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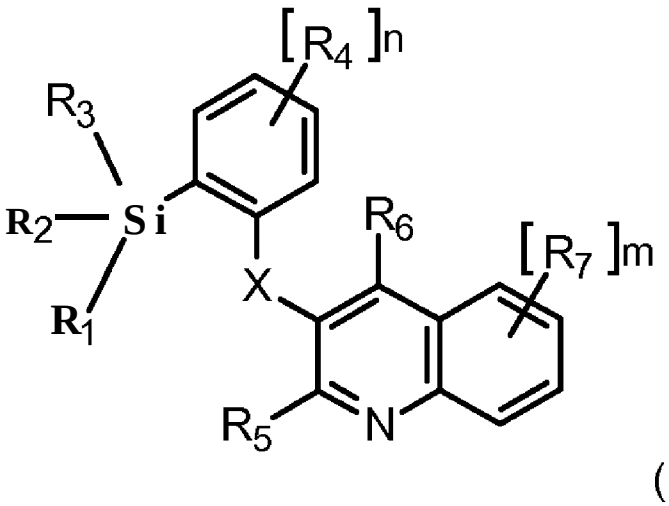
(54) Title: MICROBIOCIDAL SILICON CONTAINING ARYL DERIVATIVES



(I)

(57) Abstract: Compounds of the formula (I) wherein the subsitiuents are as defined in claim 1. Furthermore, the present invention relates to agrochemical compositions which comprise compounds of formula (I), to preparation of these compositions, and to the use of the compounds or compositions in agriculture or horticulture for combating, preventing or controlling infestation of plants, harvested food crops, seeds or non-living materials by phytopatho genie microorganisms, in particular fungi.

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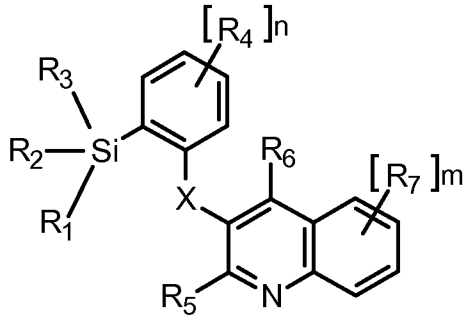
MICROBICIDAL SILICON CONTAINING ARYL DERIVATIVES

The present invention relates to microbiocidal silicon containing aryl derivatives, e.g. as active ingredients, which have microbiocidal activity, in particular fungicidal activity. The invention also relates to preparation of these silicon containing aryl derivatives, to intermediates useful in the preparation of these silicon containing aryl derivatives, to the preparation of these intermediates, to agrochemical compositions which comprise at least one of the silicon containing aryl derivatives, to preparation of these compositions and to the use of the silicon containing aryl derivatives or compositions in agriculture or horticulture for controlling or preventing infestation of plants, harvested food crops, seeds or non-living materials by phytopathogenic microorganisms, in particular fungi.

Certain fungicidal compounds are described in W01 1081 174.

It has now surprisingly been found that certain novel silicon containing aryl derivatives have favourable fungicidal properties.

The present invention therefore provides compounds of formula (I)



(I)

wherein

X is O or S;

Ri is hydrogen, C1-C4 alkyl, C1-C4 alkoxy or hydroxy;

R_2 and R_3 are each independently selected from C1-C6 alkyl, C3-C6 cycloalkyi, C2-C6 alkenyl, C2-C6 alkynyl, hydroxyl and C1-C6 alkoxy; or

R_2 and R_3 together represent -CH2CH2CH2-, $-CH_2CH_2CH_2CH_2-$, $-CH_2CH_2CH_2CH_2$ CH2-, $-OCH_2CH_20-$, $-OCH_2CH_2CH_20-$, $-CH_2CH_2CH_20-$, $-CH_2CH_2CH_2CH_20$ - or $-CH_2CH_2OCH_2$ CH_2-;

each R_4 independently represents halogen, cyano, C1-C5 alkyl, C_2-Cs alkenyl, C_2-Cs alkynyl, C3-C6 cycloalkyi, C1-C5 alkoxy, C3-C5 alkenyloxy, C3-C5 alkynyloxy or C1-C5 alkylthio, in which the alkyl, cycloalkyi, alkenyl, alkynyl, alkoxy, alkenyloxy, alkynyloxy and alkylthio may be optionally substituted with 1 to 3 substituents independently selected from halogen, C1-C3 alkyl, C1-C3 alkoxy, cyano and C1-C3 alkylthio; n is 0, 1, 2, 3 or 4;

Rsand R_6 are each independently hydrogen, halogen, C1-C4 alkyl or C1-C4 alkoxy, in which the alkyl and alkoxy may be optionally substituted with 1 to 3 halogens;

each R_7 independently represents cyano, halogen, C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl, C1-C6 alkylthio, C3-C7 cycloalkyl, C1-C6 alkoxy, C3-C6 alkenyloxy or C3-C6 alkynyloxy, in which the alkyl, cycloalkyl, alkenyl, alkynyl, alkoxy, alkenyloxy, alkynyloxy and alkylthio may be optionally substituted with 1 to 3 substituents independently selected from halogen, C1-C3 alkyl, C1-C3 alkoxy, cyano and C1-C3 alkylthio; and m is 0, 1, 2, 3 or 4;
and salts and/or N-oxides thereof.

In a second aspect the present invention provides an agrochemical composition comprising a compound of formula (I).

Compounds of formula (I) may be used to control phytopathogenic microorganisms. Thus, in order to control a phytopathogen a compound of formula (I), or a composition comprising a compound of formula (I), according to the invention may be applied directly to the phytopathogen, or to the locus of a phytopathogen, in particular to a plant susceptible to attack by phytopathogens.

Thus, in a third aspect the present invention provides the use of a compound of formula (I), or a composition comprising a compound of formula (I), as described herein to control a phytopathogen.

In a further aspect the present invention provides a method of controlling phytopathogens, comprising applying a compound of formula (I), or a composition comprising a compound of formula (I), as described herein to said phytopathogen, or to the locus of said phytopathogen, in particular to a plant susceptible to attack by a phytopathogen.

Compounds of formula (I) are particularly effective in the control of phytopathogenic fungi.

Thus, in a yet further aspect the present invention provides the use of a compound of formula (I), or a composition comprising a compound of formula (I), as described herein to control phytopathogenic fungi.

In a further aspect the present invention provides a method of controlling phytopathogenic fungi, comprising applying a compound of formula (I), or a composition comprising a compound of formula (I), as described herein to said phytopathogenic fungi, or to the locus of said phytopathogenic fungi, in particular to a plant susceptible to attack by phytopathogenic fungi.

Where substituents are indicated as being optionally substituted, this means that they may or may not carry one or more identical or different substituents, e.g. one to three substituents. Normally not more than three such optional substituents are present at the

same time. Where a group is indicated as being substituted, e.g. alkyl, this includes those groups that are part of other groups, e.g. the alkyl in alkylthio.

The term "halogen" refers to fluorine, chlorine, bromine or iodine, preferably fluorine, chlorine or bromine.

Alkyl substituents (either alone or as part of a larger group, such as alkoxy-, alkylthio-) may be straight-chained or branched. Alkyl on its own or as part of another substituent is, depending upon the number of carbon atoms mentioned, for example, methyl, ethyl, n-propyl, n-butyl, n-pentyl, n-hexyl and the isomers thereof, for example, iso-propyl, iso-butyl, sec-butyl, ie*rt*-butyl or iso-amyl.

Alkenyl substituents (either alone or as part of a larger group, eg. alkenyloxy) can be in the form of straight or branched chains, and the alkenyl moieties, where appropriate, can be of either the (E)- or (Z)-configuration. Examples are vinyl and allyl. The alkenyl groups are preferably C2-C6, more preferably C2-C_4 and most preferably C2-C3 alkenyl groups.

Alkynyl substituents (either alone or as part of a larger group, eg. alkynyloxy) can be in the form of straight or branched chains. Examples are ethynyl and propargyl. The alkynyl groups are preferably C2-C6, more preferably C2-C_4 and most preferably C2-C3 alkynyl groups.

Cycloalkyl substituents may be saturated or partially unsaturated, preferably fully saturated, and are, for example, cyclopropyl, cyclobutyl, cyclopentyl or cyclohexyl.

Haloalkyl groups (either alone or as part of a larger group, eg. haloalkyloxy) may contain one or more identical or different halogen atoms and, for example, may stand for CH2Cl, $CHCl_2$, CCIs, CH2F, CHF_2, CF_3, CF3CH2, CH3CF2, CF3CF2 or CCl3CCl2.

Haloalkenyl groups (either alone or as part of a larger group, eg. haloalkenyloxy) are alkenyl groups, respectively, which are substituted with one or more of the same or different halogen atoms and are, for example, 2,2-difluorovinyl or 1,2-dichloro-2-fluoro-vinyl.

Haloalkynyl groups (either alone or as part of a larger group, eg. haloalkynyloxy) are alkynyl groups, respectively, which are substituted with one or more of the same or different halogen atoms and are, for example, 1-chloro-prop-2-ynyl.

Alkoxy means a radical -OR, where R is alkyl, e.g. as defined above. Alkoxy groups include, but are not limited to, methoxy, ethoxy, 1-methylethoxy, propoxy, butoxy, 1-methylpropoxy and 2-methylpropoxy.

Cyano means a -CN group.

Amino means an -NH2 group.

Hydroxyl or hydroxy stands for a -OH group.

Aryl groups (either alone or as part of a larger group, such as e.g. aryloxy, aryl-alkyl) are aromatic ring systems which can be in mono-, bi- or tricyclic form. Examples of such rings include phenyl, naphthyl, anthracenyl, indenyl or phenanthrenyl. Preferred aryl groups

are phenyl and naphthyl, phenyl being most preferred. Where an aryl moiety is said to be substituted, the aryl moiety is preferably substituted by one to four substituents, most preferably by one to three substituents.

