringsmateriale av Dianthus L. (nellik), unntatt frø : Det er offesielt kostatert at: a) lantematerialet stammer direkte fra

official entry management measures			morplanter som ved offisielt godkjente undersøkelser foretatt minst én gang i løpet av de siste

Question	Answer options				Justification
be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely			X	to årene, har vist seg å være fri for Erwinia chrysanthemi Burkholder et al. pv. dianthicola, Burkholderia caryophylli (Burkholder) Yabuuchi et al. og Phialophora cinerescens (Wollen-weber) van Beyma, og b) symptomer på de ovennevnte planteskadegjørerne ikke er observert på plantematerialet.
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification: small production (?)

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification: greenhouse production makes eridacation possible. Infected or contaminated planting material for multiplication purposes, because of the specific use of the commodity, is very likely to be introduced into greenhouses or open fields in which susceptible hosts are grown. Thereafter, the pathogen can come into contact with new susceptible host plants through infested
Pathway 2			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during	d. It can, and it is likely				

the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 3		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			

ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	P. cinerescens is an indigenous pest in Europe and the historical records (see Tables 1 and 2; in EFSA Journal 2013;11(1):3070) show that the pest is established, or has been established, in several countries, from north to south and from east to west.The pest has former been present in Scandinavia (Norway) but has been eredicated and are no longer presnet. (se figure 3 in EFSA Journal 2013;11(1):3070)
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small	X X X	small production

Question	**Answer options**				**Justification**
	Medium Large				
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	Justification; long between production areas and not very common with wild dianthius even thou it exists. Current cultural practices and control measures strongly reduce the probability of infection of crops despite the fact that Host plants are widespread in the risk assessment area Host plants are susceptible for the whole growing cycle Environmental conditions are suitable in most parts of the risk assessment area and for most of the host growing season Natural spread via infested soil is possible but very slow

			Natural spread via infested irrigation water is possiblepread by human
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X X X	Justification; Although P. cinerescens is not known to produce survival structures such as chlamydospores or sclerotia, it is able to survive for years in infested soil, most likely as a saprobe (Hellmers, 1958). P. cinerescens is an indigenous species in Europe. The environmental conditions are suitable in most parts of the risk assessment area and for most of the host growing season. However, owing to current cultural practices and control measures, the probability of new establishment in areas where the pest was not
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year	X X X	Approxemetly 2.6 mill Dianthus spp. vas produced in Norway 2019/2020

	0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year		

Question	Answer options				Justification
	l. 25-50 million € per year				

Question	Answer options				Justification
2. Is the pest a vector for other pests?				X	
3. Would the pest have a significant impact on the profitability of some		X	X	X	
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X	X	X	Justification
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0*	*0*	*0*	Justification; No environmental consequences are known in the areas where the disease is or was present.(EPPO 2013)
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture					
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X	X	X	

MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	 X X X	Justification. Yes, se distrubution map at EPPO
MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X X X	Justification; he first symptoms of the disease consist of colour changes in leaves and stems that turn bluish-grey. Successively wilting of the whole plant follows. The root system remains apparently unaffected. Removing
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X X X	Justification; has been done in the past

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	Justification; as it alreadu has been eradicated I assume Norway have developed or adaped a pest survey thats working (?).
References					EFSA Panel on Plant Health (PLH); Scientific Opinion on the risk to plant health posed by Phialophora cinerescens (Wollenweber) van Beyma for the EU territory, with the identification and evaluation of risk reduction options. EFSA Journal 2013;11(1):3070. [88 pp.] doi:10.2903/j.efsa.2013.3070. Available online:

	www.efsa.europa.eu/efsajournal https://gd.eppo.int/taxon/PHIACI/distribution

PHYPPN Candidatus phytoplasma

Species pruni

Date 07.01.2021

Name of the assessor May Bente Brurberg

Quarantine status in the PRA area Quarantine

Taxonomic group Bacterium and phytoplasma

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large		X	 X	Present in some of the United States and Canada [EPPO].
Pathway 1	**Plants for planting**				*Prunus*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	 X	Not present in EU. No interceptions notified in Europe the last 10 years [EUROPHYT].

than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot	X	No interceptions notified in Europhyt the last 10 years [EUROPHYT].

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely	X		X	
ii) be transported from one country to another with other than host plant commodity, transport	c. It can, but it is unlikely				

or passengers (pathway F)?			
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely		
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	No information for import volumes of planting material of Prunus could be obtained [SSB].
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X X	The pest live inside planting material. Prunus are cultivated for fruit production and as ornamentals throughout the PRA.
Pathway 2	Hitchhiking		*Insect vectors*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international	No it cannot It can, but it is very unlikely	X X X	No interceptions notified in Europhyt the last 10 years

trade with the host plant commodity considered in the pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	No interceptions notified in Europhyt the last 10 years
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	No information for import volumes of planting material of Prunus could be obtained [SSB]

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X	 X 	 X	Insect vectors may transmit the pest to the plants. Prunus are cultivated for fruit production and as ornamentals throughout the PRA.
Pathway 3		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	**Answer options**				**Justification**
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			

ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X	X	X	Candidatus phytoplasma pruni is currently present in North America and Canada, in regions with similar climate as Norway [EPPO]
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small				Prunus are grown throughout the PRA.

Question	**Answer options**				**Justification**
	Medium Large	X	X	X	
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	Candidatus phytoplasma pruni can spread with planting material. Phytoplasma diseases in general may give rise to latent infections which could result in unnoticed spread.
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent	X	X	X	Candidatus phytoplasma pruni reproduces potentially rapidly and asexually within plant material, and can also be transmitted with a range of different insect vectors.

	It has characteristics that could assist to a very great extent		
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X X X	No statistic for direct economic losses for this pest was found for other countries. Mean yearly Prunus production is valued at 39.154.800 NOK. The crop is important in Norway.Costs would depend on management strategy.

Question	**Answer options**				**Justification**

	l. 25-50 million € per year		

Question	Answer options				Justification
	m. > 50 million €per year				

IMP2: Would the pest cause the following indirect economic impacts in the PRA area?	No Yes	*1*	*1*	*2*	
1. Would the pest impact foreign trade?				X	

Question	Answer options				Justification
Is the pest a vector for other pests? Would the pest have a significant impact on the profitability of some		X	X	X	
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X	X	X	Wild Prunus species are present throughout Norway [Artsdatabanken], and provide selter and food for animals.
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*2*	*0*	*3*	
Cultural impacts		X		X	
Significant aesthetic impacts3. An impact on plants which have an important,		X		X X	

recognized position in the Finnish culture					
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X	X	X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X	X	X	No previous interceptions [EPPO].
MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X	X	X	Phytoplasma infections may be latent or symptoms may be difficult to distinguish from those of other pathogens
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	No chemical or biological control methods available. Host plants are present thoughout the country. Potential vectors are also likely present. Latent infections are common.

Question	Answer options				Justification
MAN5: How difficult would it be to	Easy Rather difficult	X X		X	Latent infections are common and symptoms can be mistaken. Diagnosis will depend on DNA based laboratory tests.

survey the pest's occurrence in the PRA area?	Very difficult Impossible		
References			Artsdatabanken. Kirsebærslekta Prunus L. https://www.artsdatabanken.no/taxon/Prunus/103367 [accessed 03/10/2020] Davis, RE, Y Zhao, EL Dally, I-M Lee, R Jomantiene, SM Douglas. 2013. 'Candidatus Phytoplasma pruni', a novel taxon associated with X-disease of stone fruits, Prunus spp.: multilocus characterization based on 16S rRNA, secY, and ribosomal protein genes. IJSEM 63:766–776. EFSA Panel on Plant Health (PLH). 2020. List of non-EU phytoplasmas of Cydonia Mill., Fragaria L., Malus Mill., Prunus L., Pyrus L., Ribes L., Rubus L. and Vitis L. EFSA Journal 18(1):5930. EPPO Global Database. 'Candidatus Phytoplasma pruni' (PHYPPN). https://gd.eppo.int/taxon/PHYPPN [accessed 03/10/2020] EUROPHYT - European Union Notification System for Plant Health Interceptions https://ec.europa.eu/food/plant/plant_health_biosecurity/europhyt/interceptions_en [accessed 03/10/2020] Forskrift om planter og tiltak mot planteskadegjørere. FOR-2000-12-01-1333. Kogej, Z, M Dermastia, N Mehle. 2020. Development and validation of a new Taqman real-time PCR for detection of 'Candidatus phytoplasma pruni'. Pathogens 9:642.

PHYPSO Candidatus Phytoplasma

Species solani

Date 07.01.2021

Name of the assessor May Bente Brurberg

Quarantine status in the PRA area Quarantine

Taxonomic group Bacterium and phytoplasma

Question	**Answer options**				**Justification**
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small		X		Occurs in several countries in Europe and Asia, and in Chile and Niger.
	Medium				
	Large	X		X	
Pathway 1	**Plants for planting**				*Potato seed tubers*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	No it cannot		X		The pest occur widely and is transmitted with seed potatoes [EPPO].
	It can, but it is very unlikely				
	It can, but it is unlikely				
	It can, and it is likely				
	It can, and it is very likely				
		X		X	

be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot	X	JusNorway currently does not import seed tubers for direct planting [Forskrift om settepoteter, §14]. Potato material (primarily new cultivars) may only be imported by certified actors and must undergo testing and assessment in

Question	**Answer options**				**Justification**
be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X		X	quarantine fields before being introduced for growing in Norway. Planting quarantine fields before being introduced for growing in Norway. Planting of imported ware potatoes by private persons may present some risk.tification

spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Import of potato seed tubers has only occurred in amounts of approx. 5 tons per year, if at all, over the last ten years [SSB].
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X X	Transmitted with seed tubers.
Pathway 2	Plants for planting		*Strawberry*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the	No it cannot It can, but it is very unlikely	X X	Few occurences in strawberry

pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely			X	
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Few occurences in strawberrystification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Plants for 200-300 ha; ca 10.000 plants per ha.

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely		X X X		The pest lives inside planting material and insect vectors.
Pathway 3		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			

ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X	X	X	The pest can survive in seed potatoes.
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small				Potatoes were grown on 11 000 ha in 2018.

Question	**Answer options**				**Justification**
	d. Medium		X		
	e. Large	X		X	
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	Will likely spread rather slowly in potatoes via seed tubers. Phytoplasmas can also spread with insect vectors.
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent	X	X	X	Reproduces potentially rapidly and asexually. Can spread with seed potatoes and possibly with insect vectors.

	It has characteristics that could assist to a very great extent		
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X X X	No statistic for direct economic losses for this pest was found in other countries. Potato and Strawberry crops are important in Norway and are velued to 721.075.500 and 370.632.500 NOK respectivly.

Question	**Answer options**				**Justification**

	l. 25-50 million € per year		

Question	Answer options				Justification
	m. > 50 million €per year				

IMP2: Would the pest cause the following indirect economic impacts in the PRA area?	No Yes	*1*	*1*	*2*	Justification
1. Would the pest impact foreign trade?				X	

Question	Answer options				Justification
Is the pest a vector for other pests? Would the pest have a significant impact on the profitability of some		X	X	X	
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X	X	X	Wide host range, but unclear damage pontential in species occurring in Norway.
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0*	*0*	*0*	Justification
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important,					

recognized position in the Finnish culture					
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X	X	X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X	X	X	Occurs in several countries in EU, but only restricted presence in some of the countries.
MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X	X	X	Phytoplasma infections may be latent or symptoms may be difficult to distinguish from those of other pathogens.
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	No chemical or biological control methods available. Latent infections common.

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult	X	X	X	Justification

	Very difficult Impossible		
References			EFSA Panel on Plant Health (PLH). 2014. Scientific opinion on the pest categorisation of Candidatus Phytoplasma solani. EFSA Journal 12(12):3924. EFSA Panel on Plant Health (PLH). 2020. List of non-EU phytoplasmas of Cydonia Mill., Fragaria L., Malus Mill., Prunus L., Pyrus L., Ribes L., Rubus L. and Vitis L. EFSA Journal 18(1):5930. EPPO Global Database. 'Candidatus Phytoplasma solani' (PHYPSO). https://gd.eppo.int/taxon/PHYPSO [accessed 04/10/2020]. Forskrift om planter og tiltak mot planteskadegjørere. FOR-2000-12-01-1333. Hodgetts, J, LJ Flint, M Daly, VA Harju, AL Skelton, A Fox. 2015. Identification of 'Candidatus Phytoplasma solani' (16Sr XII-A) infecting strawberry plants in the United Kingdom. New Disease Reports 31:5. Quaglino, F, Y Zhao, P Casati, D Bulgari, PA Bianco, W Wei, RE Davis, 2013. 'Candidatus Phytoplasma solani', a novel taxon associated with stolbur-and bois noir-related diseases of plants. IJSEM 63:2879–2894.

Species PLRV00 Potato leaf roll virus

Date 07.01.2021

Name of the assessor Mogens Nicolaisen

Quarantine status in the PRA area Quarantine

Taxonomic group Viruses and viroids

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large		X X X		Only European isolates are treated here. European isolates of PLRV are widespread in Europe (CABI)
Pathway 1	**Plants for planting**				*Infected tubers of Solanum tuberosum*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely			X X X	PLRV can be carried with infected potato tubers. As PLRV is widespread in Europe (CABI) and if it is not monitored, the pest will very likely enter the PRA area through the import of seed potatoes

ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot		Assuming that imported seed potatoes are certified (and tested for the presence of PLRV), the likelihood of introducing the pest is significantly reduced. If not properly tested, ware potatoes could represent a risk if a

Question	Answer options				Justification
be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	proportion is used as seed potatoes in private gardens
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	According to statistical information approximately 40,000 tons of potato is imported annually into the PRA area from a wide variety of countries. No distinction

annually? (pathways A-E)	Large		between ware and seed potatoes can be extracted form the information.
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X X	PLRV can transfer to other potato plants via vectors, Myzus persicae being the most efficient (Descriptions of Plant Viruses, Potato leaf roll virus). However, distance between plants is of high importance and Plantevernleksikonet states that at 100 m distance, transmission is insignificant.
Pathway 2	Natural spread		*Aphid vectors*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	As only tubers of Solanum tuberosum are imported, the presence of viruliferous vectors is highly unlikely on this commodity. However, viruliferous vectors could on rare occasions hitchhike on other imported material (plants for planting)

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	If imported plant material is examined for the presence of aphids, this will reduce the risk of entry through this pathway

ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large				According to statistical information approximately 40,000 tons of potato is imported annually into the PRA area from a wide variety of countries. No distinction between ware and seed potatoes in the statistical information.
			X	X	X	

Question	**Answer options**				**Justification**
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely		X	X	Suitable vectors will be present (Heie 1994) and viruliferous aphids will be able to infect potato plants
Pathway 3		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	**Answer options**				**Justification**
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			

ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X	X	X	PLRV could reproduce in potato plants and PLRV could overwinter in infected tubers used as seed potatoes the following year or in spilled potatos from the preceding year
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small				Potato is grown in a large area of the PRA area

Question	Answer options				Justification
	d. Medium		X		
	e. Large	X		X	
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	Once infected plants are present, transmission would be rather quick though the presence of suitable vectors in the PRA area. However, spread is insignificant if distance between fields is larger than 100 m (Plantevernleksikonet). Trade, sharing etc of infected tubers would incrfease the spread of the virus.
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent	X	X	X	PLRV will accumulate rapidly in infected hosts and its vector is present in the PRA area (CABI, Heie, 1994)

	It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent		
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X X	PLRV is one of the most devastating viruses infecting potatoes where it is present (Plantevernleksikonet) and losses may be up to 100 %.