The presence of one or more possible asymmetric carbon atoms in a compound of formula (I) means that the compounds may occur in optically isomeric forms, i.e. enantiomeric or diastereomeric forms. Also atropisomers may occur as a result of restricted rotation about a single bond. Formula (I) is intended to include all those possible isomeric forms and mixtures thereof. The present invention includes all those possible isomeric forms and mixtures thereof for a compound of formula (I). Likewise, formula (I) is intended to include all possible tautomers. The present invention includes all possible tautomeric forms for a compound of formula (I).

In each case, the compounds of formula (I) according to the invention are in free form, in oxidized form as a N-oxide or in salt form, e.g. an agronomically usable salt form.

N-oxides are oxidized forms of tertiary amines or oxidized forms of nitrogen containing heteroaromatic compounds. They are described for instance in the book "Heterocyclic N-oxides" by A. Albini and S. Pietra, CRC Press, Boca Raton 1991 .

Preferred values of X, Ri, R2, R3, R_4, R5, R6, R7, n and m are, in any combination thereof, as set out below:

Preferably X is O.

Preferably Ri is hydrogen, Ci-C_4 alkoxy or hydroxy.

More preferably Ri is C1-C2 alkoxy or hydroxy.

Most preferably Ri is hydroxy.

Preferably R2 and R3 are each independently selected from C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl and C1-C6 alkoxy; or R2 and R3 together represent -CH2CH2CH2-, -CH2CH2CH2CH2-, -CH2CH2CH2CH2 CH_2-, -OCH2CH2O-, or -$OCH_2CH_2CH_2$0-.

More preferably R2 and R3 are each independently selected from C1-C3 alkyl and Ci-C_2 alkoxy; or R_2 and R_3 together represent -OCH2CH2O-, or -OCH2CH2CH2O-.

Even more preferably R2 and R3 are each independently selected from methyl and ethyl.

Most preferably R2 and R3 are both methyl.

Preferably each R_4 independently represents halogen, cyano, C1-C5 alkyl, C2-C5 alkenyl, C2-C5 alkynyl, C3-C6 cycloalkyl, or C1-C5 alkylthio, in which the alkyl, cycloalkyl, alkenyl, alkynyl, and alkylthio may be optionally substituted with 1 to 3 substituents independently selected from halogen, C1-C3 alkyl, C1-C3 alkoxy, cyano and C1-C3 alkylthio; n is 0, 1 or 2.

More preferably each R_4 independently represents fluoro, chloro, bromo, cyano, methyl, or methylthio; n is 0, 1 or 2.

Even more preferably each R_4 independently represents fluoro, chloro, cyano or methyl; n is 0 or 1.

Most preferably each R_4 independently represents fluoro or methyl; n is 0 or 1.

Preferably Rsand $_{R6}$ are each independently hydrogen, halogen or Ci-C $_4$ alkyl.

More preferably Rsand $_{R6}$ are each independently hydrogen, chloro or C1-C2 alkyl.

Even more preferably Rsand $_{R6}$ are each independently hydrogen or methyl

Most preferably Rs is methyl and $_{R6}$ is hydrogen.

Preferably each R_7 independently represents cyano, halogen, C1-C3 alkyl, C1-C3 alkylthio, or C3-C5 cycloalkyi, in which the cycloalkyi and alkylthio may be optionally substituted with 1 to 3 substituents independently selected from halogen and C1-C2 alkyl; and m is 0, 1 or 2.

More preferably each R_7 independently represents cyano, fluoro, chloro, bromo, methyl or methylthio; and m is 0, 1 or 2.

Even more preferably each R_7 independently represents cyano, fluoro, chloro or methyl; and m is 1 or 2.

Most preferably each R_7 independently represents fluoro; and m is 1 or 2.

Embodiments according to the invention are provided as set out below.

Embodiment 1 provides compounds of formula I, and a salt or N-oxide thereof, as defined above.

Embodiment 2 provides compounds according to embodiment 1 wherein Ri is hydrogen, C1-C4 alkoxy or hydroxy.

Embodiment 3 provides compounds according to embodiment 1 or 2 wherein R_2 and R_3 are each independently selected from C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl and C1-C6 alkoxy; or R_2 and R_3 together represent -CH2CH2CH2-, -CH2CH2CH2CH2-, -CH2CH2CH2CH2 CH_2-, -OCH2CH2O-, or -$OCH_2CH_2CH_2$0-.

Embodiment 4 provides compounds according to any one of embodiments 1, 2 or 3 wherein each R_4 independently represents halogen, cyano, C1-C5 alkyl, C2-C5 alkenyl, C2-C5 alkynyl, C3-C6 cycloalkyi, or C1-C5 alkylthio, in which the alkyl, cycloalkyi, alkenyl, alkynyl, and alkylthio may be optionally substituted with 1 to 3 substituents independently selected from halogen, C1-C3 alkyl, C1-C3 alkoxy, cyano and C1-C3 alkylthio; n is 0, 1 or 2.

Embodiment 5 provides compounds according to any one of embodiments 1, 2, 3 or 4 wherein R_5 and $_{R6}$ are each independently hydrogen, halogen or C1-C4 alkyl.

Embodiment 6 provides compounds according to any one of embodiments 1, 2, 3, 4, or 5 wherein each R_7 independently represents cyano, halogen, C1-C3 alkyl, C1-C3 alkylthio,

or C_{3-C5} cycloalkyl, in which the cycloalkyl and alkylthio may be optionally substituted with 1 to 3 substituents independently selected from halogen and C1-C2 alkyl; and m is 0, 1 or 2.

Embodiment 7 provides compounds according to any one of embodiments 1, 2, 3, 4, 5, or 6 wherein Ri is C1-C2 alkoxy or hydroxy.

Embodiment 8 provides compounds according to any one of embodiments 1, 2, 3, 4, 5, 6, or 7 wherein R_2 and R_3 are each independently selected from C1-C3 alkyl and C1-C2 alkoxy; or R_2 and R_3 together represent -OCH2CH2O-, or -OCH2CH2CH2O-.

Embodiment 9 provides compounds according to any one of embodiments 1, 2, 3, 4, 5, 6, 7, or 8 wherein each R_4 independently represents fluoro, chloro, bromo, cyano, methyl, or methylthio; n is 0, 1 or 2.

Embodiment 10 provides compounds according to any one of embodiments 1, 2, 3, 4, 5, 6, 7, 8, or 9 wherein R_5 and R_6 are each independently hydrogen, chloro or C1-C2 alkyl.

Embodiment 11 provides compounds according to any one of embodiments 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10 wherein each R_7 independently represents cyano, fluoro, chloro, bromo, methyl or methylthio; and m is 0, 1 or 2.

Embodiment 12 provides compounds according to any one of embodiments 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 or 11 wherein Ri is hydroxy.

Embodiment 13 provides compounds according to any one of embodiments 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 or 12 wherein R_2 and R_3 are each independently selected from methyl and ethyl.

Embodiment 14 provides compounds according to any one of embodiments 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 or 13 wherein each R_4 independently represents fluoro, chloro, cyano or methyl; n is 0 or 1.

Embodiment 15 provides compounds according to any one of embodiments 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 or 14 wherein R_5 and R_6 are each independently hydrogen or methyl

Embodiment 16 provides compounds according to any one of embodiments 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 or 15 wherein each R_7 independently represents cyano, fluoro, chloro or methyl; and m is 1 or 2.

Embodiment 17 provides compounds according to any one of embodiments 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 or 16 wherein R_2 and R_3 are both methyl.

Embodiment 18 provides compounds according to any one of embodiments 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16 or 17 wherein each R_4 independently represents fluoro or methyl; n is 0 or 1.

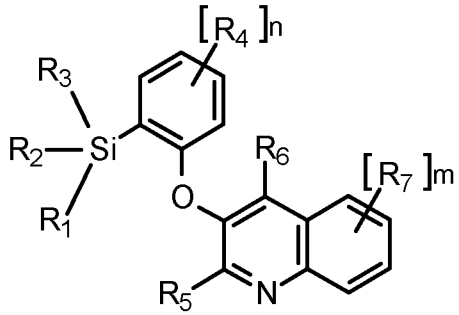
Embodiment 19 provides compounds according to any one of embodiments 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17 or 18 wherein R_5 is methyl and R_6 is hydrogen.

Embodiment 20 provides compounds according to any one of embodiments 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18 or 19 wherein each R_7 independently represents fluoro; and m is 1 or 2.

Embodiment 21 provides compounds according to any one of embodiments 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19 or 20 wherein X is O.

Embodiment 22 provides compounds according to any one of embodiments 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19 or 20 wherein X is S.

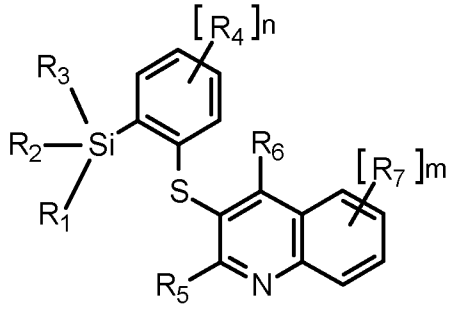
One group of compounds according to the invention are those of formula (I'):



(I')

wherein Ri, R2, R3, R_4, R5, R6, R7, n and m are as defined for compounds of formula (I), or a salt or N-oxide thereof. Preferred definitions of Ri, R2, R3, R_4, R5, R6, R7, n and m are as defined for compounds of formula (I).

One group of compounds according to the invention are those of formula (!"):



(I'')

wherein Ri, R2, R3, R_4, R5, R6, R7, n and m are as defined for compounds of formula (I), or a salt or N-oxide thereof. Preferred definitions of Ri, R2, R3, R_4, R5, R6, R7, n and m are as defined for compounds of formula (I).

A preferred group of compounds according to the invention are those of formula (1-1) which are compounds of formula (I) wherein X is O or S; Ri is hydrogen, C1-C4 alkoxy or hydroxy; R2 and R3 are each independently selected from C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl and Ci-C_6 alkoxy; or R_2 and R_3 together represent -CH2CH2CH2-, -CH2CH2CH2CH2-, -CH2CH2CH2CH2 CH_2-, -OCH2CH2O-, or -$OCH_2CH_2CH_2$0-; each R_4 independently represents halogen, cyano, C1-C5 alkyl, C2-C5 alkenyl, C2-C5 alkynyl, C3-C6 cycloalkyi, or Ci-

C_5 alkylthio, in which the alkyl, cycloalkyl, alkenyl, alkynyl, and alkylthio may be optionally substituted with 1 to 3 substituents independently selected from halogen, C1-C3 alkyl, C1-C3 alkoxy, cyano and C1-C3 alkylthio; n is 0, 1 or 2; R_5 and R_6 are each independently hydrogen, halogen or C1-C4 alkyl; each R_7 independently represents cyano, halogen, C1-C3 alkyl, C1-C3 alkylthio, or C_{3-C5} cycloalkyl, in which the cycloalkyl and alkylthio may be optionally substituted with 1 to 3 substituents independently selected from halogen and C1-C2 alkyl; and m is 0, 1 or 2; or a salt or N-oxide thereof.

One group of compounds according to this embodiment are compounds of formula (I-1a) which are compounds of formula (1-1) wherein X is O.

Another group of compounds according to this embodiment are compounds of formula (1-1b) which are compounds of formula (1-1) wherein X is S.

A further preferred group of compounds according to the invention are those of formula (I-2) which are compounds of formula (I) wherein X is O or S; Ri is C1-C2 alkoxy or hydroxy; R_2 and R_3 are each independently selected from C1-C3 alkyl and C1-C2 alkoxy; or R_2 and R_3 together represent -OCH2CH2O-, or -OCH2CH2CH2O-; each R_4 independently represents fluoro, chloro, bromo, cyano, methyl, or methylthio; n is 0, 1 or 2; R_5 and R_6 are each independently hydrogen, chloro or C1-C2 alkyl; each R_7 independently represents cyano, fluoro, chloro, bromo, methyl or methylthio; and m is 0, 1 or 2; or a salt or N-oxide thereof.

One group of compounds according to this embodiment are compounds of formula (I-2a) which are compounds of formula (I-2) wherein X is O.

Another group of compounds according to this embodiment are compounds of formula (I-2b) which are compounds of formula (I-2) wherein X is S.

A further preferred group of compounds according to the invention are those of formula (I-3) which are compounds of formula (I) wherein X is O or S; Ri is hydroxy; R_2 and R_3 are each independently selected from methyl and ethyl; each R_4 independently represents fluoro, chloro, cyano or methyl; n is 0 or 1; R_5 and R_6 are each independently hydrogen or methyl; each R_7 independently represents cyano, fluoro, chloro or methyl; and m is 1 or 2; or a salt or N-oxide thereof.

One group of compounds according to this embodiment are compounds of formula (I-3a) which are compounds of formula (I-3) wherein X is O.

Another group of compounds according to this embodiment are compounds of formula (I-3b) which are compounds of formula (I-3) wherein X is S.

A further preferred group of compounds according to the invention are those of formula (I-4) which are compounds of formula (I) wherein X is O or S; Ri is hydroxy; R_2 and R_3 are both methyl; each R_4 independently represents fluoro or methyl; n is 0 or 1; R_5 is

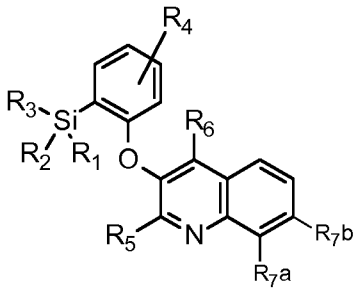
methyl; R_6 is hydrogen; each R_7 independently represents fluoro; and m is 1 or 2; or a salt or N-oxide thereof.

One group of compounds according to this embodiment are compounds of formula (I-4a) which are compounds of formula (I-4) wherein X is O.

Another group of compounds according to this embodiment are compounds of formula (I-4b) which are compounds of formula (I-4) wherein X is S.

Compounds according to the invention may possess any number of benefits including, *inter alia,* advantageous levels of biological activity for protecting plants against diseases that are caused by fungi or superior properties for use as agrochemical active ingredients (for example, greater biological activity, an advantageous spectrum of activity, an increased safety profile, improved physico-chemical properties, or increased biodegradability).

Specific examples of compounds of formula (I) are illustrated in the Tables A 1 to A 14 below:
Table A 1 provides 146 compounds of formula (I-o)



(I-o)

wherein R_5 is CH3, R_6 is H, R_{7a} is F, R_7b is H
and wherein the values of Ri, R2, R_3 and R_4 are as defined in Table Z below:

Table Z

Entry	R_1	R_2	R_3	R_4
1	H	CH_3	CH_3	6-F
2	H	CH_3	CH_2CH_3	6-F
3	H	CH_3	$CH(CH_3)_2$	6-F
4	H	CH_3	$CH_2CH_2CH_3$	6-F
5	H	$CH_2CH_2CH_2$		6-F
6	H	$CH_2(CH_2)_2CH_2$		6-F
7	H	$CH_2(CH_2)_3CH_2$		6-F
8	OH	CH_3	CH_3	6-F
9	OH	CH_3	CH_2CH_3	6-F
10	OH	CH_3	$CH(CH_3)_2$	6-F

Entry	R_1	R_2	R_3	R_4
11	OH	$CH_2CH_2CH_2$		6-F
12	OH	$CH_2(CH_2)_2CH_2$		6-F
13	OH	$CH_2(CH_2)_3CH_2$		6-F
14	OH	CH_3	$CH=CH_2$	6-F
15	OH	CH_3	$CH_2CH_2CH_3$	6-F
16	OCH_3	CH_3	CH_3	6-F
17	OCH_3	CH_3	CH_2CH_3	6-F
18	OCH_3	CH_3	$CH(CH_3)_2$	6-F
19	OCH_3	CH_3	$CH_2CH_2CH_3$	6-F
20	OCH_3	$CH_2(CH_2)_2CH_2$		6-F
21	OCH_3	$CH_2(CH_2)_3CH_2$		6-F
22	OCH_2CH_3	CH_3	CH_3	6-F
23	OCH_2CH_3	CH_3	CH_2CH_3	6-F
24	OCH_2CH_3	CH_3	$CH(CH_3)_2$	6-F
25	OCH_2CH_3	CH_3	$CH_2CH_2CH_3$	6-F
26	OCH_2CH_3	$CH_2(CH_2)_2CH_2$		6-F
27	$OCH(CH_3)_2$	CH_3	CH_3	6-F
28	$OCH_2CH(CH_3)_2$	CH_3	CH_3	6-F
29	CH_3	CH_3	CH_3	6-F
30	H	CH_3	CH_3	-
31	H	CH_3	CH_2CH_3	-
32	H	CH_3	$CH_2CH_2CH_3$	-
33	H	CH_3	$CH(CH_3)_2$	-
34	H	$CH_2CH_2CH_2$		-
35	H	$CH_2(CH_2)_2CH_2$		-
36	H	$CH_2(CH_2)_3CH_2$		-
37	OH	CH_3	CH_3	-
38	OH	CH_3	CH_2CH_3	-
39	OH	CH_3	$CH(CH_3)_2$	-
40	OH	$CH_2CH_2CH_2$		-
41	OH	$CH_2(CH_2)_2CH_2$		-
42	OH	$CH_2(CH_2)_3CH_2$		-
43	OH	CH_3	$CH=CH_2$	-
44	OH	CH_3	$CH_2CH_2CH_3$	-
45	OCH_3	CH_3	CH_3	-

Entry	R_1	R_2	R_3	R_4
46	OCH_3	CH_3	CH_2CH_3	-
47	OCH_3	CH_3	$CH(CH_3)_2$	-
48	OCH_3	CH_3	$CH_2CH_2CH_3$	-
49	OCH_3	$CH_2(CH_2)_2CH_2$		-
50	OCH_3	$CH_2(CH_2)_3CH_2$		-
51	OCH_2CH_3	CH_3	CH_3	-
52	OCH_2CH_3	CH_3	CH_2CH_3	-
53	OCH_2CH_3	CH_3	$CH(CH_3)_2$	-
54	OCH_2CH_3	CH_3	$CH_2CH_2CH_3$	-
55	OCH_2CH_3	$CH_2(CH_2)_2CH_2$		-
56	$OCH(CH_3)_2$	CH_3	CH_3	-
57	$OCH_2CH(CH_3)_2$	CH_3	CH_3	-
58	CH_3	CH_3	CH_3	-
59	CH_3	$CH_2(CH_2)_2CH_2$		-
60	H	CH_3	CH_3	6-CH_3
61	H	CH_3	CH_2CH_3	6-CH_3
62	H	CH_3	$CH_2CH_2CH_3$	6-CH_3
63	H	CH_3	$CH(CH_3)_2$	6-CH_3
64	H	$CH_2CH_2CH_2$		6-CH_3
65	H	$CH_2(CH_2)_2CH_2$		6-CH_3
66	H	$CH_2(CH_2)_3CH_2$		6-CH_3
67	OH	CH_3	CH_3	6-CH_3
68	OH	CH_3	CH_2CH_3	6-CH_3
69	OH	CH_3	$CH(CH_3)_2$	6-CH_3
70	OH	$CH_2CH_2CH_2$		6-CH_3
71	OH	$CH_2(CH_2)_2CH_2$		6-CH_3
72	OH	$CH_2(CH_2)_3CH_2$		6-CH_3
73	OH	CH_3	$CH=CH_2$	6-CH_3
74	OH	CH_3	$CH_2CH_2CH_3$	6-CH_3
75	OCH_3	CH_3	CH_3	6-CH_3
76	OCH_3	CH_3	CH_2CH_3	6-CH_3
77	OCH_3	CH_3	$CH(CH_3)_2$	6-CH_3
78	OCH_3	CH_3	$CH_2CH_2CH_3$	6-CH_3
79	OCH_3	$CH_2(CH_2)_2CH_2$		6-CH_3
80	OCH_3	$CH_2(CH_2)_3CH_2$		6-CH_3