Question	**Answer options**				**Justification**

	l. 25-50 million € per year		

Question	Answer options				Justification
	m. > 50 million €per year				

IMP2: Would the pest cause the following indirect economic impacts in the PRA area? 1. Would the pest impact foreign trade?	No Yes	*1*	*0*	*1*	The virus is not statutory in most countries and would thus not pose any restrictions on the export of potatoes. The potato industry would experience consequences as losses caused by PLVR could be substantial (Plantwise; Plantevernleksikonet).

Question	**Answer options**				**Justification**
Is the pest a vector for other pests? Would the pest have a significant impact on the profitability of some				X	
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X	X	X	Potato is the only host in the PRA area (Plantevernleksikonet)
IMP4: Would the pest have the following environmental or social impacts in the PRA area? Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important,	No Yes	*0*	*0*	*0*	Justification

recognized position in the Finnish culture			
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X X X	According to CABI, the virus is present in most European countries
MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X X X	As the most likely entry pathway is potato tubers, visual inspection cannot be used as the virus does not produce any easily recognizable symptoms in tubers (although it may show net necrosis in the tuber flesh (CABI)). ELISA is widely
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X X X	Use of certified seed potatoes would efficiently eliminate the virus. However, overwintering/spill tubers may provide a route for new infections. No alternative hosts are present in the PRA area (Plantevernleksikonet)

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the	Easy Rather difficult	X	X	X	Symptoms on plants from infected tubers usually show strong symptoms wheas newly infected tubers (via the vector) show less distinct symptoms (CABI).

pest's occurrence in the PRA area?	Very difficult Impossible		Monitoring potato fields/seed potatoes can be done using using ELISA (EPPO PM4/028)
References			CABI: https://www.cabi.org/isc/datasheet/42783#toDistributionMaps; Descriptions of Plant Viruses: http://www.dpvweb.net/dpv/showdpv.php?dpvno=36; CABI (Myzus persicae): https://www.cabi.org/isc/datasheet/35642; Heie OE, 1994. The Aphidoidea of Fennoscandia and Denmark. V. Family Aphididae: Part 2 of tribe Macrosiphini of subfamily Aphidinae. In: Fauna Entomologica Scandinavica, 28 1-242; https://gd.eppo.int/taxon/PLRV00; Plantwise: https://www.plantwise.org/KnowledgeBank/datasheet/42783; EPPO PM4/028 https://gd.eppo.int/taxon/PLRV00/documents

PSDMCA Paraburkholderia

Species caryophylli

Date 07.01.2021

Name of the assessor May Bente Brurberg

Quarantine status in the PRA area Quarantine

Taxonomic group Bacterium and phytoplasma

Question	**Answer options**				**Justification**
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large		X	 X	Present in some of the United States, some countries in South America, in China, India, Japan. Restricted presence in EI (Italy and Serbia) [EPPO].
Pathway 1	**Plants for planting**				*Dianthus*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	 X	A combination of plant tests, new cultivars and measures minimizing cross contamination during propagation has resulted in a Dianthus crop which is largely free from the pest today [EPPO].

than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot		Testing for the pest is part of the certification schem for carnation [EPPO]. No reported interception the last ten years [EUROPHYT].

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely	X	X	X	
ii) be transported from one country to another with other than host plant commodity, transport	c. It can, but it is unlikely				

or passengers (pathway F)?			
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely		
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	No current information about import volumes of planting material of Dianthus could be obtained from 2010 [SSB].The total import volume of all ornamentals for planting exceeded 3 mill kg since 2015 but included other species than Dianthus.
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X X	Dianthus are common garden plants and also occur in the wild.
Pathway 2			
ENT2A: Not taking into account current management measures, can the pest i) be transported in international	No it cannot It can, but it is very unlikely	X X X	

trade with the host plant commodity considered in the pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot	X	X	X	
i) be transported in international trade with the host plant commodity considered in the	b. It can, but it is very unlikely				

pathway (pathways A-E)?					
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely	X	X	X	

	It can, and it is very likely		
Pathway 3			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	
ENT2B: As in ENT2A, but taking into account current official entry management measures	No it cannot It can, but it is very unlikely	X X X	

i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?					

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	
Pathway 4			
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during	d. It can, and it is likely				

the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	a. No it cannot b. It can, but it is very unlikely c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely	X X X	

ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	
Pathway 5					
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	

commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	It survives in Dianthus planst that are perennial.
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small	X	Dianthus plants are grown and occur throughout Norway.

Question	Answer options				Justification
	d. Medium	X			
	e. Large			X	
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly	X	X	X	No known vectors, but can spread with planting material.
	Rather slowly				
	Rather quickly				
	Quickly				
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not	X	X		It reproduces asexually, and can probably survive without host plants e.g. in soil [Compant et al. 2008].
	It has characteristics that could assist to some extent				
	It has characteristics that could assist to a great extent			X	
	It has characteristics that could assist to a very great extent				
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area	X	X	X	Dianthus are produced in the PRA, but specifications of numbers have not been found in SSB. More than 2.5 mill Dianthus was produced in Norway yearly in 2019 and 2020
	< 0.05 million € per year				
	0.05-0.1 million € per year				
	0.1-0.2 million € per year				
	0.2-0.4 million € per year				
	0.4-0.8 million € per year				
	0.8-1.5 million € per year				
	1.5-3 million € per year				

	3-6 million € per year 6-12 million € per year 12-25 million € per year		

Question	Answer options				Justification
	l. 25-50 million € per year				

Question	Answer options				Justification

	m. > 50 million €per year		
IMP2: Would the pest cause the following indirect economic impacts in the PRA area?	No Yes	0 0 2	
1. Would the pest impact foreign trade?		X	

Question	Answer options				Justification
Is the pest a vector for other pests? Would the pest have a significant impact on				X	

the profitability of some			
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X X X	A few spcies of wild Dianthus occurs in Norway, and some are spread from gardens.
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0 0 3*	
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture		X X X	
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X X X	Restricted distribution in Serbia and Italy [EPPO].

MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	 X X	 	 X	Latent infections are common and symptoms can be mistaken.
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	 X	 X 	 X	No chemical or biological control methods available.

Question	Answer options				Justification
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	 X	 X 	 X	Latent infections are common and symptoms can be mistaken. DNA based laboratory methods would be required.

References		Compant, S, J Nowak, T Coenye, C Clément, EA Barka. 2008. Diversity and occurrence of Burkholderia spp. in the natural environment. FEMS Microbiol Rev 32:607–626. Estrada-de Los Santos, P, M, Palmer, B Chávez-Ramírez, C Beukes, ET Steenkamp, L Briscoe, N Khan, M Maluk, M Lafos, E Humm, M Arrabit, M Crook, E Gross, MF Simon, FB Dos Reis Junior, WB Whitman, N Shapiro, PS Poole, AM Hirsch, SN Venter, EK James. 2018. Whole genome analyses suggests that Burkholderia sensu lato contains two additional novel genera (Mycetohabitans gen. nov., and Trinickia gen. nov.): implications for the evolution of diazotrophy and nodulation in the Burkholderiaceae. Genes 9:389. EPPO Global Database. Paraburkholderia caryophylli (PSDMCA). https://gd.eppo.int/taxon/PSDMCA [accessed 04/10/2020]. Pettersen, I, S Kårstad, H Knutsen. 2019. Liten, utsatt, mangfoldig og blomstrende - struktur, innovasjon og verdiskaping i norsk blomsternæring. NIBIO Rapport 5(135). Sawana, A. M Adeolu, RS Gupta. Molecular signatures and phylogenomic analysis of the genus Burkholderia: Proposal for division of this genus into the emended genus Burkholderia containing pathogenic organisms and a new genus Paraburkholderia gen. nov. harboring environmental species. Front. Genet. 5:429.

Species PSTVD0 Potato Spindle Tuber Viroid

Date 07.01.2021

Name of the assessor Mogens Nicolaisen

Quarantine status in the PRA area Quarantine

Taxonomic group Viruses and viroids

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large	X X		X	PSTVd has a worldwide distribution (CABI)
Pathway 1	**Plants for planting**				*Potato seed tubers*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X		X	Considering the worldwide distribution of PSTVd, the import of potato tubes seed it seems likely that the pest can be transported by international trade

be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot		Certification schemes will most probably result in the eradication of PSTVd in potato seed tubers

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely		X		
ii) be transported from one country to another with other than host plant commodity, transport	c. It can, but it is unlikely	X		X	

or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	 d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	 X X X	According to statistical information approximately 40,000 tons of potato is imported annually into the PRA area from a wide variety of countries. No distinction between ware and seed potatoes can be extracted form the information.
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X X	PSTVd can be present in infected potato seed tubers and will thus be introduced into fields. PSTVd is easily transmissible by plant sap and may thus be transmitted by contaminated machinery etc. (Descriptions of Plant Viruses)
Pathway 2	Seeds		*Mostly tomato seeds but also seeds from other solanaceous hosts*
ENT2A: Not taking into account current management measures, can the pest	a. No it cannot	X	Considering the worldwide distribution of PSTVd (CABI) and the import of true seeds of solanaceous plants (mostly tomato seeds), it seems likely that the pest can be introduced by international trade

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely				
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely	X		X	
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Certification schemes will most probably result in the eradication of PSTVd from seeds

Question	**Answer options**				**Justification**
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Not known

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X X	Infected plants will be highly contagious (CABI) and the pest can be easily transmitted mechanically to host plants
Pathway 3		*Specify*	
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification

be intentionally introduced to the PRA area (pathway H)?						
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot	X	X	X	Justification	

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely				
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?					
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			

ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X	X	X	PSTVd could reproduce in potato plants and could overwinter in infected tubers used as seed potatoes the following year. The pest can overwinter in spilled potato tubers.
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small				Potatoes are grown in most ot the PRA area. Tomato and most other Solanaceous hosts are grown in protected greenhouses

Question	**Answer options**				**Justification**
	d. Medium		X		
	e. Large	X		X	
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	PSTVd is spread by infected tubers and mechanically from plant to plant and over longer distances with machinery. Pollen transmission has also been reported. Vector transmission is reported but seems not to be of major importance and requires another virus, potato leaf roll virus for transmission (CABI)
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent	X	X	X	PSTVd is rapidly multiplied in plants. PSTVd is easily transmitted by mechanical means

	It has characteristics that could assist to a very great extent		
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X X X	Potato is widely grown in the PRA area as well as tomato in protected areas. PSTVd can cause yield losses of up to 64 % in potato (CABI) but losses are highly varying. In tomato, fruit setting may stop when plants are stunting as a result of infection whereas in pepper no yield losses have been observed in infected rops (CABI)

Question	**Answer options**				**Justification**

	l. 25-50 million € per year		

Question	Answer options				Justification
	m. > 50 million €per year				

IMP2: Would the pest cause the following indirect economic impacts in the PRA area?	No Yes	*1*	*0*	*1*	As PSTVd is a statutory pest in many countries and RNQP in EU (EPPO) the pest may have impact on foreign trade
1. Would the pest impact foreign trade?		X		X	

Question	**Answer options**				**Justification**
Is the pest a vector for other pests? Would the pest have a significant impact on the profitability of some					
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X	X	X	PSTVd will mostly infect crop plants such as potato and tomato, although it may be transmitted to wild solanaceae
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0*	*0*	*0*	PSTVd will probably only infect crop plants such as potato and tomato to a significant level
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important,					

recognized position in the Finnish culture					
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X	X	 X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X	X	 X	Allthough reported from many European countries, the pest is "Under eradication" or "Few occurrences" in the individual countries (EPPO)
MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X	X	X	According to CABi "In potato, PSTVd can induce severe growth reduction; however, reduction may also be hardly visible. Vines of infected plants may be smaller, more upright, and produce smaller leaves than their healthy
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	A certification scheme would eradicate the pest from seed material. It is not known whether the pest can survive in wild hosts and thus serve as reservoirs. However, the pest is not easily transmitted by vectors, and thus transmission from wild hosts to crops would be unlikely.

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the	Easy Rather difficult	X	X	 X	Molecular detection methods exist and could be used. Visual inspection is erroneous as symptom severity may vary is different species and even cultivars (CABI)

pest's occurrence in the PRA area?	Very difficult Impossible		
References			Descriptions of Plant Viruses; Potato Spindle tuber 'virus': http://www.dpvweb.net/dpv/showdpv.php?dpvno=66; CABI: https://www.cabi.org/isc/datasheet/43659#toDistributionMaps; EPPO: https://gd.eppo.int/taxon/PSTVD0; Pfannenstiel MA and Slack SA, 1980. Response of potato cultivars to infection by the potato spindle tuber viroid. Phytopathology, 70(9), 922-926; Diener TO, 1987. Biological properties. In: Diener TO, Ed. The Viroids. Plenum Press, New York, 9-35; Owens RA and Verhoeven JThJ, 2009. Potato spindle tuber. The plant health instructor. DOI: 10.1094/PHI-I-2009-0804-01; Lebas BSM, Clover GRG, Ochoa-Corona FM, Elliott DR, Tang Z and Alexander BJR, 2005. Distribution of potato spindle tuber viroid in New Zealand glasshouse crops of capsicum and tomato. Australasian Plant Pathology, 34, 129-133; Verhoeven JThJ, Jansen CCC and Roenhorst JW, 2008a. First report of pospiviroids infecting ornamentals in the Netherlands: Citrus exocortis viroid in Verbena sp., Potato spindle tuber viroid in Brugmansia suaveolens and Solanum jasminoides, and Tomato apical stunt viroid in Cestrum sp. Plant Pathology, 57, 399; Verhoeven JThJ, Jansen CCC and Roenhorst JW, 2008b. Streptosolen jamesonii 'Yellow', a new host plant of Potato spindle tuber viroid. Plant Pathology, 57, 399 ; Luigi M, Luison D, Tomassoli L and Faggioli F, 2011. Natural spread and molecular analysis of pospiviroids infecting ornamentals in Italy. Journal of Plant Pathology, 93(2), 1-5

Species PUCCHN Puccinia horiana Hennings

Date 07.01.2021

Name of the assessor Venche Talgø

Quarantine status in the PRA area Quarantine

Taxonomic group Fungi and fungus-like

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large		X	X X	The current global distribution is wide including several countries in Africa, North and South America, Europe, Asia and Oceania (EPPO 2020)
Pathway 1	**Plants for planting**				*Specify*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely		X X	X	According to EU 2020 (year ref. downloaded), there is normally an incubation period of 7-10 days, but it may take up to eight weeks under high temperature conditions, i.e. over 30 °C. Thus, non-symptomatic, infected plants can be traded during that period.

ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot		As for ENT2A

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely				
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely		X		
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely	X			
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely			X	
ENT3: How large a volume of the considered host plant	Non-existent	X	X	X	Potted or as cuttings.

commodity is traded into the PRA area annually? (pathways A-E)	Small Medium Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X X	Glasshouse crop. It will not spread to natural environments.
Pathway 2			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity,	c. It can, but it is unlikely				

transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	 d. It can, and it is likely e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification

ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 3		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity,	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	**Answer options**				**Justification**
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			

ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X	X	X	Only in glasshouse chrysanthemum crops. The ability of the fungus to overwinter outdoors is unknown. In experiments, teliospores in sori on detached leaves survived for 8 weeks at 50% RH but, at higher humidities or when buried in dry or moist compost, they only survived for 3 weeks or less. It would, therefore, appear that infected debris is not likely to be important in the carry-over of the disease.
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small	X	X	X	Unknown glasshouse chrysanthemum production area in Norway

Question	**Answer options**				**Justification**
	Medium Large				
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	Natural spread is unlikely over long distances; it is limited even between glasshouses (or else it would never have been possible to contain the disease at all) CABI
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent	X	X	X	Justification

	It has characteristics that could assist to a very great extent		
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X X X	Depends on the inspection. If discovered early, it may be possable to erredicate. P. horiana is now a feared and serious disease in nurseries, frequently causing complete loss of glasshouse chrysanthemum crops.

Question	**Answer options**				**Justification**

	l. 25-50 million € per year		

Question	Answer options				Justification
	m. > 50 million €per year				

IMP2: Would the pest cause the following indirect economic impacts in the PRA area?	No Yes	*1*	*1*	*1*	It would especially mpact he import and nursery sector
1. Would the pest impact foreign trade?		X	X	X	

Question	**Answer options**				**Justification**
Is the pest a vector for other pests? Would the pest have a significant impact on the profitability of some					
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X	X	X	It wouls not impact natural ecosystems
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0*	*0*	*0*	As a quarantine organisms, sanitation must take place long before the aestetic value of the plant is reduced.
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important,					

recognized position in the Finnish culture					
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X	X	X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X	X	X	It is present in several European countries and widespread in Germany, Belgium, Croatia and France (EPPO 2020)
MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X	X	X	If chlorotic spots occur on the leaf surface, it is easy, but the infection may be at an invisible stage
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	When discovered early (not widespread), several countries have managed to eradicate the fungus, included Norway

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's	Easy Rather difficult	X	X	X	Rather easy - relatively few production sites

occurrence in the PRA area?	Very difficult Impossible		
References			EPPO 2020. Puccinia horiana(PUCCHN). https://www.cabi.org/isc/datasheet/4580 EU 2020. Data Sheets on Quarantine Pests Puccinia horiana. file:///C:/Users/veta/Downloads/datasheet_PUCCHN%20(1).pdf

PUCCPZ Puccinia pelargonii-zonalis

Species Doidge

Date 07.01.2021

Name of the assessor Venche Talgø

Quarantine status in the PRA area Quarantine

Taxonomic group Fungi and fungus-like

Question	**Answer options**				**Justification**
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large			X X X	Wide distribution (EPPO 2020): America (USA, Mexico and Venezuela), Asia (India, Israel and the Republic of Korea), Europe (many countries), Oceania (New Zealand, Australia, New Caledonia, and Papua New Guinea)
Pathway 1	**Plants for planting**				*Specify*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely		X	X X	At an early stage, mycelium of the fungus may be present in infected leaves without showing symptoms, and my therefore be overlooked during a visible inspection. The incubation period is 11-14 days (Tronsmo & Sundheim 1997)

another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot		As for ENT2A

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely				
ii) be transported from one country to another with other than host plant commodity, transport	c. It can, but it is unlikely		X		

or passengers (pathway F)?				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely	X		
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely			X
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent		X	
	Small			
	Medium			
	Large	X		X
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot			
	It can, but it is very unlikely			
	It can, but it is unlikely		X	
	It can, and it is likely			
	It can, and it is very likely	X		X
Pathway 2				*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international	No it cannot	X	X	X
	It can, but it is very unlikely			

trade with the host plant commodity considered in the pathway (pathways A-E)?					

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot	X	X	X	
i) be transported in international trade with the host plant commodity considered in the	b. It can, but it is very unlikely				

pathway (pathways A-E)?					
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely	X	X	X	

	It can, and it is very likely		
Pathway 3		*Specify*	
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international	No it cannot It can, but it is very unlikely	X X X	Justification

trade with the host plant commodity considered in the pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely	X	X	X	Justification

	It can, and it is likely It can, and it is very likely		
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				

iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	Too cold in the winter and no natural hosts
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small	X X X	Only cultivated indoors when out of season (winter)

Question	**Answer options**				**Justification**
	Medium Large				

EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X X X	It may spread quickly within a greenhouse where conditions are warm and humid.
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X X X	The fungus has airborne spores - urediniospores may effectivly spread the fungus indoors
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X X X	Being a quarantine organism, inspection and sanitation are necessary, but an outbreak may not be able to spread to other nurseries/garden centres.

Question	Answer options				Justification
	l. 25-50 million € per year				

Question	Answer options				Justification

	m. > 50 million €per year		
IMP2: Would the pest cause the following indirect economic impacts in the PRA area?	No Yes	 *1 1 1*	It may significantly impact the nursery sector
1. Would the pest impact foreign trade?		X X X	

Question	Answer options				Justification
Is the pest a vector for other pests? Would the pest have a significant impact on					

the profitability of some			
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X X X	The pathogen would not survive the winter outdoors and there are no known natural hosts
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0 0 0*	Very limited impact on the requested criteria.
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture			
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X X X	Widly - see distribution map in EPPO 2020

MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	 X X X	Only easy if leaves shows symptoms.
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X X X	Relativly easy if discovered early

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	Relativly easy due to a limited number of production sites for Pelargonium
References					EPPO. 2020. Puccinia pelargonii-zonalis https://gd.eppo.int/taxon/PUCCPZ Tronsmo AM & Sundheim, L. 1997. Pest risk assessment (PRA) for Norway of the pelargonium rust (Puccinia pelargonii-zonalis) on Pelargonium zonale. PlanteforskRapport 32/97.

QUADPE Comstockaspis perniciosa

Species (Comstock)

Date 07.01.2021

Name of the assessor Daniel Flø

Quarantine status in the PRA area Quarantine

Taxonomic group Insects

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large		X	X X	Algeria ,Congo, Democratic republic of the Morocco , South Africa ,Tunisia , Zimbabwe , Argentina , Bolivia ,Brazil , Canada , Chile , Cuba , Ecuador, Mexico , Paraguay , Peru , United States of America Uruguay , Venezuela, Afghanistan
Pathway 1	**Plants for planting**				*plants for planting*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely		X	X X	Has previously been intercepted on imported plums in Norway

another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot		Justification

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely				
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely		
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely	X X X	
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	 X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X X	Justification
Pathway 2	Natural spread		*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X	 X 	 X	Justification
Pathway 3		*Specify*			

ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 4					*Specify*

ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

Question	Answer options				Justification

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 5		*Specify*	
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	The first larval stage is very cold resistant, and about 20% were reported to withstand long periods at -30°C. The threshold temperature for development of 1st instar larvae is around 9-10°C, although development at this temperature is extremely slow. (See eppo fact sheet) - See degree day map
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small		Possebly attacks Betula spp., >41% of Norway is Betula.

Question	**Answer options**				**Justification**
	Medium Large	X	X	X	

EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X X X	slow, The first-instar larva is the dispersal phase. It can be distributed by wind, birds or flying insects. The most important means of transport, however, is infested nursery material (CABI pest compendium).
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X X X	Females can lay from 50-400 larvae over a period of 6 to 8 weeks.
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X X X	value in 2019 for Epler 163.187.160 kr. Plommer 76.647.270 kr. Pære 6.147.840 kr. sums to 245.982.270 kr. costs would be incresed management costs (Totalkalkylen)

Question	Answer options				Justification
	l. 25-50 million € per year				

Question	Answer options				Justification
Is the pest a vector for other pests? Would the pest have a significant impact on the profitability of some					
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X	X	X	Justification
IMP4: Would the pest have the following environmental or	No	*0*	*0*	*0*	Justification

social impacts in the PRA area? Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture	Yes		
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X X X	Almost the whole of EU
MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X X X	From CABI - In cases of heavy infestation, greyish scales can be found on the bark of the trees. Lighter infestations can be found by laboratory examination with stereomicroscope analyses of the branches, following the survey system
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X X X	Could survive in the forest i.e. Betula

Question	Answer options				Justification
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	Could survive in the forest i.e. Betula
References					https://www.nibio.no/tjenester/totalkalkylen-statistikk#groups/402/9668 EPPO. (2008) Data sheets on quarantime organisms; Quadraspidiotus perniciosus, Data sheets on quarantime organisms. EPPO list A2.; 1979. many ref., European and Mediterranean Plant Protection Organization, Paris. CABI Invasive Species Compendium - https://www.cabi.org/isc/datasheet/46224#tobiologyAndEcology

RADOSI Radopholus similis (Cobb)

Species Thorne

Date 07.01.2021

Name of the assessor Christer Magnusson

Quarantine status in the PRA area Quarantine

Taxonomic group Nematodes

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large			X X X	The pest is restricted to tropical and sub-tropical regions. In the temperate zone The pest is occurring in protected cultivation (green houses and retailers of ornamental plants. Benin, BurkinaFaso, Burundi, Cameroon, Central African
Pathway 1	**Plants for planting**				*Specify*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely			X X X	The pest has been intercepted occasionally on ornamental plants in greenhouse production in Norway. The pest spreads by plants for planting/home cultivation.

commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot		The pest has been intercepted occasionally on ornamental plants in greenhouse production in Norway. The pest spreads by plants for planting/home cultivation

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely				
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely	X X X	
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	24.434.509 kg of P4P in 2019 that could contain plants suitable for R. similis. varenummer "06029098", "06029021", "06029030", "06029041", "06029022", "06029031", "06029099", "06022000", "06029043"
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	The survival of the pest during composting is not well studied. But thermotherapy at 55oC for 20 min will sanitate banana rhizomes from the pest (1). Garden compost could be a pathway from household potted plants to the environment, unless the composting process is carried out ensuring the whole volume of material have reached the maximum temperatures.
Pathway 2			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the	No it cannot It can, but it is very unlikely	X X X	Justification

pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

Question	Answer options				Justification

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 3		*Specify*	
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small	X X X	Justification

annually? (pathways A-E)	Medium Large		

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	Sub tropical species. Could survive in greenhouses
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small	X X	Possibly on potatos

Question	Answer options				Justification
	Medium Large			X	
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	The pest lives only in soil and has a low rate of spread
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X	X	X	The pest is a highly polyphagous parasite that attacks a wide range of agronomic and horticultural crops as well as many weeds. To date, this nematode has been observed in tropical and sub-tropical regions infecting more than 365 plant species belonging to several families including Solanaceae, Fabaceae, Poaceae Apiaceae Brassicaceae, Pinaceae and Rosaceae. Generally, this nematode does not reproduce at temperatures below 16–17 °C. However, populations exposed to lower temperatures for longer periods could adapt and
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year	X	X	X	We have no information on the impact of the pest in greenhouse production of Araceae (Anthurium spp., Epipremnum spp., Philodendron spp., Spathifillum spp. and Syngonium spp.) and Marantaceae (Calathea spp. and Maranta spp.) in Norway. Solanum tuberosum is an artificial host (only in inoculation studies or under laboratory conditions, no records of infection in the field or the environment).

	1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year		

Question	Answer options				Justification
	l. 25-50 million € per year				

Question	Answer options				Justification

	m. > 50 million €per year		
IMP2: Would the pest cause the following indirect economic impacts in the PRA area? 1. Would the pest impact foreign trade?	No Yes	*1* *1* *1*	Trade impacts in ornamental plants are unknown in Norway. The pest has been intercepted in Norwegian greenhouse production but the The economic impact is not known.

Question	**Answer options**				**Justification**
Is the pest a vector for other pests? Would the pest have a significant impact on		X	X	X	

the profitability of some			
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X X X	No impact
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0 0 0*	Justification
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture			
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X X X	Belgium, France, Italy and the Netherlands

MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible		X 	X X	Plants need to be analysed by exstraction of nematodes
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible		X	X 	X 	Stop in production and economic loss

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X	X 	X 	It is easy for this nematode to go undetected because of unspecific symptomes
References					EFSA panel of planth healt - Radopholus similis 2014

Species SCIRAC Lecanosticta acicola

Date 07.01.2021

Name of the assessor Iben Margrete Thomsen

Quarantine status in the PRA area Quarantine

Taxonomic group Fungi and fungus-like

Question	**Answer options**				**Justification**
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large		X	 X	Mostly found in USA, and scattered occurences in Europe (and Asia)
Pathway 1	**Plants for planting**				*Forestry or ornametals*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Low likelihood of importinmg live pine plants from USA even with no restrictions. Scattered presence in Europe means low risk, but depends on amount of import from countries where the fungus is present. However, most pine plants are produced in Norway.

or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot	X	No import of live conifer plants from North America, inspections in nurseries in EU should catch the symptoms.

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely	X		X	
ii) be transported from one country to another with other than host plant commodity, transport	c. It can, but it is unlikely				

or passengers (pathway F)?			
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely		
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Pine plants are generally produced in Norway.
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	If infected plants are planted in pine forests, local spread is likely. Windborne ascoospores not likely to be produced in Norway, only conidia, which are spread by rain, and perhaps by animal vectors and forestry equipment.
Pathway 2	Hitchhiking		*In seed lots contaminated with infected needles*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international	No it cannot It can, but it is very unlikely	X X X	Import of pine seeds from North America is probably rare and unlikely to contain needles.

trade with the host plant commodity considered in the pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Same as above
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Import of pine seeds from North America is probably rare.

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Only if needles in seed lots are discarded outside near host plants
Pathway 3	Other living plant parts	*Cut branches for decoration*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Not very likely cut pine branches are imported.

be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Same as above

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Not very likely cut pine branches are imported.
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	If the imported branches are used outside (eg decorations on graves in church yards).
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the	No it cannot It can, but it is very unlikely	X X X	Justification

pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

Question	Answer options				Justification

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 5		*Specify*	
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large				
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X	X	X	Yea, but probably only as conidia (local spread), not ascospores (wind spread).
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small				Pinus sylvestris is common in all of Norway, not so much other pine species.

Question	**Answer options**				**Justification**
	d. Medium		X		
	e. Large	X		X	

EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X X X	Only local spread with conidia
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X X X	Windborne ascospores only produced in southern USA, not in the northern parts.
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X X X	Early eradication woudl be less costly, but if the pathogen became widespread and caused a lot of damage, the economic loses could get high.

Question	Answer options				Justification
	l. 25-50 million € per year				

Question	Answer options				Justification

	m. > 50 million €per year		
IMP2: Would the pest cause the following indirect economic impacts in the PRA area?	No Yes	 2 2 2	If infections become widespread nurseries producing pine plants would be affected.
1. Would the pest impact foreign trade?		X X X	

Question	Answer options				Justification
Is the pest a vector for other pests? Would the pest have a significant impact on		X	X	X	

the profitability of some			
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X X X	But only if the pathogen became widespread, and this has not happened in other countries in Europe.
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*2 2 3*	Beacuse Pinus sylvestris is an important tree species in Norway.
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture		X X X X X X X	
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X X X	Scattered finds in most countries, but usually under eradication.

MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X	X	X	Symptoms are fairly easy to detect in late summer, but can be confused with other needle fungi on pine.
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	If brought in via plants and caught early, it should be possible to eradicate. If natural spread and many infected areas, it would be rather difficult.

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	Easy if origin of plants for planting known, as areas with imported pines can be surveyed. Difficutl if infections are established in older trees.
References	EPPO datas sheet on Mycosphaerella dearnessii and Mycosphaerella pini				

Species SMOV00 Strawberry mottle virus

Date 07.01.2021

Name of the assessor Mogens Nicolaisen

Quarantine status in the PRA area Non-quarantine

Taxonomic group Viruses and viroids

Question	**Answer options**				**Justification**
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large		X	X X	SMoV is probably distributed worldwide (Plant Viruses Online), probably in all areas with strawberry production (Mellor and Krzal 1987). According to CABI, mostly found in Southern Europe, Northern and South America, East Asia and
Pathway 1	**Plants for planting**				*Strawberry for planting*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely			X X X	Since SMoV is present worldwide (Plant Viruses Online) it is likely that the virus can be transported with plants for planting

or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot		X		EFSA (2014) in a scientific opinion on another strawberry virus (Strawberry Latent C Virus) states that voluntary certification schemes for strawberry constitutes a very strong limitation to the spread of SLCV through plants for

Question	**Answer options**				**Justification**
be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X		X	planting. The plants for planting of Fragaria imported from countries where the pest is present have to be officially certified under a certification scheme or derived in direct line from material which is maintained under appropriate conditions, and no symptoms of diseases. Although this statement is from an opinion for Strawberry Latent C Virus this is also relevant for SMoV. SMoV can be detected using molecular methods (Thompson et al 2003) .

spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	The quantity of imported strawberry plants for planting into the PRA area is not known
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X X	SMoV is transmitted mainly by Chaetosiphon fragaefolii, but also other vectors exist. Therefore, the virus may be transmitted from infected strawberry plants to wild Fragariae (Express PRA for "Strawberry Mottle Virus".
Pathway 2	Natural spread		*Viruliferous vectors*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the	No it cannot It can, but it is very unlikely	 X X	Vectors can be transported by wind, however considering the natural borders of the PRA area this seems unlikely

pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely			X	
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Not relevant
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

Question	Answer options				Justification

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 3		*Specify*	
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small	X X X	Justification

annually? (pathways A-E)	Medium Large				

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	As a virus the pest will be able to survive in living strawberry plants
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small	X	1500 ha of strawberry is grown in Norway (Norwegian express PRA for Chaetosiphon fragaefoli). Hosts in the wild (e.g. F. vescaare probably present throughout Norway

Question	Answer options				Justification
	Medium Large	X		X	
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	SMoV may be spread by trade and other human transportation - or by insect vectors. Trade of infected plants for planting will rapidly spread SMoV in the PRA area if not detected. The main vector Chaetosiphon fragaefoli is likely not present or very rare in Norway (Norwegian express PRAfor Chaetosiphon fragaefoli). However, SMoV is also transmitted by C. thomasi, C. minor, C. jacobi, Acyrthosiphon pelargonii rogersii, Amphorophora rubi, Aphis gossypii, Chaetosiphon tetrahodum, Myzaphis rosarum, Myzus ascalonicus, Myzus ornatus, Rhobium porosum, although the role of those vectors in transmission
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X	X	X	It is a virus

IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area		X		SMoV has recently been causing serious damage in strawberry crops in North America (Demschak 2013). It seems that in this case most damaged plants were double infected with SMoV and other viruses. This case underpins the potential for crop loss due to SMoV. Alone, SMoV can cause yield losses of up to 30% (Thompson and Jelkmann 2003)
	< 0.05 million € per year				
	0.05-0.1 million € per year				
	0.1-0.2 million € per year				
	0.2-0.4 million € per year				
	0.4-0.8 million € per year				
	0.8-1.5 million € per year				
	1.5-3 million € per year				
	3-6 million € per year				
	6-12 million € per year				
	12-25 million € per year	X		X	

Question	**Answer options**				**Justification**
	l. 25-50 million € per year				

Question	Answer options				Justification
	m. > 50 million €per year				
IMP2: Would the pest cause the following indirect economic impacts in the PRA area?	No Yes	*1*	*0*	*2*	Strawberry export from Norway is probably minimal. SMoV would have significant impact on the strawberry production sector in the form of reduction of yields
1. Would the pest impact foreign trade?				X	

Question	Answer options				Justification

Is the pest a vector for other pests? Would the pest have a significant impact on the profitability of some		X X	
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X X X	As the main vector is nearly absent from Norway, SMoV will only have limited effect on natural populations of e.g. F. vesca
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0 0 3*	As the main vector is nearly absent from Norway, the virus will only have negligible effects
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture		X X X	
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area	X X X	According to Express PRA for "Strawberry Mottle Virus" it is present worldwide in strawberry production: "SMoV is regarded as prevalent in all strawberry production areas in

	Yes in a large area		the world (Mellor & Krzal1987), but up till today no case of
MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X X X	No discriminative symptoms have been described (Plant Viruses Online). Molecular methods exist for SMoV detection (e.g. Thompson et al 2003)
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X X X	In case of outbreaks, areas must be kept free from host plants (strawberry), and new virus-free planting material must be used. If spread to wild plants eradication will be nearly impossible

Question	Answer options				Justification
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	Molecular test methods exist (e.g. Thompson et al 2003). Infections cannot be diagnosed solely based on visual inspection

References	Plant Viruses Online: http://bio-mirror.im.ac.cn/mirrors/pvo/vide/descr761.htm; CABI: https://www.cabi.org/isc/datasheet/52407#toDistributionMaps; Mellor FC & Krczal H (1987) Strawberry mottle, pp 10-16, in Converse RH (ed) Virus diseases of small fruits. USDA, Agriculture Handbook Number 631. 277 pp; EFSA Panel on Plant Health 2014. Scientific opinion on the pest categorization of Strawberry Latent C Virus. EFSA journal 12(7) 3771. Demchak K (2013) Strawberry Virus Alert http://extension.psu.edu/plants/treefruit/news/2013/strawberry-virus-alert; Express PRA for "Strawberry Mottle Virus": https://www.mattilsynet.no/planter_og_dyrking/planteskadegjorere/virus_og_viroider_i_planter/virus_i_jordbaer/risikoanalyse_for_strawberry_mottle_virus__nibio_2014.38736/binary/Risikoanalyse%20for%20Strawberry%20mottle%20virus_%20NIBIO%202014 Thompson, Wetzel, Klerks, Vasková, Schoen, Spak, Jelkmann 2003 Multiplex RTPCR Detection of Four Aphid-Borne Strawberry Viruses in Fragaria Spp. In Combination With a Plant mRNA Specific Internal Control. J Virol Methods 111: 85-93 Thompson and Jelkmann 2003 The detection and variation of strawberry mottle virus. Plant disease 87: 385-390. Babini AR, Cieslinska M, Karesova R, Thompson JR, Cardoni M, Malinowski T, Paprstein F & Jelkmann W (2001) Occurrence and indenfication of strawberry viruses in five European countries. Acta Horticulturae 656, 39-44; Cieslinska M & Zawadzka B (1996) The spread of strawberry mottle virus and its effect on the yield of three strawberry cultivars. Journal of Fruits and Ornamental Plant Research 3, 131-139.

SPODLI Spodoptera littoralis

Species (Boisduval)

Date 07.01.2021

Name of the assessor Daniel Flø

Quarantine status in the PRA area Quarantine

Taxonomic group Insects

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large		X		Native to Africa (present in all counties?). Also present in Greece, Italy, Portugal, Spain, France, Turkey, Cyprus, Malta, Bahrain, Iraq, Jordan, Lebanon, Oman, Saudi Arabia, Syria, United Arab Emirates, Yemen, Israel. Uncertainty because of
		X		X	
Pathway 1	**Plants for planting**				*plants for planting, seedlings, cut flowers or branches*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely				Spodoptera littoralis has been intercepted numerous times, usually on cuttings, Vegetables, Herbs, plants, sent from African countries to the Netherlands.But was also intercepted on leaves of Mentha spp., from Ethiopia to Norway (EPPO rep 2016 no. 10). These interceptions are probably adults, inaddition eggs or larvae may be ppresent.
		X	X	X	

be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot		Justification

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely				
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely		
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely	X X X	
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	1770 metric tons of krysantemum in 2019 alone. se ssb data
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 2			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the	No it cannot It can, but it is very unlikely	X X X	Justification

pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

Question	Answer options				Justification

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 3		*Specify*	
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small	X X X	Justification

annually? (pathways A-E)	Medium Large				

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	Has been present in Europe since the 1930s, but does not spread North. The minimum constant temperature for normal development in all stages is 13-14°C (CABI). Newly laid eggs of S. littoralis were reported to survive exposure to 1°C for 8 days (EPPO data sheet). exposure to temperatures not exceeding 1.7°C for for at least 10 days will kill all stages of S. littoralis (CABI) . Will probably survive in greenhouses. Low winter temperatures would limit establishment outdoors in norway. Pupation may takes place in the soil? Unknown if in plants are grown in greenhouses year-round?

EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small		X 	X X	Greenhouse production area is unknown

Question	Answer options				Justification
	Medium Large				
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly		X	X X	Has shown the ability to spread far with the movement of plants. Spodopteru littorulis have a flight range of 1.5 kilometers during a period of four hours overnight (Salama H.S., Shoukry A. 1972). flight activity during the life span of the moth which may extend to 10 days probably facilitates its dispersion and oviposition on different hosts and as well to feed on the nectar of different flowers.
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent		X	X X	can lay up to 1000 eggs (CABI - Khalifa et al., 1982). Can possebly overwinter in soil. has host plants from 40 different plant families.

IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area		X		Unlikely to cause significant damage outdoors. Would increse pest menagement costs in greenhouses mainly Chrysanthemum, Rosa and Tomat. Could also attack potato during summer. Shuld be possible to eradicate from greenhouses.
	< 0.05 million € per year				
	0.05-0.1 million € per year				
	0.1-0.2 million € per year				
	0.2-0.4 million € per year				
	0.4-0.8 million € per year				
	0.8-1.5 million € per year				
	1.5-3 million € per year				
	3-6 million € per year				
	6-12 million € per year				
	12-25 million € per year	X		X	

Question	**Answer options**				**Justification**
	l. 25-50 million € per year				

Question	Answer options				Justification
Is the pest a vector for other pests? Would the pest have a significant impact on the profitability of some					
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X	X	X	May damage some parts of wild plants, but the damage would not kill the plants, and the damage would not hinder the functioning of the ecosystems. In addition, the species is not belived to be able to survive outdors due to low temperature.
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0*	*0*	*0*	Justification
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture					
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X	X	X	

MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area		X X X		France, Italy and Spain
MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible		X X X		Pheromeone traps can be used to monitor S. littoralis (CABI). Possibly also lighten traps. Adults can be identified morphologically. molecular-based methods may be necessary to determine juveniles to species level.
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible		X X X		Biological Control, Chemical Control and IPM strategies are available. However, the species is probably unable to persist in Norway due to sub zero temperature.

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	Pheromeone traps can be used to monitor S. littoralis (CABI). Possibly also lighten traps. Adults can be identified morphologically. molecular-based methods may be necessary to determine juveniles to species level. also cause considerable damage by feeding on the leaves wich is easely observable.

References		EPPO. Data sheets on quarantime organisms: Spodoptera littoralis and Spodoptera litura, Data sheets on quarantime organisms. EPPO list A2., European and Mediterranean Plant Protection Organization, Paris. Khalifa A., Iss-hak R.R., Foda M.E. Vertical and horizontal distribution of the Egyptian cotton leafworm eggmasses in cotton fields in Egypt, Research Bulletin, Faculty of Agriculture, Ain Shams University; 1982. (1749):6 [+8] pp. 9 ref. Totalkalkylen - statistikk https://www.nibio.no/tjenester/totalkalkylen- statistikk#groups/402/9888 Salama H.S., Shoukry A. (1972) Flight Range of the Moth of the Cotton Leaf Worm Spodoptera littoralis (Bois.). Zeitschrift für Angewandte Entomologie 71:181-184. DOI: 10.1111/j.14390418.1972.tb01739.x.

Species STLCV0 Strawberry latent C virus

Date 07.01.2021

Name of the assessor Mogens Nicolaisen

Quarantine status in the PRA area Quarantine

Taxonomic group Viruses and viroids

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of	Small Medium Large		X	X X	SLCV is found in the eastern parts of North America and in Japan (EPPO Data Sheets)

the pest? (pathways A-F)			
Pathway 1	**Plants for planting**		*Strawberry plants for planting*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	SLCV is latent and only produces symptoms in combination with other viruses. No known detection methods exist (EFSA 2014; EPPO Data Sheets). Therefore SLCV may be imported unknowingly. However, as it only is present in parts of North America and Japan (EPPO) introduction seems unlikely as it is presumed that very few if any strawberry plants for planting are imported from those areas
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot	X	SLCV is latent and no known detection methods exist. However, EFSA (2014) states that voluntary certification schemes for strawberry constitutes a very strong limitation to the spread of SLCV through plants for planting. The plants

Question	Answer options				Justification
be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X		X	for planting of Fragaria imported from countries where the pest is present have to be officially certified under a certification scheme or derived in direct line from material which is maintained under appropriate conditions, and no symptoms of diseases.
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	The quantity of imported strawberry plants for planting into the PRA area is not known
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely	X	X	 X	If infected plants are planted SLCV can be transmitted to neighboring plants by vector transmission (the main vector being Chaetosiphon fragaefolii, which is widespread in Europe (EPPO), but not common in the PRA area (Norwegian Express PRA)

	It can, and it is very likely		
Pathway 2			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				

iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 3		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small	X X X	Justification

annually? (pathways A-E)	Medium Large				

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	SLCV could survive in strawberry plants in the field.
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small		Cultivated area of strawberry in Norway is 1500 ha (Norwegian express PRA). SLCV can also infect Fragaria vesca (EPPO Data Sheets), which is present in Norway

Question	Answer options				Justification
	Medium Large	X	X	X	
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	SCLV spreads from plant to plant through an aphid vector Chaetosiphon fragaefolii. According to a Norwegian express PRAfor Chaetosiphon fragaefolii: "Two winged specimens (1 female and 1 male), trapped at Ås in September 1955, are the only finds of this species published from Fennoscandia (TambsLyche 1970, details provided by Steffen Roth, NHM Bergen, where specimens are kept). Stenseth (1989) surveyed aphids on strawberry in Norway and did not find the species". The same express PRA concluded that the likelihood of the vector establishes in Norway is moderate with a high degree of uncertainty.
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X	X	X	It is a virus and rapidly reproduces in the plant

IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X	X	X	SLCV is as the name indicates latent in most cases and mostly causes losses in combination with other viruses such as Strawberry mottle virus or Strawberry vein-banding virus. However, the importance and impact of SLCV have both essentially disappeared in North America, most probably "as a result of modern practices including the systematic use of certified planting materials and the use of short crop cycles. Such practices are also widely used in the EU and have broadly reduced the impact of strawberry viruses." (EFSA 2014)

Question	**Answer options**				**Justification**
	l. 25-50 million € per year				

Question	Answer options				Justification
	m. > 50 million €per year				
IMP2: Would the pest cause the following indirect economic impacts in the PRA area?	No Yes	*2*	*0*	*2*	If present in Norway, in case of export of plants for planting, legislation may cause restrictions.
1. Would the pest impact foreign trade?		X		X	

Question	Answer options				Justification

Is the pest a vector for other pests? Would the pest have a significant impact on the profitability of some		X X	
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X X X	SLCV would be transmitted only very slowly. The vector is at present not common in Norway, and willd Fragaria (F. vesca) is a poor host of the vector (Norwegian Express PRA Chaetosiphon fragaefolii)
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0 0 0*	Due to low transmission, low economic impact, latency and limited transmission to wild species, it is considered not to have any significant environmental or cultural impact
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture			
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area	X X X	Not present according to EPPO

	Yes in a large area		
MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X X X	As the name indicates, SLCV does not show symptoms, except in co-infections with other viruses (EFSA 2014). No diagnostic methods apparently exist
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X X X	No efficient detection method apparently exist. The main control measure is use of certified virus-free planting material. In case of an outbreak, strawberry should not be grown for a period in that area. If SLCV is spread to e.g. wild strawberry, eradication would be nearly impossible.