Entry	R_1	R_2	R_3	R_4
81	OCH_2CH_3	CH_3	CH_3	6-CH_3
82	OCH_2CH_3	CH_3	CH_2CH_3	6-CH_3
83	OCH_2CH_3	CH_3	$CH(CH_3)_2$	6-CH_3
84	OCH_2CH_3	CH_3	$CH_2CH_2CH_3$	6-CH_3
85	OCH_2CH_3	$CH_2(CH_2)_2CH_2$		6-CH_3
86	$OCH(CH_3)_2$	CH_3	CH_3	6-CH_3
87	$OCH_2CH(CH_3)_2$	CH_3	CH_3	6-CH_3
88	CH_3	CH_3	CH_3	6-CH_3
89	H	CH_3	CH_3	6-CN
90	H	CH_3	CH_2CH_3	6-CN
91	H	CH_3	$CH_2CH_2CH_3$	6-CN
92	H	CH_3	$CH(CH_3)_2$	6-CN
93	H	$CH_2CH_2CH_2$		6-CN
94	H	$CH_2(CH_2)_2CH_2$		6-CN
95	H	$CH_2(CH_2)_3CH_2$		6-CN
96	OH	CH_3	CH_3	6-CN
97	OH	CH_3	CH_2CH_3	6-CN
98	OH	CH_3	$CH(CH_3)_2$	6-CN
99	OH	$CH_2CH_2CH_2$		6-CN
100	OH	$CH_2(CH_2)_2CH_2$		6-CN
101	OH	$CH_2(CH_2)_3CH_2$		6-CN
102	OH	CH_3	$CH=CH_2$	6-CN
103	OH	CH_3	$CH_2CH_2CH_3$	6-CN
104	OCH_3	CH_3	CH_3	6-CN
105	OCH_3	CH_3	CH_2CH_3	6-CN
106	OCH_3	CH_3	$CH(CH_3)_2$	6-CN
107	OCH_3	CH_3	$CH_2CH_2CH_3$	6-CN
108	OCH_3	$CH_2(CH_2)_2CH_2$		6-CN
109	OCH_3	$CH_2(CH_2)_3CH_2$		6-CN
110	OCH_2CH_3	CH_3	CH_3	6-CN
111	OCH_2CH_3	CH_3	CH_2CH_3	6-CN
112	OCH_2CH_3	CH_3	$CH(CH_3)_2$	6-CN
113	OCH_2CH_3	CH_3	$CH_2CH_2CH_3$	6-CN
114	OCH_2CH_3	$CH_2(CH_2)_2CH_2$		6-CN
115	$OCH(CH_3)_2$	CH_3	CH_3	6-CN

Entry	R_1	R_2	R_3	R_4
116	$OCH_2CH(CH_3)_2$	CH_3	CH_3	6-CN
117	CH_3	CH_3	CH_3	6-CN
118	H	CH_3	CH_3	6-Cl
119	H	CH_3	CH_2CH_3	6-Cl
120	H	CH_3	$CH_2CH_2CH_3$	6-Cl
121	H	CH_3	$CH(CH_3)_2$	6-Cl
122	H	$CH_2CH_2CH_2$		6-CN
123	H	$CH_2(CH_2)_2CH_2$		6-CN
124	H	$CH_2(CH_2)_3CH_2$		6-CN
125	OH	CH_3	CH_3	6-Cl
126	OH	CH_3	CH_2CH_3	6-Cl
127	OH	CH_3	$CH(CH_3)_2$	6-Cl
128	OH	$CH_2CH_2CH_2$		6-CN
129	OH	$CH_2(CH_2)_2CH_2$		6-CN
130	OH	$CH_2(CH_2)_3CH_2$		6-CN
131	OH	CH_3	$CH=CH_2$	6-Cl
132	OH	CH_3	$CH_2CH_2CH_3$	6-Cl
133	OCH_3	CH_3	CH_3	6-Cl
134	OCH_3	CH_3	CH_2CH_3	6-Cl
135	OCH_3	CH_3	$CH(CH_3)_2$	6-Cl
136	OCH_3	CH_3	$CH_2CH_2CH_3$	6-Cl
137	OCH_3	$CH_2(CH_2)_2CH_2$		6-Cl
138	OCH_3	$CH_2(CH_2)_3CH_2$		6-CN
139	OCH_2CH_3	CH_3	CH_3	6-Cl
140	OCH_2CH_3	CH_3	CH_2CH_3	6-Cl
141	OCH_2CH_3	CH_3	$CH(CH_3)_2$	6-Cl
142	OCH_2CH_3	CH_3	$CH_2CH_2CH_3$	6-Cl
143	OCH_2CH_3	$CH_2(CH_2)_2CH_2$		6-Cl
144	$OCH(CH_3)_2$	CH_3	CH_3	6-Cl
145	$OCH_2CH(CH_3)_2$	CH_3	CH_3	6-Cl
146	CH_3	CH_3	CH_3	6-Cl

Table A2 provides 146 compounds of formula (I-o) wherein R_5 is Cl, R_6 is H, R_{7a} is F, R_7b is H and wherein the values of R_1, R_2, R_3 and R_4 are as defined in Table Z above.

Table A3 provides 146 compounds of formula (I-o) wherein R_5 is H, R_6 is H, R_{7a} is F, R_{7b} is H and wherein the values of Ri, R2, R3 and R_4 are as defined in Table Z above.

Table A4 provides 146 compounds of formula (I-o) wherein R_5 is CH2CH3, R_6 is H, R_{7a} is F, R_{7b} is H and wherein the values of Ri, R2, R3 and R_4 are as defined in Table Z above.

Table A5 provides 146 compounds of formula (I-o) wherein R_5 is CH3, R_6 is H, R_{7a} is CH3, R_{7b} is H and wherein the values of Ri, R2, R3 and R_4 are as defined in Table Z above.

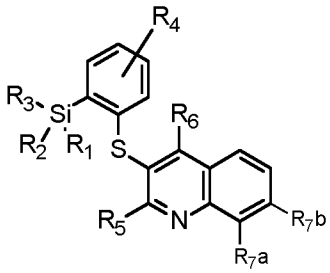
Table A6 provides 146 compounds of formula (I-o) wherein R_5 is CH3, R_6 is H, R_{7a} is H, R_{7b} is H and wherein the values of Ri, R2, R3 and R_4 are as defined in Table Z above.

Table A7 provides 146 compounds of formula (I-o) wherein R_5 is CH3, R_6 is H, R_{7a} is Cl, R_{7b} is H and wherein the values of Ri, R2, R3 and R_4 are as defined in Table Z above.

Table A8 provides 146 compounds of formula (I-o) wherein R_5 is CH3, R_6 is H, R_{7a} is CN, R_{7b} is H and wherein the values of Ri, R2, R3 and R_4 are as defined in Table Z above.

Table A9 provides 146 compounds of formula (I-o) wherein R_5 is CH3, R_6 is H, R_{7a} is F, R_{7b} is F and wherein the values of Ri, R2, R3 and R_4 are as defined in Table Z above.

Table A10 provides 146 compounds of formula (I-s)



(I-s)

where R_5 is CH3, R_6 is H, R_{7a} is F, R_{7b} is H and the values of Ri, R2, R3 and R_4 are as defined in Table Z above.

Table A11 provides 146 compounds of formula (I-s) wherein R_5 is H, R_6 is H, R_{7a} is F, R_{7b} is H and wherein the values of Ri, R2, R3 and R_4 are as defined in Table Z above.

Table A12 provides 146 compounds of formula (I-s) wherein R_5 is CH3, R_6 is H, R_{7a} is H, R_{7b} is H and wherein the values of Ri, R2, R3 and R_4 are as defined in Table Z above.

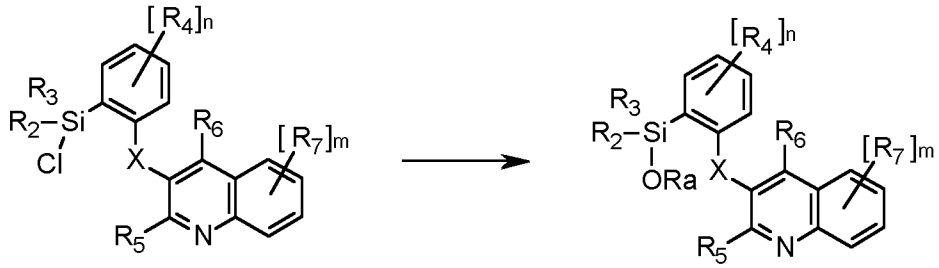
Table A13 provides 146 compounds of formula (I-s) wherein R_5 is CH3, R_6 is H, R_{7a} is CN, R_{7b} is H and wherein the values of Ri, R2, R3 and R_4 are as defined in Table Z above.

Table A14 provides 146 compounds of formula (I-s) wherein R_5 is CH3, R_6 is H, R_{7a} is F, R_{7b} is F and wherein the values of Ri, R2, R3 and R_4 are as defined in Table Z above.

Compounds of the present invention can be made as shown in the following schemes, in which, unless otherwise stated, the definition of each variable is as defined above for a compound of formula (I).

A shown in scheme 1, compounds of formula (I-a) where R2, R3, R_4, R5, R6, R_7, n, m and X are as described for compound (I) and R_a is H or a C1-C4 alkyl group, can be prepared

by the reaction of compounds of formula (II) with H_2O or HOR_a respectively in an inert solvent like dichloromethane in the presence of a base like triethylamine at temperatures between 0 °C and 80 °C as described in *Protective Groups in Organic Synthesis, Greene and Wuts, 4th Edition, Wiley 2006.*



(») (l-a)

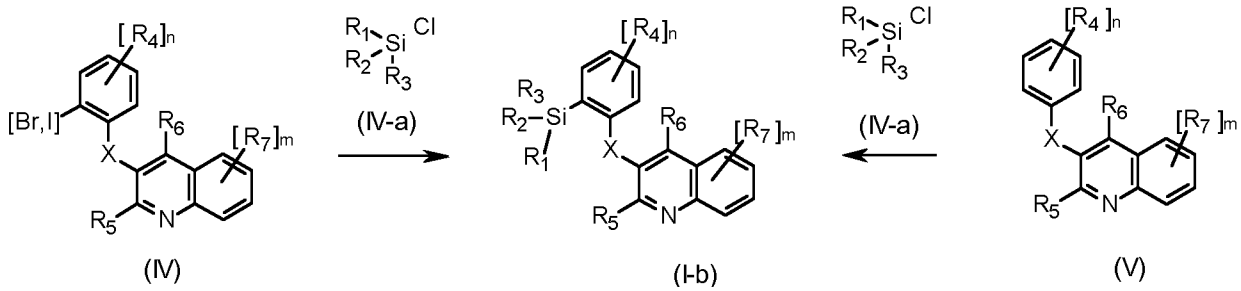
Scheme 1

Alternatively, compounds of general formula (l-a) where R2, R3, R_4, R5, R6, R7, n, m and X are as described for compound (I) and R_a is H or a Ci-C_4 alkyl group, can be prepared by the reaction of compounds of formula (III) with H_2O or HOR_a respectively, a catalytic amount of suitably supported transition metal like palladium on carbon in an inert solvent like 1,4-dioxane at temperatures between 0 °C and 100 °C as shown in scheme 2 and described in *Organometallics* **2003,** 2387-2395 or Chem. Eur. J. 201 1, 17, 9897 - 9900.

(HI) (l-a)

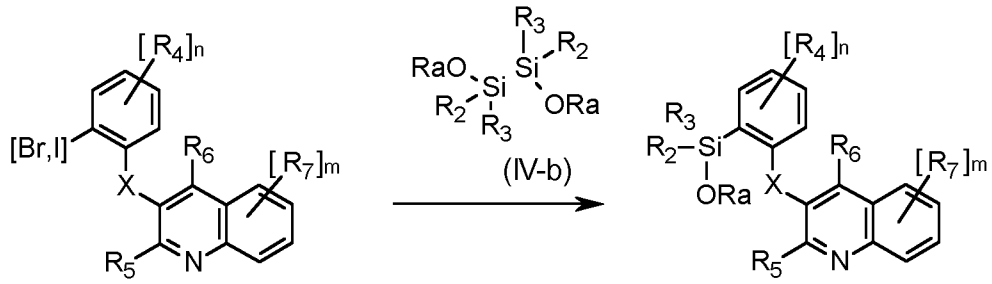
Scheme 2

Alternatively, compounds of general formula (l-b) where R2, R3, R_4, R5, R6, R7, n, m and X are as described for compound (I) and Ri is Ci-C_4 alkyl group can be prepared by the reaction of compounds of formula (IV) with an organolithium like n-butyl lithium, or by reaction of compounds of formula (V) with a strong amide base like lithium diisopropylamide in an inert solvent like tetrahydrofuran (THF) at temperatures between -100 °C and 20 °C, followed by reaction with a compound of formula (IV-a) as shown in scheme 3 and described in *Science of Synthesis,* **2002,** 4, 685-712.



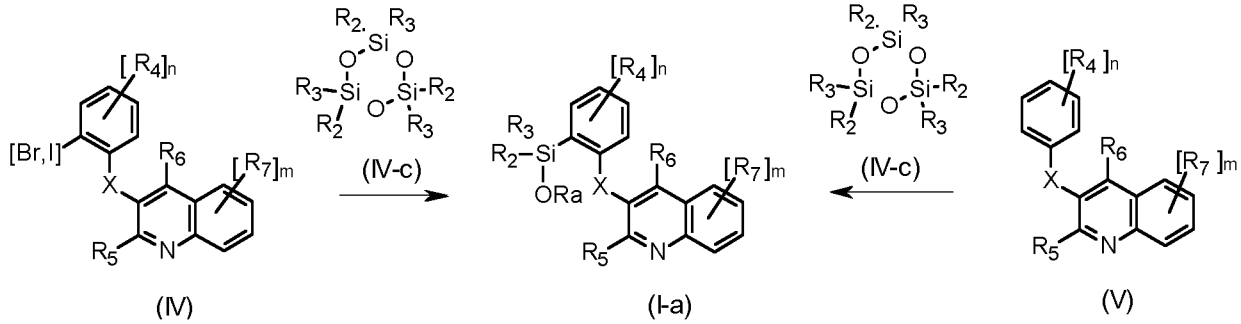
Scheme 3

Alternatively, compounds of general formula (I-a) where R2, R3, R_4, R5, R6, R7, n, m and X are as described for compound (I) and R_a is C1-C4 alkyl group, can be prepared by the reaction of compounds of formula (IV) with a disilane of formula (IV-b) in the presence of a phosphine supported palladium catalyst and a base like ethyl-diisopropylamine in an inert solvent like NMP at temperature between 20 °C and 150 °C as shown in scheme 4 and described in *Organic Letters* **2003,** 3483-3486;



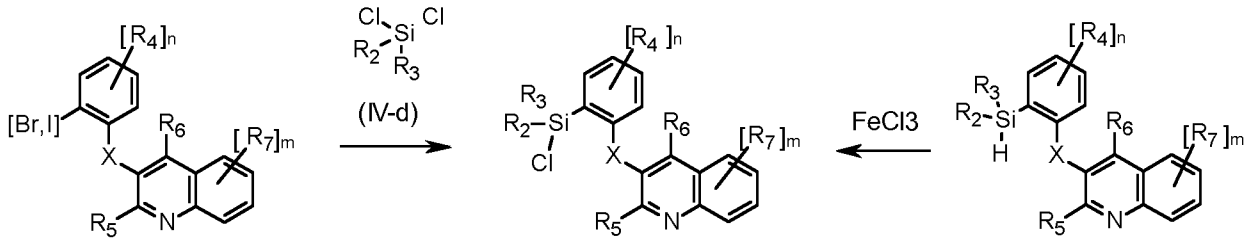
Scheme 4

Alternatively, compounds of general formula (I-a) where R2, R3, R_4, R5, R6, R7, n, m and X are as described for compound (I) and R_a is H can be prepared by the reaction of compounds of formula (IV) with an organolithium like n-butyl lithium, or by reaction of compounds of formula (V) with a strong amide base like lithium diisopropylamide, in an inert solvent like tetrahydrofuran (THF) at temperatures between -100 °C and 20 °C, followed by reaction with a compound of formula (IV-c) as shown in scheme 5 and described in *J. Am. Chem. Soc.,* **2009,** *3104-3118.*



Scheme 5

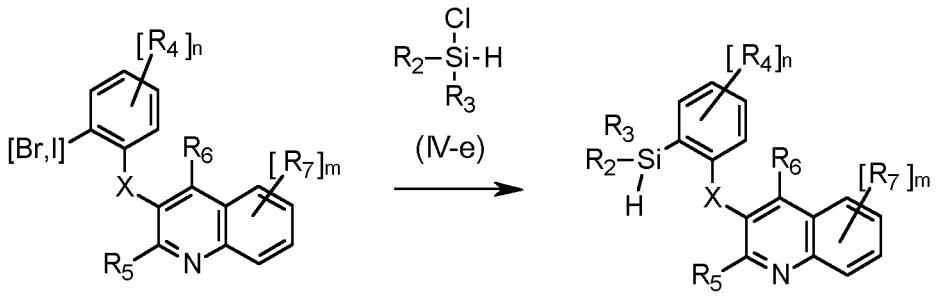
As shown in scheme 6, compounds of formula (II) where R2, R3, R_4, R5, R6, R7, n, m and X are as described for compound (I) can be prepared by the reaction of compounds of formula (IV) with an organolithium like n-butyl lithium in an inert solvent like tetrahydrofuran (THF) at temperatures between -100 °C and 20 °C, followed by reaction with a compound of formula (IV-d) as described in *Organometallics* **2006,** 2796-2805. Alternatively, compounds of formula (II) can be also prepared by the reaction of compounds (III) with a chlorinating agent like iron(lll)chloride in an inert solvent like DCM at temperatures between 0°C and 100 °C as described in *Organometallics* **2012,** 3199-3206.



(IV) (II) (HI)

Scheme 6

As shown in scheme 7, compounds of formula (III) where R2, R3, R_4, R5, R6, R7, n, m and X are as described for compound (I) can be prepared by the reaction of compounds of formula (IV) with an organolithium like n-butyl lithium in an inert solvent like tetrahydrofuran (THF) at temperatures between -100 °C and 20 °C, followed by reaction with a compound of formula (IV-e) as described in *J. Org. Chem.* **2012** 7052-7060..



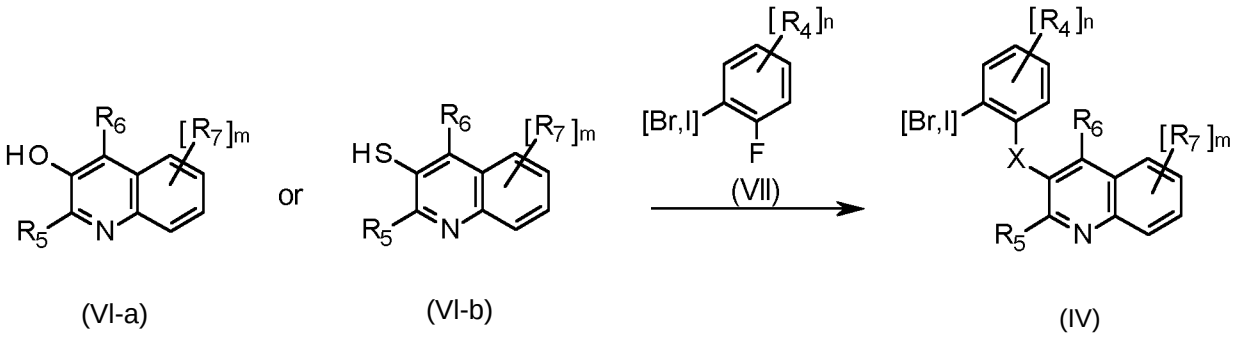
(IV) (III)

Scheme 7

The synthesis of silicon compounds of formula (IV-a), (IV-b), (IV-c), (IV-d) and (IV-e) by elaboration of commercially available silane compounds or by functional group transformations thereof is obvious to a person skilled in the art and is well described in the series *Organosilicon Chemistry I-VI, From Molecules to Materials,* Auner and Weis, VCH,