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	"SLCV is defined only by symptoms in strawberry indicators. It has not been characterised, is not recognised as a valid species, and reliable detection assays are unavailable" (EFSA 2014)
References					EFSA Panel on Plant Health 2014. Scientific opinion on the pest categorization of Strawberry Latent C Virus. EFSA journal 12(7) 3771. EPPO Data Sheets on Quarantine Pests. Strawberry latent C 'rhabdovirus' https://gd.eppo.int/taxon/STLCV0/documents. Norwegian Express PRA for Strawberry Latent C Virus. Norwegian Express PRA for Chaetosiphon fragaefolii

TORTPR Cacoecimorpha pronubana

Species Hübner / 21.09.2020

Date 07.01.2021

Name of the assessor Bjørn Arild Hatteland

Quarantine status in the PRA area Non-quarantine

Taxonomic group Insects

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large		X	X X	Most of Europe, including Denmark and Netherlands. Present in northern africa, and restricted distrebutions in Russia and the US.
Pathway 1	**Plants for planting**				
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely		X	X X	C. pronubana is not included in Council Directive 2000/29, the principal Directive that sets out the EC Plant Health regime. Cacoecimorpha pronubana is the subject of European Council Directive 74/647/EEC that lays down requirements needed by EU Member States to inhibit the spread of C. pronubana. (FERA PRA, 2000). There no interceptions reported in Europhyt for the last 20 years. The history of the spread shows that the species is able to survive the transport and the species is spread internationaly mainly with plant material or other organic material, but probably also with other goods.

than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot		

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely				
ii) be transported from one country to another with other than host plant commodity, transport	c. It can, but it is unlikely	X	X		

or passengers (pathway F)?			
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely	X	
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Dianthus - 823 600, Dendranthema - 1 173 400, Rosa - 673 000 kpl.
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X X	
Pathway 2	Other living plant parts		
ENT2A: Not taking into account current management measures, can the pest i) be transported in international	No it cannot It can, but it is very unlikely		

trade with the host plant commodity considered in the pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely	X	X		
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely			X	
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot				
i) be transported in international trade with the host plant commodity considered in the	b. It can, but it is very unlikely				

pathway (pathways A-E)?					
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely	X	X		
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely			X	
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	ruusu - 14 013 740 milj., neilikka - 12 396 830 milj., krysanteemi - 3 350 319 milj.

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely	X	X	X	

	It can, and it is very likely		
Pathway 3			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	
ENT2B: As in ENT2A, but taking into account current official entry management measures	No it cannot It can, but it is very unlikely	X X X	

i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?					

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	
Pathway 4			
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during	d. It can, and it is likely				

the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	a. No it cannot b. It can, but it is very unlikely c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely	X X X	

ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	
Pathway 5					
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	

commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	The species overwinter as larvae on the host plant. It can probably not survive during the winter otside in the Norwegian climate conditions. However, it can potentially become a pest in greenhoeses. The "neilikat" production does not take place all year round, but there is a possibility that it may establish in some of the other host plants (krysanteemi, ruusu...); "In glasshouses (with a minimum temperature of 15°C, e.g. for roses), more than five generations of C. pronubana may develop each year, and all stages of the insect may be found between spring and autumn. Larvae can overwinter on hosts maintained in glasshouses." (FERA); "In northern areas of its distribution (England), C.

					pronubana overwinters as first or mainly second generation larvae, on plants in
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small		X	X	major hosts include Brassica, Picea (spruce), Pinus (pine), Prunus, Rosa. Minor hosts include Prunus (stone fruits) and Fragaria (strawberry)

Question	Answer options				Justification
	Medium Large			X	
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	The adults can disperse themselves locally; The large-bodied females cannot fly easily and only males are normally active. (EPPO). "The larvae emerge within a few seconds and, being positively phototactic, quickly move or are carried in wind to the young growing points or flowers. Here, they spin silk around two to three terminal leaves or petals, and feed on the upper surface" (EPPO)
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent	X	X	X	C. pronubana may have several generations in greenhouses, and the female may lay up to 700 eggs. This species have many host plants, and several of them are grown in greenhouses.

	It has characteristics that could assist to a very great extent		
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X X X	In spite of the polyphagous nature of this insect, serious damage is confined mainly to carnation crops in the Mediterranean area, where losses have been reported since the 1920s. In France, around Nice, 25-35% of carnations were affected in 1972-1973, and losses in consignments for export were valued at about 100 000 F. In Morocco, C. pronubana was first found in 1933, on citrus, but it was not until 20 years later that it developed into a widespread pest on this crop, the larvae destroying foliage and damaging fruit. In Algeria, it is found mainly on lemons, but is not considered a serious pest. In Italy (Sicily) surveys reported C. pronubana mainly on olives, weeds and roses but not on lemons (Inserra et al., 1987; Siscaro et al., 1988). In northern countries (e.g. Poland), C. pronubana is important in glasshouses. (EPPO) . Potential host plants and thus damage in Norwegian conditions is expected to affect tomato, Nellika and

Question	**Answer options**				**Justification**

	l. 25-50 million € per year		Chrysantium production. The anual income for Neilika in Norway is almost 1 million NOK, while Chrysanthemum is about 7.5 mill NOK per year. The tomato production in Norway is valued to about 530 mill NOK per year. Thus the highest economic losses due to damage by C. pronubana in Norway is expected to happen in the tomato production.

Question	**Answer options**				**Justification**
	m. > 50 million €per year				

IMP2: Would the pest cause the following indirect economic impacts in the PRA area? 1. Would the pest impact foreign trade?	No Yes	*0* *0* *0*	

Question	Answer options				Justification
Is the pest a vector for other pests? Would the pest have a significant impact on the profitability of some					
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X	X	X	
IMP4: Would the pest have the following environmental or social impacts in the PRA area? Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important,	No Yes	*0*	*0*	*0*	

recognized position in the Finnish culture					
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X	X	X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X	X	X	Widespread in Belgium, France, Italy, Malta, Spain, Swidzerland; In some of the other countries has restricted distribution or few occurences.
MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X	X	X	On carnation cuttings terminal and axial leaves and buds are enclosed in silk and eaten, becoming typically crooked; this is usually more serious in spring. On carnation flowers the buds are penetrated by the larvae; petals may be joined
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	The species will probably not survive in the Norwegian climatic conditions, so the break in the cultivation during winter will help for eradication. "C. pronubana is a pest that can be managed by the domestic horticulture industry given that there are effective chemical controls and physical methods available

Question	Answer options				Justification

MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X X X	Monitoring of C. pronubana populations is carried out by sex pheromone traps (EPPO)
References			EPPO Data Sheet; CABI 2014; FERA PRA: http://www.fera.defra.gov.uk/plants/plantHealth/pestsDiseases/documents/cac oecimorphaPronubana.pdf

XANTDF Xanthomonas axonopodis

pv. dieffenbachiae (McCulloch

Species &Pirone) Vauterin et al.

Date 07.01.2021

Name of the assessor Simeon Rossmann

Quarantine status in the PRA area Quarantine

Taxonomic group Bacterium and phytoplasma

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large		X	X X	Xad (outdated taxonomy) has been reported from various locations in the Americas, parts of Australia, South Africa, some European countries and various regions in Asia [EPPO]. Because the pest has a failry narrow host range of plants
Pathway 1	**Plants for planting**				*Host plants from the Araceae family*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely		X	X X	No registered interceptions in Europhyt in the accessible records, hosts are imported regularly but only for direct sale, not commercial production in the PRA. Pest survives without living host plants for a limited amount of time.

be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			

Question	Answer options				Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	There are no specific management strategies aimed at controlling import of this pest via host plants beyond the standard precautions and routines (phytosanitary certificates).

spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	There are no import statistics available that would allow direct conclusions on the import of Xad host plants from the Araceae family of ornamentals specifically, however, the annual amount of all imported potted plants is about 3 million kg (3000 t), making it unlikely that hosts of Xad make up more than 1
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	To the assessor's knowledge, ornamental hosts of the Araceae family are not produced in Norwegian greenhouses, although they are popular household ornamentals. There are also no known wild hosts in Norway. The possibility that maintained commercial populations of host plants beyond the assessor's knowledge exist, however, can not be entirely excluded.
Pathway 2			*Specify*
ENT2A: Not taking into account current management measures, can the pest	a. No it cannot	X X X	Justification

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely				
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

Question	Answer options				Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 3		*Specify*	
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT2B: As in ENT2A, but taking into account	a. No it cannot	X X X	Justification

current official entry management measures			

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely				
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during	d. It can, and it is likely				

the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	The pest can not overwinter without a host plant and there are no wild hosts of Xad in Norway. The possibility that maintained commercial populations of host plants beyond the assessor's knowledge exist, however, can not be entirely excluded.
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small	X X X	see comments to ENT4 and EST1

Question	Answer options				Justification
	Medium Large				
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	Sparse presence of hosts in the PRA, unlikely to be spread without host association.
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X	X	X	High reproductive output and asexual reproduction but hosts are restricted to a single (albeit very large) plant family. Taxonomical identity within Xanthomonas is linked to the host complex and Xad pests (outdated taxonomy) are quite specific to their hosts [Cotty et al., 2018].
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year	X	X	X	As the hosts of Xad (outdated taxonomy) are not currently commercially produced in the PRA (to the assessor's knowledge), economic losses would be related to import and are unlikely to exceed 0.05 million € annually.

	3-6 million € per year 6-12 million € per year 12-25 million € per year		

Question	Answer options				Justification
	l. 25-50 million € per year				

Question	Answer options				Justification

	m. > 50 million €per year		
IMP2: Would the pest cause the following indirect economic impacts in the PRA area? 1. Would the pest impact foreign trade?	No Yes	*0 0 0*	There are no significant wild hosts or commercial productions of hosts in the PRA.

Question	**Answer options**				**Justification**
Is the pest a vector for other pests? Would the pest have a significant impact on					

the profitability of some			
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X X X	There are no significant wild hosts or commercial productions of hosts in the PRA.
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0 0 0*	There are no significant wild hosts or commercial productions of hosts in the PRA.
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture			
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X X X	The pest has been found in commercial greenhouse productions of host plants in multiple EU member states but was not reported in wild hosts, as there are no or very few wild hosts in Europe.

MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X X X	Although the pest usually causes visible symptoms on leaves, it may be present in the host plants latently for a prolonged time period.
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X X X	Because hosts are restricted to greenhouses in the PRA, if at all commercialy propagated, and it can not survive outside its hosts for a prolonged amount of time, eradication would likely only require a short break in cultivation.

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	The pest requires molecular detection for definitive identification [Cottyn et al. 2018], however, the abundance of host plants in the PRA is rather limited and likely restricted to import. A concerted effort to survey all commercial cultivation and import with molecular tools would therefore likely be

References		Constantin EC, Cleenwerck I, Maes M, Baeyen S, Van Malderghem C, De Vos P, et al. Genetic characterization of strains named as Xanthomonas axonopodis pv. dieffenbachiae leads to a taxonomic revision of the X. axonopodis species complex. Plant Pathol. 2016;65(5):792-806. doi: 10.1111/ppa.12461. Cottyn B, Constantin EC, Maes M. Consequences of the taxonomic revision of Xanthomonas axonopodis pv. dieffenbachiae and of the analysis of its associated pathogenicity for the recommendation of regulation (EPPO A2 List). EPPO Bulletin. 2018;48(2):242-4. doi: 10.1111/epp.12463. EPPO. Xanthomonas axonopodis pv. dieffenbachiae (XANTDF) EPPO Global Database (available online) [cited 2020 09/12]. Available from: https://gd.eppo.int/taxon/XANTDF. SSB. 08801: Utenrikshandel med varer, etter varenummer, import/eksport, land, statistikkvariabel og år SSB Database (available online) [cited 2020 09/12]. Available from: https://www.ssb.no/statbank/table/08801/.

XANTVE Xanthomonas vesicatoria (ex

Species Doidge) Vauterin et al

Date 07.01.2021

Name of the assessor Simeon Rossmann

Quarantine status in the PRA area Quarantine

Taxonomic group Bacterium and phytoplasma

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large		X	 X	The pest is present in nearly all countries that farm tomato or pepper, although it prefers warmer temperatures (like its host plants). Countries with presence of the pest in North America, South America, Europe, all parts of Africa, all parts of
Pathway 1	**Seeds**				*True seeds*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely		X	 X	Wide distribution is the main factor for a high likelihood of import of infected seed material occuring. Several but not annual interceptions reported by Europhyt.

be intentionally introduced to the PRA area (pathway H)?			

Question	Answer options				Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	There are currently concerted efforts to implement a zero-tolerance policy on seeds and plant material of pepper and tomato containing Xanthomonas vesicatoria in Norway, in accordance with EU directive (EU) 2020/177. It remains to be seen how effective the suggested policy changes will be (see Mattilsynet).

current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	The assessor estimates the amount of imported pepper and tomtato seed for commercial growth to be below 1 million kg although official numbers could not be found
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Suitable habitats in Norway are restricted to greenhouses as there are no wild hosts and temperatures are typically not warm enough outside.
Pathway 2	Plants for planting		*Seedlings or transplants, fruits and other plant parts except roots*
ENT2A: Not taking into account current management measures, can the pest	a. No it cannot		Wide distribution makes import with plant material likely. Several but not annual interceptions reported by Europhyt.