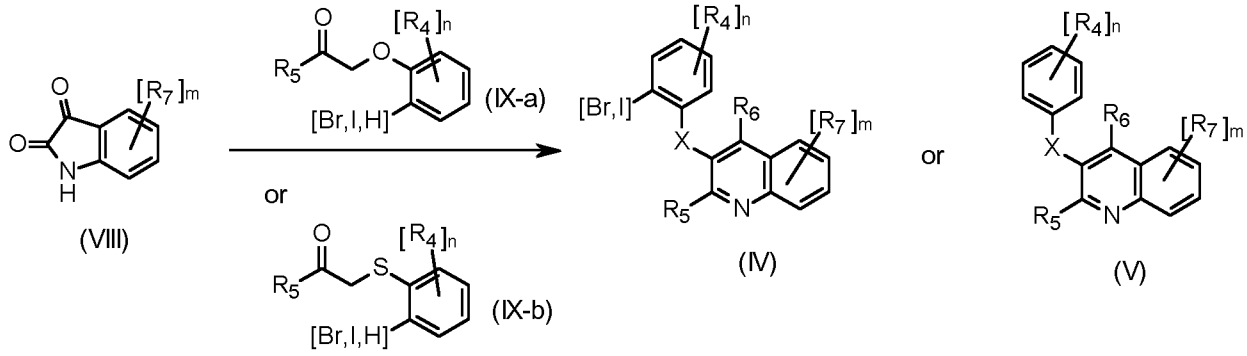
As shown in scheme 8, compounds of formula (IV) where R_4, R5, R6, R7, n, m and X are as described for compound (I) can be prepared by the reaction of compounds of formula (Vl-a) or (Vl-b) respectively with compounds of formula (VII) in the presence of a base like

potassium carbonate in an inert solvent like N-methyl-2-pyrrolidone (NMP) at temperatures between 20 °C and 180 °C as described in WO 2005033074.



Scheme 8

Alternatively, compounds of formula (IV), where R_6 is **H, R_4, Rs,** R_7, n, m and X are as described for compound (I) can be prepared by the reaction of compounds of formula (VIII) with compounds of formula (IX-a) or (IX-b) respectively in the presence of a base like calcium hydroxide in an organic or inorganic solvent like water at temperatures between 0 °C and 100 °C, followed by decarboxylation in an inert solvent like nitrobenzene at temperatures between 100 °C and 250 °C as shown in scheme 9 and as described in *Organic Syntheses,* **1960,** 54-60, *J. Am. Chem. Soc.* **1939,** 2730-2733 and US 20090318436.



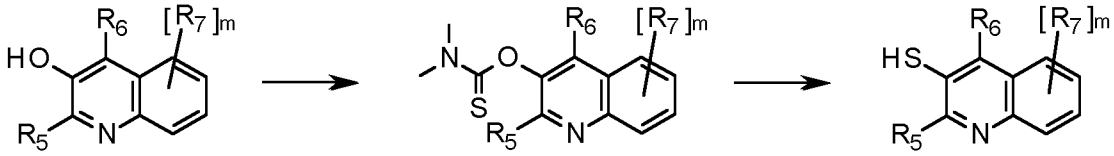
Scheme 9

The synthesis of compounds of formula (IX-a) or (IX-b) respectively from the corresponding alpha-halogen ketones and a phenol or thiophenol respectively is obvious to a person skilled in the art and general reaction conditions can be found in *March's Advanced Organic Chemistry,* Smith and March, 6th edition, Wiley, 2007.

Protocols for the preparation of isatin derivatives of formula (VIII) are well known to a person skilled in the art and representative conditions can be found in *J. Braz. Chem. Soc.* **2001 ,** 273-324.

Compounds of formula (VI-b) can be prepared by the sequence of stepped shown in scheme 10, outlined below and described in *Synthesis* **2008,** 661-689. The reaction of

compounds of formula (Vl-a) with N,N-dimethylcarbamothioyl chloride in the presence of a base like sodium hydride in an inert solvent like dimethyl formamide produces intermediates of formula (Vl-a-i) which can converted to compounds of formula (Vl-b) by heating as neat compound or in an inert solvent like diphenyl ether at temperatures between 50 °C and 350 °C, followed by treatment with a strong base like sodium hydroxide in an organic solvent like methanol at temperatures between 0 °C and 100 °C.



(Vl-a) (Vl-a-i) (Vl-b)

Scheme 10

Among the various ways for the synthesis of compounds of formula (Vl-a) the most widely applied methods are described in *J. Org. Chem.* **1995,** 7369-7371 ; WO 201 1081 174, *J. Am. Chem. Soc.* **1948,** 2622-2624, WO 2014062655, *J. Heterocyclic Chem.* **1989,** 1589-1594 and are obvious to a person skilled in the art.

Alternatively, the compounds of formula (I) wherein **Ri,** F¾, R3, **R_4,** R5, R6, R7, X, m and n are as defined for compounds of formula (I) can be obtained by transformation of another, closely related, compound of formula (I) using standard synthesis techniques known to the person skilled in the art. Non-exhaustive examples include oxidation reactions, reduction reactions, hydrolysis reactions, metal catalysed cross coupling reactions, aromatic nucleophilic or electrophilic substitution reactions, nucleophilic substitution reactions, nucleophilic addition reactions, and halogenation reactions.

Certain intermediates described in the above schemes are novel and as such form a further aspect of the invention.

The compounds of formula (I) can be used in the agricultural sector and related fields of use e.g. as active ingredients for controlling plant pests or on non-living materials for control of spoilage microorganisms or organisms potentially harmful to man. The novel compounds are distinguished by excellent activity at low rates of application, by being well tolerated by plants and by being environmentally safe. They have very useful curative, preventive and systemic properties and may be used for protecting numerous cultivated plants. The compounds of formula (I) can be used to inhibit or destroy the pests that occur on plants or parts of plants (fruit, blossoms, leaves, stems, tubers, roots) of different crops of useful plants, while at the same time protecting also those parts of the plants that grow later e.g. from phytopathogenic microorganisms.

It is also possible to use compounds of formula (I) as fungicide. The term "fungicide" as used herein means a compound that controls, modifies, or prevents the growth of fungi. The term "fungicidally effective amount" means the quantity of such a compound or combination of such compounds that is capable of producing an effect on the growth of fungi. Controlling or modifying effects include all deviation from natural development, such as killing, retardation and the like, and prevention includes barrier or other defensive formation in or on a plant to prevent fungal infection.

It is also possible to use compounds of formula (I) as dressing agents for the treatment of plant propagation material, e.g., seed, such as fruits, tubers or grains, or plant cuttings (for example rice), for the protection against fungal infections as well as against phytopathogenic fungi occurring in the soil. The propagation material can be treated with a composition comprising a compound of formula (I) before planting: seed, for example, can be dressed before being sown. The compounds of formula (I) can also be applied to grains (coating), either by impregnating the seeds in a liquid formulation or by coating them with a solid formulation. The composition can also be applied to the planting site when the propagation material is being planted, for example, to the seed furrow during sowing. The invention relates also to such methods of treating plant propagation material and to the plant propagation material so treated.

Furthermore the compounds according to present invention can be used for controlling fungi in related areas, for example in the protection of technical materials, including wood and wood related technical products, in food storage, in hygiene management.

In addition, the invention could be used to protect non-living materials from fungal attack, e.g. lumber, wall boards and paint.

Compounds of formula (I) and fungicidal compositions containing them may be used to control plant diseases caused by a broad spectrum of fungal plant pathogens. They are effective in controlling a broad spectrum of plant diseases, such as foliar pathogens of ornamental, turf, vegetable, field, cereal, and fruit crops.

These fungi and fungal vectors of disease, as well as phytopathogenic bacteria and viruses, which may be controlled are for example:

Absidia corymbifera, Alternaria spp, Aphanomyces spp, Ascochyta spp, Aspergillus spp. including A. flavus, A. fumigatus, A. nidulans, A. niger, A. terrus, Aureobasidium spp. including A. pullulans, Blastomyces dermatitidis, Blumeria graminis, Bremia lactucae, Botryosphaeria spp. including B. dothidea, B. obtusa, Botrytis spp. inclusing B. cinerea, Candida spp. including C. albicans, C. glabrata, C. krusei, C. lusitaniae, C. parapsilosis, C. tropicalis, Cephaloascus fragrans, Ceratocystis spp, Cercospora spp. including C. arachidicola, Cercosporidium personatum, Cladosporium spp, Claviceps purpurea,

Coccidioides immitis, Cochliobolus spp, Colletotrichum spp. including C. musae, Cryptococcus neoformans, Diaporthe spp, Didymella spp, Drechslera spp, Elsinoe spp,

Epidermophyton spp, Erwinia amylovora, Erysiphe spp. including E. cichoracearum, Eutypa lata, Fusarium spp. including F. culmorum, F. graminearum, F. langsethiae, F. moniliforme, F. oxysporum, F. proliferatum, F. subglutinans, F. solani, Gaeumannomyces graminis, Gibberella fujikuroi, Gloeodes pomigena, Gloeosporium musarum, Glomerella cingulate, Guignardia bidwellii, Gymnosporangium juniperi-virginianae, Helminthosporium spp, Hemileia spp, Histoplasma spp. including H. capsulatum, Laetisaria fuciformis, Leptographium lindbergi, Leveillula taurica, Lophodermium seditiosum, Microdochium nivale, Microsporum spp, Monilinia spp, Mucor spp, Mycosphaerella spp. including M. graminicola, M. pomi, Oncobasidium theobromaeon, Ophiostoma piceae, Paracoccidioides spp, Penicillium spp. including P. digitatum, P. italicum, Petriellidium spp, Peronosclerospora spp. Including P. maydis, P. philippinensis and P. sorghi, Peronospora spp, Phaeosphaeria nodorum, Phakopsora pachyrhizi, Phellinus igniarus, Phialophora spp, Phoma spp, Phomopsis viticola, Phytophthora spp. including P. infestans, Plasmopara spp. including P. halstedii, P. viticola, Pleospora spp., Podosphaera spp. including P. leucotricha, Polymyxa graminis, Polymyxa betae, Pseudocercosporella herpotrichoides, Pseudomonas spp, Pseudoperonospora spp. including P. cubensis, P. humuli, Pseudopeziza tracheiphila, Puccinia Spp. including P. hordei, P. recondita, P. striiformis, P. triticina, Pyrenopeziza spp, Pyrenophora spp, Pyricularia spp. including P. oryzae, Pythium spp. including P. ultimum, Ramularia spp, Rhizoctonia spp, Rhizomucor pusillus, Rhizopus arrhizus, Rhynchosporium spp, Scedosporium spp. including S. apiospermum and S. prolificans, Schizothyrium pomi,

Sclerotinia spp, Sclerotium spp, Septoria spp, including S. nodorum, S. tritici, Sphaerotheca macularis, Sphaerotheca fusca (Sphaerotheca fuliginea), Sporothorix spp, Stagonospora nodorum, Stemphylium spp,. Stereum hirsutum, Thanatephorus cucumeris, Thielaviopsis basicola, Tilletia spp, Trichoderma spp. including T. harzianum, T. pseudokoningii, T. viride,

Trichophyton spp, Typhula spp, Uncinula necator, Urocystis spp, Ustilago spp, Venturia spp. including V. inaequalis, Verticillium spp, and Xanthomonas spp.

In particular, compounds of formula (I) and fungicidal compositions containing them may be used to control plant diseases caused by a broad spectrum of fungal plant pathogens in the Basidiomycete, Ascomycete, Oomycete and/or Deuteromycete, Blasocladiomycete, Chrytidiomycete, Glomeromycete and/or Mucoromycete classes.

These pathogens may include:

Oomycetes, including Phytophthora diseases such as those caused by *Phytophthora capsici, Phytophthora infestans, Phytophthora sojae, Phytophthora fragariae, Phytophthora*

nicotianae, Phytophthora cinnamomi, Phytophthora citricola, Phytophthora citrophthora and *Phytophthora erythroseptica;* Pythium diseases such as those caused by *Pythium aphanidermatum, Pythium arrhenomanes, Pythium graminicola, Pythium irregulare* and *Pythium ultimum;* diseases caused by Peronosporales such as *Peronospora destructor, Peronospora parasitica, Plasmopara viticola, Plasmopara halstedii, Pseudoperonospora cubensis, Albugo Candida, Sclerophthora macrospora* and *Bremia lactucae;* and others such as *Aphanomyces cochlioides, Labyrinthula zosterae, Peronosclerospora sorghi* and *Sclerospora graminicola.*

Ascomycetes, including blotch, spot, blast or blight diseases and/or rots for example those caused by Pleosporales such as *Stemphylium solani, Stagonospora tainanensis, Spilocaea oleaginea, Setosphaeria turcica, Pyrenochaeta lycoperisici, Pleospora herbarum, Phoma destructiva, Phaeosphaeria herpotrichoides, Phaeocryptocus gaeumannii, Ophiosphaerella graminicola, Ophiobolus graminis, Leptosphaeria maculans, Hendersonia creberrima, Helminthosporium triticirepentis, Setosphaeria turcica, Drechslera glycines, Didymella bryoniae, Cycloconium oleagineum, Corynespora cassiicola, Cochliobolus sativus, Bipolaris cactivora, Venturia inaequalis, Pyrenophora teres, Pyrenophora tritici-repentis, Alternaria alternata, Alternaria brassicicola, Alternaria solani* and *Alternaria tomatophila,* Capnodiales such as *Septoria tritici, Septoria nodorum, Septoria glycines, Cercospora arachidicola, Cercospora sojina, Cercospora zeae-maydis, Cercosporella capsellae* and *Cercosporella herpotrichoides, Cladosporium carpophilum, Cladosporium effusum, Passalora fulva, Cladosporium oxysporum, Dothistroma septosporum, Isariopsis clavispora, Mycosphaerella fijiensis, Mycosphaerella graminicola, Mycovellosiella koepkeii, Phaeoisariopsis bataticola, Pseudocercospora vitis, Pseudocercosporella herpotrichoides, Ramularia beticola, Ramularia collo-cygni,* Magnaporthales such as *Gaeumannomyces graminis, Magnaporthe grisea, Pyricularia oryzae,* Diaporthales such as *Anisogramma anomala, Apiognomonia errabunda, Cytospora platani, Diaporthe phaseolorum, Discula destructiva, Gnomonia fructicola, Greeneria uvicola, Melanconium juglandinum, Phomopsis viticola, Sirococcus clavigignenti-juglandacearum, Tubakia dryina, Dicarpella* spp., *Valsa ceratosperma,* and others such as *Actinothyrium graminis, Ascochyta pisi, Aspergillus flavus, Aspergillus fumigatus, Aspergillus nidulans, Asperisporium caricae, Blumeriella jaapii, Candida* spp., *Capnodium ramosum, Cephaloascus* spp., *Cephalosporium gramineum, Ceratocystis paradoxa, Chaetomium* spp., *Hymenoscyphus pseudoalbidus, Coccidioides* spp., *Cylindrosporium padi, Diplocarpon malae, Drepanopeziza campestris, Elsinoe ampelina, Epicoccum nigrum, Epidermophyton* spp., *Eutypa lata, Geotrichum candidum, Gibellina cerealis, Gloeocercospora sorghi, Gloeodes pomigena, Gloeosporium perennans; Gloeotinia temulenta, Griphospaeria corticola, Kabatiella lini, Leptographium microsporum, Leptosphaerulinia crassiasca, Lophodermium seditiosum, Marssonina graminicola,*

Microdochium nivale, Monilinia fructicola, Monographella albescens, Monosporascus cannonballus, Naemacyclus spp., *Ophiostoma novo-ulmi, Paracoccidioides brasiliensis, Penicillium expansum, Pestalotia rhododendri, Petriellidium* spp., *Pezicula* spp., *Phialophora gregata, Phyllachora pomigena, Phymatotrichum omnivora, Physalospora abdita, Plectosporium tabacinum, Polyscytalum pustulans, Pseudopeziza medicaginis, Pyrenopeziza brassicae, Ramulispora sorghi, Rhabdocline pseudotsugae, Rhynchosporium secalis, Sacrocladium oryzae, Scedosporium* spp., *Schizothyrium pomi, Sclerotinia sclerotiorum, Sclerotinia minor, Sclerotium* spp., *Typhula ishikariensis, Seimatosporium mariae, Lepteutypa cupressi, Septocyta ruborum, Sphaceloma perseae, Sporonema phacidioides, Stigmina palmivora, Tapesia yallundae, Taphrina bullata, Thielviopsis basicola, Trichoseptoria fructigena, Zygophiala jamaicensis;* powdery mildew diseases for example those caused by Erysiphales such as *Blumeria graminis, Erysiphe polygoni, Uncinula necator, Sphaerotheca fuligena, Podosphaera leucotricha, Podospaera macularis Golovinomyces cichoracearum, Leveillula taurica, Microsphaera diffusa, Oidiopsis gossypii, Phyllactinia guttata* and *Oidium arachidis;* molds for example those caused by Botryosphaeriales such as *Dothiorella aromatica, Diplodia seriata, Guignardia bidwellii, Botrytis cinerea, Botryotinia allii, Botryotinia fabae, Fusicoccum amygdali, Lasiodiplodia theobromae, Macrophoma theicola, Macrophomina phaseolina, Phyllosticta cucurbitacearum;* anthracnoses for example those caused by Glommerelales such as *Colletotrichum gloeosporioides, Colletotrichum lagenarium, Colletotrichum gossypii, Glomerella cingulata,* and *Colletotrichum graminicola;* and wilts or blights for example those caused by Hypocreales such as *Acremonium strictum, Claviceps purpurea, Fusarium culmorum, Fusarium graminearum, Fusarium virguliforme, Fusarium oxysporum, Fusarium subglutinans, Fusarium oxysporum* f.sp. *cubense, Gerlachia nivale, Gibberella fujikuroi, Gibberella zeae, Gliocladium* spp., *Myrothecium verrucaria, Nectria ramulariae, Trichoderma viride, Trichothecium roseum,* and *Verticillium theobromae.*

Basidiomycetes, including smuts for example those caused by Ustilaginales such as *Ustilaginoidea virens, Ustilago nuda, Ustilago tritici, Ustilago zeae,* rusts for example those caused by Pucciniales such as *Cerotelium fici, Chrysomyxa arctostaphyli, Coleosporium ipomoeae, Hemileia vastatrix, Puccinia arachidis, Puccinia cacabata, Puccinia graminis, Puccinia recondita, Puccinia sorghi, Puccinia hordei, Puccinia striiformis* f.sp. Hordei, *Puccinia striiformis* f.sp. Secalis, *Pucciniastrum coryli,* or Uredinales such as *Cronartium ribicola, Gymnosporangium juniperi-viginianae, Melampsora medusae, Phakopsora pachyrhizi, Phragmidium mucronatum, Physopella ampelosidis, Tranzschelia discolor and Uromyces viciae-fabae;* and other rots and diseases such as those caused by *Cryptococcus* spp., *Exobasidium vexans, Marasmiellus inoderma, Mycena* spp., *Sphacelotheca reiliana, Typhula ishikariensis, Urocystis agropyri, Itersonilia perplexans, Corticium invisum, Laetisaria*

fuciformis, Waitea circinata, Rhizoctonia solani, Thanetephorus cucurmeris, Entyloma dahliae, Entylomella microspora, Neovossia moliniae and *Tilletia caries.*

Blastocladiomycetes, such as *Physoderma maydis.*

Mucoromycetes, such as *Choanephora cucurbitarum.; Mucor* spp.; *Rhizopus arrhizus,*

As well as diseases caused by other species and genera closely related to those listed above.

In addition to their fungicidal activity, the compounds and compositions comprising them may also have activity against bacteria such as *Erwinia amylovora, Erwinia caratovora, Xanthomonas campestris, Pseudomonas syringae, Strptomyces scabies* and other related species as well as certain protozoa.