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely				
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely		X		
iii) spread naturally to the PRA area from its current ranges during the next ten years	d. It can, and it is likely	X		X	

(pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Usually clear symptoms should make discovery during health inspections easy and disqualify affected plants or plant parts according to current regulations [CABI]. In addition: There are currently concerted efforts to implement a zero-tolerance policy on seeds and plant material of pepper and tomato containing Xanthomonas vesicatoria in Norway, in accordance with EU directive (EU) 2020/177. It remains to be seen how effective the suggested policy changes will be. See letter with recommendations from Mattilsynet: https://www.mattilsynet.no/planter_og_dyrking/savarer_og_annet_formerings materiale/savarer/horingsbrev__revidering_av_saavareforskriften_2020.39861/ binary/H%C3%B8ringsbrev%20- %20Revidering%20av%20s%C3%A5vareforskriften%202020

(pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			

Question	Answer options				Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Plants and plant parts for planting are likely mainly distributed to hobbyists and for private use. There are no dedicated statistics available, that separate pepper and tomato from other imported plants for private use, but the annual amount is very unlikely to be over 1 million kg.
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely		X		Suitable habitats in Norway are restricted to greenhouses as there are no wild hosts and temperatures are typically not warm enough outside.
		X		X	

Pathway 3		*Specify*	
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot	X X X	Justification

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	b. It can, but it is very unlikely c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely	X	X	X	Justification

	It can, and it is likely It can, and it is very likely		
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

Question	Answer options				Justification

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 5		*Specify*	
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	The tomato production in Norwegian greenhouses is seasonal and not yearround, it is not likely that the pest can overwinter without host plants, although plant parts in soil may offer suitable conditions for survival.
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small	X X X	Pepper is not cultivated in Norwegian greenhouses or to a very small extent, tomato cultivation in Norwegian greenhouses is far less than 100 ha annually [SSB].

Question	**Answer options**				**Justification**
	Medium Large				

EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	Due to sparse cultivation of host plants in few greenhouses, spread is likely to be rather slow.
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X	X	 X	The pest reproduces asexually and in potentially large numbers but it does not have other characteristics that assist spread.
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	 X	X	 X	The value of the tomato industry in Norway is hard to estimate since official value assessments are not available. About 11 000 tons are produced annually in Norway [SSB], the relatively limited amount of production makes excessive losses unlikely.

Question	Answer options				Justification
	l. 25-50 million € per year				

Question	Answer options				Justification

	m. > 50 million €per year		
IMP2: Would the pest cause the following indirect economic impacts in the PRA area? 1. Would the pest impact foreign trade?	No Yes	*1* *0* *1*	Only small production for domestic market. Single actors in the Norwegian vegetable sector may specialize on tomato and be affected disproportionally.

Question	**Answer options**				**Justification**
Is the pest a vector for other pests? Would the pest have a significant impact on		X		X	

the profitability of some			
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X X X	No wild hosts, limited cultivation
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0 0 1*	Although direct impacts of a Xanthomonas vesicatoria outbreak are likely to be neglible, it is important to note that domestic production of typically imported foods is a central component for food independence and sustainability in
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture		X	Norway.
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X X X	The pest is widespread in Southern Europe and reported present in multiple EU member countries [CABI, EPPO]

MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X X X	Infected plants usually display identifying symptoms [CABI]. Seeds must be tested for detection
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X X X	Host plants are only cultivated in Greenhouses and a short break in cultivation with accompanying measures to sanitize soil and equipments would likely eradicate the pest in Norway.

Question	Answer options				Justification
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	Infected plants usually display identifying symptoms and the area of cultivation is rather small. It should be possible to survey the pest with visual inspections and additional confirmation of the pest's identity by molecular methods and isolation of pure cultures.

References	CABI. Xanthomonas vesicatoria (bacterial spot of tomato and pepper) CABI Invasive Species Compendium (available online) [cited 2020 09/20]. Available from: https://www.cabi.org/ISC/datasheet/56981. EPPO. Xanthomonas vesicatoria (XANTVE) EPPO Global Database (available online) [cited 2020 09/20]. Available from: https://gd.eppo.int/taxon/XANTVE. Mattilsynet. Letter with recommendations on control regulations in accordance with EU directive (EU) 2020/177 from Mattilsynet, 2020, [cited 2020 09/20]. Available from: https://www.mattilsynet.no/planter_og_dyrking/savarer_og_annet_formerings materiale/savarer/horingsbrev__revidering_av_saavareforskriften_2020.39861/ binary/H%C3%B8ringsbrev%20- %20Revidering%20av%20s%C3%A5vareforskriften%202020 SSB. 10507: Avling og areal av ymse hagebruksvekstar 2010 - 2019 SSB Database (available online) [cited 2020 09/20]. Available from: https://www.ssb.no/statbank/table/10507/.

Species ACUPFU Aculops fuchsiae

Date 07.01.2021

Name of the assessor Daniel Flø

Quarantine status in the PRA area Quarantine

Taxonomic group Mites

Question	Answer options				Justification

ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large	X X X	Present in: Brasil, Chile, USA, France, UK, Jersey, Guernsey. Netherlands and Germany Transient, under eradication. EFSA. (2014)
Pathway 1	**Natural spread**		*dispersal*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT2B: As in ENT2A, but taking into account current	a. No it cannot	X X X	Justification

official entry management measures			

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely				
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 2	Plants for planting		*Fuchsia plants*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely		Spreads with live plants and survives transportation and storage. Causes leaf deformity wich are easaly detected and the pest can be detected by a magnifying glass. Human-assisted movement of infested plants and cuttings would be the main pathway of spread, given the ease of vegetative propagation in fuchsias and the exchange of plant material between fuchsia collectors.

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely		X		

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely	X	
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely	X	
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X	Justification

ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Unknown - No trade data available, but the annual volume is most likely less than 1 million plants, but probably not non-existant.

Question	**Answer options**				**Justification**
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Spreads to other plants trough multiple ways of disperse (natural active and passive, animal and human assisted)
Pathway 3		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			

ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X	X	X	Fuchsia magellanica is said to mainly grow in plant hardiness zone1 in Norway (man temp >7C, min temp -10C) wich is distributed along the soutern and parts of the soutwestern cost. The Koppen–Geiger climate types (Csa: warm temperate, dry and hot summer; Csb: warm temperate, dry and warm summer; Cfb: warm temperate, fully humid, warm summer) of the regions representing the areas of confirmed establishment of the pest (Csa and Csb in California and Cfb in Europe) encompass the main types present in most of the EU (Csa and Csb for Mediterranean parts of the EU, and Cfb for the continental part of the EU) (EFSA 2014). Fuchsia are produced in a greenhouse and production is seasonal, there are probably no suitable host plants during the winter.
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small	X	X	X	Along the southern coast - Viken, Oslo, Vestfold og Telemark, Agde, Rogaland og Vestlandet

Question	**Answer options**				**Justification**
	Medium Large				
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	Poor disperser, but spreads to other plants trough multiple ways modes of dispersal (natural active and passive, animal/human assisted).

EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X	X	X	According to Keesey (1985), a female could lay about 50 eggs during its life, with an incubation period of about seven days at 18 °C (EPPO 2014). Not likely to survive for long periods without a host plant.
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X	X	X	Approximately 200.000 fuchsia plants was produced in Norway in 2019 and equally much is expected to produced in 2020. There is currently no single effective treatment against A. fuchsiae (EFSA 2014). In California, control attempts over the last 20 years have failed (EFSA 2014). Little is known about damage by A. fuchsiae in Europe.

Question	**Answer options**				**Justification**

	l. 25-50 million € per year		

Question	Answer options				Justification
Is the pest a vector for other pests? Would the pest have a significant impact on the profitability of some					
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X	X	X	None
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*0*	*0*	*0*	None

Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture					
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X	X	X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X	X	X	France, UK, Jersey, Guernsey. Netherlands and Germany Transient, under eradication. EFSA. (2014)
MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X	X	X	Causes leaf deformity and discoloration of leafs wich can be detected. The mite itself can be detected visual inspection.
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	Justification

Question	**Answer options**				**Justification**

MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X X X	Easily in a greenhouse
References			EFSA. (2014) Scientific Opinion on the pest categorisation of Aculops fuchsiae. EFSA Journal 12.

ALTEMA Alternaria mali Roberts

Species (1924)

Date 07.01.2021

Name of the assessor Micael Wendell

Quarantine status in the PRA area Non-quarantine

Taxonomic group Fungi and fungus-like

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large			X X X	First described in the Netherlands in 1924 (Roberts 1924), A. mali is found infecting apple leaves in almost every apple growing nation of the world, including North America (Filajdic and Sutton 1991), Africa (as cited in
Pathway 1	**Plants for planting**				*Plants for planting (except seeds bulbs and tubers)*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely			X X X	A. mali is spread by means of conidia and its dispersal is particularly favoured by rainfall. However, this natural dispersal is only local. Internationally, possibilities for spread are fairly limited. The fungus is not liable to be carried on dormant planting material (without leaves). It could be carried in fruits but, since infection occurs on the young fruit, it is relatively unlikely that infected fruits would be harvested and traded. Trees with leafs are not traded or not likely to be traded that frekvently, but possesses a threat.

than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot		Både epletrær og pæretrær kan importeres til Norge, men importerer du fra et land hvor plantesjukdommen Pærebrann forekommer, er det visse vilkår som må være oppfylt i eksportlandet. I tillegg er det krav til alle eksportland om å

Question	Answer options				Justification
be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	dokumentere at varene er fri for heksekost og pærevisnesjuke.Import av vertplanter for pærebrann fra land hvor pærebrann forekommer var forbudt tidligere, men en endring i regelverket i 2015 åpnet opp for import av trær og formeringsmateriale til fruktproduksjon. Ulike krav må være oppfylt for at eple- og pæretrær skal kunne importeres fra land hvor pærebrann forekommer. Blant annet må plantematerialet enten komme fra et område i landet som er anerkjent å være fritt for pærebrann, eller det kan komme fra det som

spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			kalles en buffersone. Regelverket spesifiserer krav til etablering av og kontroll med slike buffersoner og krav til kontroll med planteproduksjonen. Plantematerialet skal også være fulgt av et sunnhetssertifikat som bekrefter hvilket vilkår i regelverket som er oppfylt. Det er fortsatt forbudt å importere prydarter av eple- og pære og de andre vertplantene for pærebrann fra land hvor pærebrann forekommer.
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Fram til 2015 var det i Norge ikke tillatt å importere epletrær eller jordbærplanter fra utlandet, hovedsakelig av den grunn at man ønsket å beskytte næringen og naturmangfoldet mot uønskede sykdommer og andre skadegjørere. Det kan antas at denne import vil øke fra år til å da imoterte trær
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X X	Mauls spps. are common in gardens as well as in fruiticulture.
Pathway 2			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity	No it cannot It can, but it is very unlikely	X X X	Justification

considered in the pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				

ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification

Question	Answer options				Justification

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 3		*Specify*	
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small	X X X	Justification

annually? (pathways A-E)	Medium Large				

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	According to EPPO (Data Sheets on Quarantine Pests Alternaria mali) A. mali presents a direct risk to the main apple crop in the EPPO region. Indeed, it has an even wider host range, extending to fruiting and ornamental Malus. A. mali is favoured by much warmer and wetter conditions than are usual in the apple production regions of Europe. Asian A. mali has been recently introduced into the USA, which shows that it does have the potential to spread. In North Carolina, it encounters conditions somewhat more similar to those of southern Europe. A. mali is principally damaging on certain susceptible cultivars, and current cultivar ratings mainly relate to those grown in

			Asia or North America. (Also direct froim the EPPO datasheat). Hoever, CABI
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small	 X X	Importanat fruiticulture districs and homegardens all over norway.

Question	Answer options				Justification
	Medium Large			X	
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	A. mali is spread by means of conidia and its dispersal is particularly favoured by rainfall. However, this natural dispersal is only local.
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent	X	X	 X	Any planting material of Malus imported from countries where A. mali occurs should be in dormancy, and not carry any leaves or plant debris. Fruits from these countries should be free from symptoms and of good commercial quality. However, -The pest can reproduce asexually and the pest is able to "find" host plants in gardens all over Norway.

	It has characteristics that could assist to a very great extent		
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X X X	It is hard to know weather, or to what extent, the apple cultivars grown in Norwayare susepteble fAterania blotch. If susepteble as the cultivar 'Golden Delicious' up to 50% defoliation may occure (Penn state extansion resport 2017). Fruit infections result in small, dark, raised lesions associated with the lenticel. Alternaria blotch tends to be uniformly distributed throughout the tree. Apples has a yearly mean value of 132.139.400 NOK

Question	**Answer options**				**Justification**

	l. 25-50 million € per year		

Question	Answer options				Justification
	m. > 50 million €per year				

IMP2: Would the pest cause the following indirect economic impacts in the PRA area?	No Yes	*2*	*2*	*2*	concidered qpest today.
1. Would the pest impact foreign trade?		X	X	X	

Question	Answer options				Justification
Is the pest a vector for other pests? Would the pest have a significant impact on the profitability of some		X	X	X	
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X	X	X	no impact at any lever. No natural malus spps in the PRA area.
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*3*	*0*	*3*	some important districts as Hardanger might be affected at a cultural level as well as an aesthetic level. Apple are also an important treefor landscaping as well as fruit production in home gardens and are used as lanscape trees in
Cultural impacts Significant aesthetic impacts3. An impact on plants which have		X X		X X	parks.The apple blossom at Ullensvang have to be considered as an important position in Norwegian culture (? or not?)

an important, recognized position in the Finnish culture		X		X	
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X	X	 X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X	X	X	No, but in Turkey and former yougoslavia (EPPO)
MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	 X	X	 X	The fungus causes leaf spots, which enlarge in zonate circular or crescentshaped rings.Hyphae are normally scant or lacking on the host surface, but abundant light-grey mycelium can be produced on the surface under moist
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	 X	X	 X	Justification: has not been eradicated at the regions where it has been introduced. Norway do not allow so many fungicides, hence meke an eredication more difficult. However, if detected early Norwegian athorities has previosly shown strong management.

Question	Answer options				Justification
MAN5: How difficult would it be to survey the pest's	Easy Rather difficult	X	X	X	Justification se MAN3

occurrence in the PRA area?	Very difficult Impossible		
References			Roberts JW (1924) Morphological characters of Alternaria mali Roberts. Journ. Agric. Res. 27, 699-708 pp. Filajdic N, Sutton TB (1992b) Influence of temperature and wetness duration on infection of apple leaves and virulence of different isolates of Alternaria mali. Phytopathology 82, 1279-1283. Sawamura K (1990) Alternaria blotch. In 'Compendium of Apple and Pear Diseases'. (Ed. HS Aldwinckle) pp. 100. (APS Press: St Paul, Minnesota) Bulajic A, Filajdic N, Babovic M, Sutton TB (1996) First report of Alternaria mali on apples in Yugoslavia. Plant Disease 80, 709. Gagkaeva TY, Levitin MM (2000) Identification of the pathogen causing leaf spots on apple trees in Krasnodar province orchards. Mikologiya i Fitopatologiya 34, 58- 62. Dickens JSW, Cook RTA (1995) Japanese pear black spot and apple Alternaria blotch. Bulletin OEPP 25, 651-659. Sawamura K (1972) Studies on apple Alternaria blotch caused by Alternaria mali Roberts. Bulletin of the Faculty of Agriculture, Hirosaki University, 152-235. SSB 2020 https://www.ssb.no/statbank/table/10508/tableViewLayout1/ Penn state extansion resport 2017: https://extension.psu.edu/apple-diseasealternaria-leaf-blotch Eppo

	https://gd.eppo.int/taxon/ALTEMA/distribution

Species ARDDTR Arthurdendyus triangulatus

Date 07.01.2021

Name of the assessor Daniel Flo

Quarantine status in the PRA area Quarantine

Taxonomic group Nematodes

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of	Small Medium Large	X	X	X	Arthurdendyus triangulatus is a native to the South Island of New Zealand, but has established in the UK, Ireland and the Faroe Islands (Archie K. Murchie, Alan W. Gordon 2013)

the pest? (pathways A-F)			
Pathway 1	**Plants for planting**		*soil*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Arthurdendyus triangulatus can be transported in intarnational trade by movemt of soil or growing medium attached to plants for planting. management options: soil free, in sterilized and/or soil-less growing media.
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot		

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely				
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely		X		
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely	X			
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely			X	
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	 X	 X	 X	All plant for planting containing soil. The anual trade volume of plants containing soil is unknown, but probanly above 1 mill kg
ENT4: Can the pest transfer to a suitable habitat after entering	It cannot It can, but it is very unlikely	 X	 X	 X	Absolutely, if plants are planted outdoors in soil.

the PRA area via the pathway?	It can, but it is unlikely It can, and it is likely It can, and it is very likely		
Pathway 2	Natural spread		*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				

iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 3		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small	X X X	Justification

annually? (pathways A-E)	Medium Large				

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	A. triangulata could become established in western Norway (Boag 2005). The main factors limiting A. triangulatus dispersal are soil temperature, soil moisture and the availability of prey (Boag et al., 1998a). Soil temperatures greater than 20°C are detrimental to A. triangulatus, with 100% mortality after 3 weeks (Blackshaw and Stewart, 1992). Similarly, consistent low temperatures of -2C caused 100% mortality after 3 days, whereas at -1°C mortality had only reached c. 50% after 21 days (Scottish Executive Rural Affairs Department, 2000). There has been little quantitative work on the effects of soil moisture on A. triangulatus, although it is clearly important (Boag et al., 2005). Part of the reason for this, is

			that in the UK and Ireland, soil moisture and temperature are
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small		Does not apply. However, there is soil almost everywhere

Question	Answer options				Justification
	Medium Large	X	X	X	
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	strongly dependent movement of soil. in Scotland, they spread from botanic gardens to horticultural wholesalers, then to domestic gardens, and only latterly did they invade agricultural land (Boag B et.al. 1998). Arthurdendyus triangulatus are spreading into agricultural land through a combination of passive (anthropochorous) and active dispersal (Murchie et al 2003). Although capable of active movement the flatworm has been spread mainly by the trade in containerised plants. Its tendency to shelter under debris on the soil surface and its sticky body, have facilitated inadvertent carriage on plant containers,

EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X	X	X	As with other flatworms, A. triangulatus is a hermaphrodite. Mating has not been observed in this species but both male and female reproductive organs are fully functional (Fyfe, 1937; Baird et al., 2005) suggesting that crossfertilisation is the norm
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X	X	 X	Taking an estimate that earthworms contribute 20% towards grass yield and that A. triangulatus predation reduces earthworm biomass by 20%, the effect of A. triangulatus colonisation could be a 4% reduction in grass yield. Boag and Neilson (2006) calculated that the New Zealand flatworm could conservatively cost Scottish farmers c. £17M. As highlighted by Alford (1998), one of the main economic effects of flatworm infestation could be limitations on trade. This applies to international trade and also to local trade in the sense that a garden centre, nursery or topsoil distributor may be held liable for distributing a harmful invasive species.

Question	**Answer options**				**Justification**

	l. 25-50 million € per year		

Question	Answer options				Justification
Is the pest a vector for other pests? Would the pest have a significant impact on the profitability of some				X	
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X	X	X	A flatworm-induced reduction in earthworm populations could change soil structure and hydrology (Haria, 1995; Haria et al., 1998) leading to poor soil drainage and encroachment of Juncus rushes in pasture (Alford, 1998). A. triangulatus is an invasive earthworm predator that directly reduces earthworm biodiversity. A decline in earthworms could have knock-on effects on earthworm-feeding wildlife (Alford, 1998). In the UK and Ireland, most vulnerable are badgers, hedgehogs, moles (not Ireland) and many familiar garden and farmland bird species (e.g. blackbirds, thrushes, rooks and

IMP4: Would the pest have the following environmental or social impacts in the PRA area? Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture	No Yes	*0* *0* *0*	A. triangulatus is a garden pest spread by the movement of plants. Gardening is a popular hobby and many gardeners exchange plants through semi-formal networks such as gardening societies. Inadvertent spread of A. triangulatus has happened by this mechanism and therefore, where A. triangulatus is present, movement of containerised plants should be minimised.
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X X X	Scotland - United Kingdom, Brexit
MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X X X	The pest may be present in the soil for a long time without causing any symptoms and making detecting difficult.
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X X X	The pest is able to survive in the soil for years without a host plant feeding other worms. The pest can spread into natural environments

Question	Answer options				Justification
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy		X		The pest is difficult to detect in soil
	Rather difficult				
	Very difficult				
	Impossible	X		X	
References					Baird J., McDowell S.D.R., Fairweather I., Murchie A.K. (2005) Reproductive structures of Arthurdendyus triangulatus (Dendy): Seasonality and the effect of starvation. Pedobiologia 49:435-442. DOI: 10.1016/j.pedobi.2005.05.003. Keith A.M., Boots B., Stromberger M.E., Schmidt O. (2018) Consequences of anecic earthworm removal over 18 months for earthworm assemblages and nutrient cycling in a grassland. Pedobiologia 66:65-73. DOI: 10.1016/j.pedobi.2017.10.003. Blackshaw R.P., Stewart V.I. (1992) Artioposthia triangulata (Dendy, 1894), a predatory terrestrial planarian and its potential impact on lumbricid earthworms. Agricultural zoology reviews 5:201-219. Petrovskaya N.B., Forbes E., Petrovskii S.V., Walters K.F.A. (2018) Towards the Development of a More Accurate Monitoring Procedure for Invertebrate Populations, in the Presence of an Unknown Spatial Pattern of Population Distribution in the Field. Insects 9. DOI: 10.3390/insects9010029. Boag B., Yeates G.W., Johns P.M. (1998) Limitations to the distribution and spread of terrestrial flatworms with special reference to the New

		Zealand flatworm (Artioposthia triangulata). Pedobiologia 42:495-503. Murchie A.K., Gordon A.W. (2013) The impact of the 'New Zealand flatworm', Arthurdendyus triangulatus, on earthworm populations in the field. Biological Invasions 15:569-586. DOI: 10.1007/s10530-012-0309-7. https://www.cabi.org/isc/datasheet/109121 Boag B., Evans K.A., Yeates G.W., Johns P.M., Neilson R. (1995) Assessment of the Global Potential Distribution of the Predatory Land Planarian ArtioposthiaTriangulata (Dendy) (Tricladida, Terricola) from Ecoclimatic Data. New Zealand Journal of Zoology 22:311-318. DOI: Doi 10.1080/03014223.1995.9518046.

CHTSFR Chaetosiphon fragaefolii

Species (Cockerell)

Date 07.01.2021

Name of the assessor Johan Stenberg

Quarantine status in the PRA area Quarantine

Taxonomic group Insects

Question	Answer options				Justification
ENT1: How wide is the current global	Small Medium		X	X X	This aphid is widely distributed in the Americas, including Argentina (Cingolani

geographical distribution of the pest? (pathways A-F)	Large		& Greco 2018) Brazil (Bernardi et al. 2013), Canada (Bonneau et al. 2019), Chile (Lavandero et al. 2012), and the United States (Randon & Cantliffe 2004). It is
Pathway 1	**Plants for planting**		*Plants imported from infected areas.*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	This aphid has previously shown potential to transport itself with plants for planting. Norway imports strawberry plants from infected areas in EU.
ENT2B: As in ENT2A, but taking into account current official entry	a. No it cannot		Although the current regulations and inspections prevent the pest's transportation relatively effectively, they do not allow for 100% detection and blocking of C. fragaefolii in the exporting country or during transport. The

management measures					

Question	Answer options				Justification
be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely		X		certification scheme for strawberry tolerates 1% of the visually inspected plants to be infected (EPPO 2008).
		X		X	
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Data is not available to the assessor.

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X	 X	 X	History shows that this aphid can transfer from plants for planting to plantations in other parts of Europe, including Denmark and Sweden. Originating from the Americas, this aphid has spread relatively quickly across Europe (EFSA Panel on Plant Health 2014).
Pathway 2	Natural spread				*Winged aphids can fly and be transported naturally with wind.*
ENT2A: Not taking into account current management measures, can the pest	a. No it cannot				This aphid has moved Northwards via Denmark and into Sweden. Recent reports suggests that it is now established on both garden strawberry as well as on wild woodland strawberry in Southern Sweden (Sigsgaard and Manduric,

Question	**Answer options**				**Justification**
be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during	It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	 X	pers.comm; own observations). Natural immigration from Sweden seems likely within a few years if the current migration speed continuous.

the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	No management measures can prevent the aphid from spreading on its wild host plants.

Question	Answer options				Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	N.A. Winged aphids can fly or be transported by wind for long distances. However, the northernmost known C. fragaefolii populations in Sweden (Skåne) are still too far away to allow natural spread within the next few years. Considering that
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Wild Fragaria and Potentilla populations are very common (almost omnipresent) serving as suitable hosts to immigrating strawberry aphids.
Pathway 3		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?					
ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot	X	X	X	Justification

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely				
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	**Answer options**				**Justification**
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			

ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	It can survive the winter in Denmark, Southern Sweden, the UK, and parts of Canada, suggesting that mild coastal areas of Southern Norway also would be suitable. Furthermore, strawberry growers normally cover their fields with fleece during winter to escape frost damage. This fleece is very likely to protect aphids from low temperatures in winters. The growing number of polytunnels for strawberry production is also likely to increase the chances for the aphid to survive. A German study showed that adult strawberry aphids could live for as long as 229 days at 3C (Krczal & Merbecks 1988). Active reproduction starts already at 4C, enabling a long active period in several parts of Norway (Dicker 1952;
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small		Wild Fragaria spp. grows throughout Norway, even in the most northern areas. Garden strawberry is cultivated ovar c. 7500ha, which considered alone would give a Medium score for EST2. However, with wild host plants taken into

Question	**Answer options**				**Justification**
	Medium Large	X	X	X	account the area is Large.
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly	X	X	X	First, aphids are likely to spread within Norway with plants for planting. Second, this aphid can fly and can be transported by wind for more than a kilometer per year and can utilise several wild host plants. Warm summers can speed up reproduction and migration considerable. It was after the hot summer of 2018 that it appeared

	Quickly		on wild strawberry in Sweden for the first time (own observations).
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X X X	The aphid can reproduce asexually, and has a high reproductive rate (Schaefer and Allen 1962). Furthermore, it is able to actively locate host plants or mates from a long distance.
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X X X	The annual value of Norwegian strawberry production was MNOK 432 in 2017. The direct losses that this aphid inflicts on garden strawberry is limited, especially at low densities. The indirect damage is much larger, including the damage made viruses that it vectors (see IMP2).

Question	Answer options				Justification
	l. 25-50 million € per year				

Question	Answer options				Justification

	m. > 50 million €per year		
IMP2: Would the pest cause the following indirect economic impacts in the PRA area? 1. Would the pest impact foreign trade?	No Yes	*2 1 2*	C. fragaefolii is the most important vector of several of the 25 viruses attacking wild and domesticated strawberry (Converse 1987). Most of these viruses are not present, or have limited effects only, today. The viruses would most likely be much more abundant in Norway if the aphid establishes here. Presence of C. fragaefolii was the most important factor behind the recent virus-mediated

Question	**Answer options**				**Justification**

Is the pest a vector for other pests? Would the pest have a significant impact on the profitability of some		X X X X X	decline in strawberry production in Canada. There are no curative methods available to combat the viruses. This indirect economic impact is potentially very big and serious as recently shown in Canada.
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X X X	C. fragaefolii can transmit viruses from infected garden strawberry plants to wild host plants (incl. Fragaria vesca and Potentilla spp.) and vice versa (Yohalem & Lower 2008; Fránová et al. 2019). The wild host plants can serve as reservoirs and sources of strawberry viruses (Yohalem et al. 2009; Bonneau et al. 2019a). The consequences of these viruses on wild plants and ecosystems are, however, probably minor and no alarming reports have been published from other infected countries. However, the lack of reports may be due to a lack of studies.
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*1 0 1*	Strawberry is a valued plant species with a recognized position in Norwegian culture. It is frequently depicted in art, and is cultivated in many private home gardens, and is an expected in several important deserts. If the aphid, and the
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture		X X	viruses vectored by the aphid, become established this would probably be noticed and regretted by many Norwegians.
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	

MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	 X X X	The pest is present in most EU countries as well as in the UK (EFSA Panel on Plant Health 2014).
MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X X X	This aphid is small and may be difficult to detect visually at low densities when no symptoms are available. The symptoms are similar to other aphids. Typical symptoms of aphid damage include curled leaves, yellowish spots and the
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	 X X X	The pest can spread into wild host plants and natural environments (own observations). The wild host plants are extremely common in Norway, making it impossible to inspect and eradicate from all suitable habitats.
Question	**Answer options**		**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	X X X	Wild host plants are so common that their comprehensive surveying would be difficult. However, surveying garden strawberry plantations only is much easier, and most plantations are probably surveyed for other aphids, pests, and diseases already.

References		Amin et al. 2017. New Additions to Pakistan's Aphididae (Hemiptera: Aphidoidea) Damaging Rosa Species. https://dx.doi.org/10.17582/journal.sja/2017/33.4.511.518 Bernardi et al. 2012.. Biology and fertility life table of the green aphid Chaetosiphon fragaefolli on strawberry cultivars. https://dx.doi.org/10.1673/031.012.2801 Bernardi et al. 2013. Aphid Species and Population Dynamics Associated with Strawberry. https://dx.doi.org/10.1007/s13744-013-0153-1 Bonneau et al. 2019. Evaluation of Various Sources of Viral Infection in Strawberry Fields of Quebec, Canada. https://doi.org/10.1093/jee/toz205 Bonneau et al. 2019. Flight phenology and trap selection for monitoring potential viral vector Aphididae and Aleyrodidae (Hemiptera) in strawberry (Rosaceae) fields of Québec, Canada. https://dx.doi.org/10.4039/tce.2019.15 Bremer & Pethman. 1978. Occurrence of virus diseases in Finnish strawberry fields. Cingolani & Greco. 2018. . Spatio-temporal variation of strawberry aphid populations and their parasitoids. https://doi.org/10.1007/s13355-018-0544-1

		Converse. 1987. Virus Disease of Small Fruits; Converse, R.H., Ed.; United States Department of Agriculture: Washington, DC, USA, 1987; pp. 1–288.

Dicker. 1952. The biology of the strawberry aphid, Pentatrichopus fragaefolii

Species CLRV00 Cherry leaf roll nepovirus

Date 07.01.2021

Name of the assessor Mogens Nicolaisen

Quarantine status in the PRA area Quarantine

Taxonomic group Viruses and viroids

Question	Answer options				Justification
ENT1: How wide is the current global	Small Medium		X	 X	CLRV is widespread at the Northern hemisphere and is also found on the southern hemisphere.

geographical distribution of the pest? (pathways A-F)	Large		
Pathway 1	**Plants for planting**		*e.g. Prunus and Rubus*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	If no certification schemes existed, CLRV could be imported through plants for planting as the virus is widespread thrughout Europe, and overseas.
ENT2B: As in ENT2A, but taking into account current official entry	a. No it cannot		For several cultivated hosts, the existence of highly efficient and voluntary certification schemes very significantly reduces the risk of entry of CLRV (EFSA 2014). Similarly,

management measures			production under protected cultivation conditions has the

Question	Answer options				Justification
be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	potential to reduce impacts of the virus (EFSA 2014). There are requirement for import of Rubus plants intended for planting to be free of CLRV. CLRV can naturall spread through pollen.
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Plants for planting could contain CLRV but it is not know how much is imported into the PRA area of this commodity (Prunus, Rubus etc)

ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X X	Horizontal and vertical transmission by pollen (EFSA 2014)
Pathway 2	Natural spread		*Pollen*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Not relevant

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during	d. It can, and it is likely				

the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	CLRV can naturall spread through pollen, however it seems unlikely that CLRV should spread into the PRA area through pollen during the next 10 year period. However, the virus is present in Sweden in Betula (EFSA 2014) and could possibly spread from there. There seems to be some host-specificity of CLRV, meaning that spread will be slower (Rebenstorf et al 2006) and likely not spread between plant species.
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small	X X X	Not known (plants for planting)

annually? (pathways A-E)	Medium Large		

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X	 X 	 X	If pollen reaches the PRA area, suitable pollination hosts are present
Pathway 3		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				

iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	d. It can, and it is likely e. It can, and it is very likely		
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?			
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	**Answer options**				**Justification**
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			

ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X	X	X	As a virus it could survive in suitable host plants which are present in the PRA area
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small				Host plants include plants that are present in all of the PRA area (Prunus, Rubus, Betula etc) (EFSA 2014)

Question	**Answer options**				**Justification**
	Medium Large	X	X	X	
EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X	X	X	There seems to be some host-specificity of CLRV (Rebenstorf et al 2006), meaning that spread will be slower and likely not spread between plant species. CLRV is already reported as present in the PRA area (EPPO)
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent	X	X	X	Viruses reproduces rapidly and CLRV is tranmitted by pollen that can travel long distances

	It has characteristics that could assist to a very great extent		
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X X X	The pest causes foliar symptoms in the form of chlorotic mosaic, chlorotic or yellow ring patterns or ringspots, yellow vein netting and yellow spotting in many of its hosts. EFSA (2014) states "As indicated above, besides the observation of foliar symptoms, the actual impact of CLRV is difficult to evaluate in many host plants. This concerns, in particular, the impact on forest trees or on other hosts in natural environments. The impact on cultivated hosts is further limited in several species (walnut, olive, grapevine, Prunus spp., Rubus spp.) by the existence of voluntary certification schemes, which reduce the risk and impact of CLRV. Given the paucity of records, there is no observed impact of CLRV in its regulated Rubus spp. hosts in the EU". However, in cherry for example, CLRV may cause tree decline or death in combination with other viruses (Büttner et al 2011)

Question	**Answer options**				**Justification**

	l. 25-50 million € per year		

Question	Answer options				Justification
	m. > 50 million €per year				

IMP2: Would the pest cause the following indirect economic impacts in the PRA area? 1. Would the pest impact foreign trade?	No Yes	*0* *0* *0*	As CLRV is not regulated in Europe, it will have no significant impact on foreing trade. CLRV could cause yield depression in e.g. Prunus or Rubus, see IMP1.

Question	**Answer options**				**Justification**
Is the pest a vector for other pests? Would the pest have a significant impact on the profitability of some					
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X	X	X	CLRV can infect a number of mainly trees in the PRA area, but symptoms/effects would depend on host (see IMP1).
IMP4: Would the pest have the following environmental or social impacts in the PRA area? Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important,	No Yes	*0*	*0*	*0*	Although CRLV may infect natural populations of e.g. Prunus, Rubus or Betula, no significant impacts are foreseen

recognized position in the Finnish culture					
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X	X	X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X	X	X	According to EFSA (2014) and EPPO, CLRV is widespread in EU
MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	X	X	X	CLRV can be detected by e.g. ELISA or PCR (Lebas et al 2016). CLRV can also be detected by symptoms on leaves (EFSA 2014)
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	X	X	X	CLRV can spread to natural populations of host plants and thus eradication would be nearly impossible

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult	X	X	X	CLRV can be detected by e.g. ELISA or PCR (Lebas et al 2016).

	Very difficult Impossible		
References			EFSA (2014). Scientific Opinion on the pest categorisation of Cherry leafroll virus. EFSA Journal 2014;12(10):3848, 23 pp.; Büttner C, von Bargen S, Bandte M and Myrta A, 2011. Cherry leaf roll virus. In: Virus and viruslike diseases of pome and stone fruits. Eds Hadidi A, Barba M, Candresse T and Jelkmann W. APS Press, St Paul, MN, USA, 119–125: Rebenstorf K, Candresse T, Dulucq MJ, Büttner C, and Obermeier C, 2006. Host Species-Dependent Population Structure of a Pollen-Borne Plant Virus, Cherry Leaf Roll Virus. Journal of Virology, 80, 2453–2462; https://gd.eppo.int/taxon/CLRV00; Lebas BS, Veerakone S, Liefting LW, et al. Comparison of diagnostic techniques for the detection and differentiation of Cherry leaf roll virus strains for quarantine purposes. J Virol Methods. 2016;234:142-151. doi:10.1016/j.jviromet.2016.04.015

Species CORBMI Clavibacter michiganensis

Date 07.01.2021

Name of the assessor May Bente Brurberg

Quarantine status in the PRA area Quarantine

Taxonomic group Bacterium and phytoplasma

Question	Answer options				Justification
ENT1: How wide is the current global geographical distribution of the pest? (pathways A-F)	Small Medium Large		X	X	Occurs worldwide [EPPO]
Pathway 1	**Seeds**				*tomato seeds*
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely		X	X	Wide distribution is the main factor for a high likelihood of import of infected seed material occuring.

ENT2B: As in ENT2A, but taking into account current official entry management measures	a. No it cannot		Testing should certify that seeds are free from the pest.

Question	Answer options				Justification
i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	b. It can, but it is very unlikely		X		
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely	X			
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely			X	
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant	Non-existent	X	X	X	Numbers for seed import could not be found but is estimated to be 1000 tonnes.

commodity is traded into the PRA area annually? (pathways A-E)	Small Medium Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X X X	It can easily spread within green houses through irrigation and work in the culture [de Leon et al. 2011].
Pathway 2	Plants for planting		*tomato plants*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely		Wide distribution is the main factor for a high likelihood of import of infected plantsl occuring.

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport	c. It can, but it is unlikely		X		

or passengers (pathway F)?			
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely	X	
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely	X	
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Testing should certify that plants are free from the pest.

be intentionally introduced to the PRA area (pathway H)?					
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	 X	Numbers not available

Question	**Answer options**				**Justification**
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	 X	 X 	 X	
Pathway 3	Plants for planting	*Potato seed tubers*			

ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Infection of potato has recently been reported from Russia. However, infections were severe and were discoverd in a large region [Ignatov et. al. 2019]
ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the	No it cannot It can, but it is very unlikely	X X X	Norway currently does not import seed tubers for direct planting [Forskrift om settepoteter, §14]. Potato material (primarily new cultivars) may only be imported by certified actors and must undergo testing and assessment in quarantine fields before being introduced for growing in Norway. Planting of imported ware potatoes by private persons may present some risk.

pathway (pathways A-E)?			

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? iv) be intentionally introduced to the PRA area (pathway H)?	c. It can, but it is unlikely d. It can, and it is likely e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X	X	X	Import of potato seed tubers has only occurred in amounts of approx. 5 tonnes per year, if at all, over the last ten years [SSB].
ENT4: Can the pest transfer to a suitable habitat after entering	It cannot It can, but it is very unlikely	X	X	X	Likely transmitted via seed tubers, as its relative Clavibacter sepedonicus.

the PRA area via the pathway?	It can, but it is unlikely It can, and it is likely It can, and it is very likely		
Pathway 4			*Specify*
ENT2A: Not taking into account current management measures, can the pest i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X X X	Justification

Question	**Answer options**				**Justification**
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				

iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely		
ENT2B: As in ENT2A, but taking into account current official entry management measures be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area annually? (pathways A-E)	Non-existent Small Medium Large	X X X	Justification

Question	Answer options				Justification
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification
Pathway 5		*Specify*			
ENT2A: Not taking into account current management measures, can the pest be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)? be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)? spread naturally to the PRA area from its current ranges during the next ten years (pathway G)? be intentionally introduced to the PRA area (pathway H)?	No it cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X	X	X	Justification

ENT2B: As in ENT2A, but taking into account current official entry management measures i) be transported in international trade with the host plant commodity considered in the pathway (pathways A-E)?	No it cannot It can, but it is very unlikely	X	X	X	Justification

Question	Answer options				Justification
ii) be transported from one country to another with other than host plant commodity, transport or passengers (pathway F)?	c. It can, but it is unlikely				
iii) spread naturally to the PRA area from its current ranges during the next ten years (pathway G)?	d. It can, and it is likely				
iv) be intentionally introduced to the PRA area (pathway H)?	e. It can, and it is very likely				
ENT3: How large a volume of the considered host plant commodity is traded into the PRA area	Non-existent Small Medium	X	X	X	Justification

annually? (pathways A-E)	Large		
ENT4: Can the pest transfer to a suitable habitat after entering the PRA area via the pathway?	It cannot It can, but it is very unlikely It can, but it is unlikely It can, and it is likely It can, and it is very likely	X X X	Justification
EST1: Could the pest reproduce and overwinter in the PRA area taking into account the climate and production conditions?	No it could not It could, but it is unlikely It could, and it is likely It could, and it is very likely	X X X	The pest will likely survive in plant and soil in greenhouses for tomato production [de León et al 2011]. The pest will likely survive in seed potatoes. Recent severe outbreaks of the disease were recorded in the central and northwest parts of the Russian Federation [Ignatov et al. 2019]. The close relative of the pest Clavibacter sepedonicus has been and is a problem in Norwegian potato production.
EST2: In how large an area do the pest's host plants grow or are cultivated in the PRA area?	Not at all Very small Small	X	Tomatoes were grown on 36 ha (greenhouse) in 2019. Potatoes were grown on 11 000 ha in 2018.

Question	**Answer options**				**Justification**
	Medium Large	X		X	

EST3: How quickly would the pest likely spread in the PRA area?	Very slowly Rather slowly Rather quickly Quickly	X X X	Will likely spread rather rapidly within a green house. Will likely spread rather slowly in potatoes via seed tubers.
EST4: Does the pest have characteristics that could assist in its establishment or spread in new areas?	No it does not It has characteristics that could assist to some extent It has characteristics that could assist to a great extent It has characteristics that could assist to a very great extent	X X X	Reproduces potentially rapidly and asexually. Has a worldwide spread in tomato production, and recent severe spread in potato production in Russia.
IMP1: How significant are the direct economic losses that the pest would cause in the PRA area?	It would not cause losses in the PRA area < 0.05 million € per year 0.05-0.1 million € per year 0.1-0.2 million € per year 0.2-0.4 million € per year 0.4-0.8 million € per year 0.8-1.5 million € per year 1.5-3 million € per year 3-6 million € per year 6-12 million € per year 12-25 million € per year	X X X	No statistic for direct economic losses for this pest was found in other countries. Potentially affected crops in are important in Norway. Tomato and Potato production has a mean yearly value of 247.028.300 and 721.075.500 NOK respectivly.

Question	Answer options				Justification
	l. 25-50 million € per year				

Question	Answer options				Justification

	m. > 50 million €per year		
IMP2: Would the pest cause the following indirect economic impacts in the PRA area?	No Yes	*1* *1* *2*	
1. Would the pest impact foreign trade?		X	

Question	Answer options				Justification
Is the pest a vector for other pests? Would the pest have a significant impact on		X	X	X	

the profitability of some			
IMP3: How much direct impact would the pest have on the natural ecosystems in the PRA area?	No impact Moderate impact Significant impact Very significant impact	X X X	No wild hosts occuring.
IMP4: Would the pest have the following environmental or social impacts in the PRA area?	No Yes	*2 0 2*	
Cultural impacts Significant aesthetic impacts3. An impact on plants which have an important, recognized position in the Finnish culture		X X X X	
MAN1: Can the pest spread naturally to the PRA area from its current range during the next ten	No it cannot It can, but it is unlikely or very unlikely It can, and it is likely or very likely	X X X	
MAN2: Is the pest present in the area of the European Union?	No it is not Yes in a small area Yes in a large area	X X X	Present in tomato production in some European countries and in potato production in Russia [EPPO]

MAN3: How difficult is it to detect the pest during inspections?	Easy Difficult Nearly impossible	 X X	 	 X	Bacterial infections may be latent or symptoms may be difficult to distinguish from those of other pathogens .
MAN4: How difficult would it be to eradicate the pest from the PRA area?	Easy Rather difficult Very difficult Impossible	 X X	 	 X	In tomato production in greenhouse it would be easier than in potato fields. No chemical or biological control methods available.

Question	**Answer options**				**Justification**
MAN5: How difficult would it be to survey the pest's occurrence in the PRA area?	Easy Rather difficult Very difficult Impossible	 X X	 	 X	Latent infections are common and symptoms can be mistaken. Diagnosis will depend on DNA based laboratory tests.

References		EPPO Global Database. Clavibacter michiganensis subsp. michiganensis (CORBMI). https://gd.eppo.int/taxon/CORBMI [accessed 04/10/2020]. Forskrift om planter og tiltak mot planteskadegjørere. FOR-2000-12-01-1333. Ignatov AN, NA Spechenkova, M Taliansky, KP Kornev. 2019. First report of Clavibacter michiganensis subsp. michiganensis infecting potato in Russia. Plant Disease 103(1), 147 León, L de, F Siverio, MM López, A Rodríguez. 2011. Clavibacter michiganesis subsp. michiganensis, a seedborne tomato pathogen: healthy seeds are still the goal. PlantDis 95:1328-1338. Li, X, J Tambong, K(X) Yuan, W Chen, H Xu, CA Lévesque, SH De Boer. 2018. Reclassification of Clavibacter michiganensis subspecies on the basis of wholegenome and multi-locus sequence analyses. IJSEM 68:234-240. Osdaghi E, T Rahimi, SM Taghavi, M Ansari, S Zarei, P Portier, M Briand, M-A Jacques. 2020. Comparative genomics and phylogenetic analyses suggest several novel species within the genus Clavibacter, including nonpathogenic tomato-associated strains. Appl Environ Microbiol 86:e02873-19.