Within the scope of present invention, target crops and/or useful plants to be protected typically comprise perennial and annual crops, such as berry plants for example blackberries, blueberries, cranberries, raspberries and strawberries; cereals for example barley, maize (corn), millet, oats, rice, rye, sorghum triticale and wheat; fibre plants for example cotton, flax, hemp, jute and sisal; field crops for example sugar and fodder beet, coffee, hops, mustard, oilseed rape (canola), poppy, sugar cane, sunflower, tea and tobacco; fruit trees for example apple, apricot, avocado, banana, cherry, citrus, nectarine, peach, pear and plum; grasses for example Bermuda grass, bluegrass, bentgrass, centipede grass, fescue, ryegrass, St. Augustine grass and Zoysia grass; herbs such as basil, borage, chives, coriander, lavender, lovage, mint, oregano, parsley, rosemary, sage and thyme; legumes for example beans, lentils, peas and soya beans; nuts for example almond, cashew, ground nut, hazelnut, peanut, pecan, pistachio and walnut; palms for example oil palm; ornamentals for example flowers, shrubs and trees; other trees, for example cacao, coconut, olive and rubber; vegetables for example asparagus, aubergine, broccoli, cabbage, carrot, cucumber, garlic, lettuce, marrow, melon, okra, onion, pepper, potato, pumpkin, rhubarb, spinach and tomato; and vines for example grapes.

The useful plants and / or target crops in accordance with the invention include conventional as well as genetically enhanced or engineered varieties such as, for example, insect resistant (e.g. Bt. and VIP varieties) as well as disease resistant, herbicide tolerant (e.g. glyphosate- and glufosinate-resistant maize varieties commercially available under the trade names RoundupReady® and LibertyLink®) and nematode tolerant varieties. By way of example, suitable genetically enhanced or engineered crop varieties include the Stoneville 5599BR cotton and Stoneville 4892BR cotton varieties.

The term "useful plants" and/or "target crops" is to be understood as including also useful plants that have been rendered tolerant to herbicides like bromoxynil or classes of herbicides (such as, for example, HPPD inhibitors, ALS inhibitors, for example primisulfuron,

prosulfuron and trifloxysulfuron, EPSPS (5-enol-pyrovyl-shikimate-3-phosphate-synthase) inhibitors, GS (glutamine synthetase) inhibitors or PPO (protoporphyrinogen-oxidase) inhibitors) as a result of conventional methods of breeding or genetic engineering. An example of a crop that has been rendered tolerant to imidazolinones, e.g. imazamox, by conventional methods of breeding (mutagenesis) is Clearfield® summer rape (Canola). Examples of crops that have been rendered tolerant to herbicides or classes of herbicides by genetic engineering methods include glyphosate- and glufosinate-resistant maize varieties commercially available under the trade names RoundupReady® , Herculex I® and LibertyLink®.

The term "useful plants" and/or "target crops" is to be understood as including those which naturally are or have been rendered resistant to harmful insects. This includes plants transformed by the use of recombinant DNA techniques, for example, to be capable of synthesising one or more selectively acting toxins, such as are known, for example, from toxin-producing bacteria. Examples of toxins which can be expressed include δ-endotoxins, vegetative insecticidal proteins (Vip), insecticidal proteins of bacteria colonising nematodes, and toxins produced by scorpions, arachnids, wasps and fungi. An example of a crop that has been modified to express the *Bacillus thuringiensis* toxin is the Bt maize KnockOut® (Syngenta Seeds). An example of a crop comprising more than one gene that codes for insecticidal resistance and thus expresses more than one toxin is VipCot® (Syngenta Seeds). Crops or seed material thereof can also be resistant to multiple types of pests (so-called stacked transgenic events when created by genetic modification). For example, a plant can have the ability to express an insecticidal protein while at the same time being herbicide tolerant, for example Herculex I® (Dow AgroSciences, Pioneer Hi-Bred International).

The term "useful plants" and/or "target crops" is to be understood as including also useful plants which have been so transformed by the use of recombinant DNA techniques that they are capable of synthesising antipathogenic substances having a selective action, such as, for example, the so-called "pathogenesis-related proteins" (PRPs, see e.g. EP-A-0 392 225). Examples of such antipathogenic substances and transgenic plants capable of synthesising such antipathogenic substances are known, for example, from EP-A-0 392 225, WO 95/33818, and EP-A-0 353 191 . The methods of producing such transgenic plants are generally known to the person skilled in the art and are described, for example, in the publications mentioned above.

Toxins that can be expressed by transgenic plants include, for example, insecticidal proteins from Bacillus cereus or Bacillus popilliae; or insecticidal proteins from Bacillus thuringiensis, such as δ-endotoxins, e.g. CrylAb, CrylAc, Cry1 F, Cry1 Fa2, Cry2Ab, Cry3A, Cry3Bb1 or Cry9C, or vegetative insecticidal proteins (Vip), e.g. Vip1 , Vip2, Vip3 or Vip3A; or insecticidal proteins of bacteria colonising nematodes, for example Photorhabdus spp. or

Xenorhabdus spp., such as Photorhabdus luminescens, Xenorhabdus nematophilus; toxins produced by animals, such as scorpion toxins, arachnid toxins, wasp toxins and other insect-specific neurotoxins; toxins produced by fungi, such as Streptomycetes toxins, plant lectins, such as pea lectins, barley lectins or snowdrop lectins; agglutinins; proteinase inhibitors, such as trypsin inhibitors, serine protease inhibitors, patatin, cystatin, papain inhibitors; ribosome-inactivating proteins (RIP), such as ricin, maize-RIP, abrin, luffin, saporin or bryodin; steroid metabolism enzymes, such as 3-hydroxysteroidoxidase, ecdysteroid-UDP-glycosyl-transferase, cholesterol oxidases, ecdysone inhibitors, HMG-COA-reductase, ion channel blockers, such as blockers of sodium or calcium channels, juvenile hormone esterase, diuretic hormone receptors, stilbene synthase, bibenzyl synthase, chitinases and glucanases.

Further, in the context of the present invention there are to be understood by δ-endotoxins, for example CrylAb, CrylAc, Cry1 F, Cry1 Fa2, Cry2Ab, Cry3A, Cry3Bb1 or Cry9C, or vegetative insecticidal proteins (Vip), for example Vip1 , Vip2, Vip3 or Vip3A, expressly also hybrid toxins, truncated toxins and modified toxins. Hybrid toxins are produced recombinantly by a new combination of different domains of those proteins (see, for example, WO 02/15701). Truncated toxins, for example a truncated CrylAb, are known. In the case of modified toxins, one or more amino acids of the naturally occurring toxin are replaced. In such amino acid replacements, preferably non-naturally present protease recognition sequences are inserted into the toxin, such as, for example, in the case of Cry3A055, a cathepsin-G-recognition sequence is inserted into a Cry3A toxin (see WO03/018810).

More examples of such toxins or transgenic plants capable of synthesising such toxins are disclosed, for example, in EP-A-0 374 753, WO93/07278, W095/34656, EP-A-0 427 529, EP-A-451 878 and WO03/052073.

The processes for the preparation of such transgenic plants are generally known to the person skilled in the art and are described, for example, in the publications mentioned above. Cryl-type deoxyribonucleic acids and their preparation are known, for example, from WO 95/34656, EP-A-0 367 474, EP-A-0 401 979 and WO 90/13651 .

The toxin contained in the transgenic plants imparts to the plants tolerance to harmful insects. Such insects can occur in any taxonomic group of insects, but are especially commonly found in the beetles (Coleoptera), two-winged insects (Diptera) and butterflies (Lepidoptera).

Transgenic plants containing one or more genes that code for an insecticidal resistance and express one or more toxins are known and some of them are commercially available. Examples of such plants are: YieldGard® (maize variety that expresses a CrylAb toxin); YieldGard Rootworm® (maize variety that expresses a Cry3Bb1 toxin); YieldGard

Plus® (maize variety that expresses a CrylAb and a Cry3Bb1 toxin); Starlink® (maize variety that expresses a Cry9C toxin); Herculex I® (maize variety that expresses a Cry1 Fa2 toxin and the enzyme phosphinothricine N-acetyltransferase (PAT) to achieve tolerance to the herbicide glufosinate ammonium); NuCOTN 33B® (cotton variety that expresses a Cry1 Ac toxin); Bollgard I® (cotton variety that expresses a Cry1 Ac toxin); Bollgard II® (cotton variety that expresses a CrylAc and a Cry2Ab toxin); VipCot® (cotton variety that expresses a Vip3A and a CrylAb toxin); NewLeaf® (potato variety that expresses a Cry3A toxin); NatureGard®, Agrisure® GT Advantage (GA21 glyphosate-tolerant trait), Agrisure® CB Advantage (Bt1 1 corn borer (CB) trait) and Protecta®.

Further examples of such transgenic crops are:

1. **Bt11 Maize** from Syngenta Seeds SAS, Chemin de l'Hobit 27, F-31 790 St. Sauveur, France, registration number C/FR/96/05/10. Genetically modified *Zea mays* which has been rendered resistant to attack by the European corn borer *(Ostrinia nubilalis* and *Sesamia nonagrioides)* by transgenic expression of a truncated CrylAb toxin. Bt1 1 maize also transgenically expresses the enzyme PAT to achieve tolerance to the herbicide glufosinate ammonium.

2. **Bt176 Maize** from Syngenta Seeds SAS, Chemin de l'Hobit 27, F-31 790 St. Sauveur, France, registration number C/FR/96/05/10. Genetically modified *Zea mays* which has been rendered resistant to attack by the European corn borer *(Ostrinia nubilalis* and *Sesamia nonagrioides)* by transgenic expression of a CrylAb toxin. Bt176 maize also transgenically expresses the enzyme PAT to achieve tolerance to the herbicide glufosinate ammonium.

3. **MIR604 Maize** from Syngenta Seeds SAS, Chemin de l'Hobit 27, F-31 790 St. Sauveur, France, registration number C/FR/96/05/10. Maize which has been rendered insect-resistant by transgenic expression of a modified Cry3A toxin. This toxin is Cry3A055 modified by insertion of a cathepsin-G-protease recognition sequence. The preparation of such transgenic maize plants is described in WO 03/018810.

4. **MON 863 Maize** from Monsanto Europe S.A. 270-272 Avenue de Tervuren, B-1150 Brussels, Belgium, registration number C/DE/02/9. MON *863* expresses a Cry3Bb1 toxin and has resistance to certain Coleoptera insects.

5. **IPC 531 Cotton** from Monsanto Europe S.A. 270-272 Avenue de Tervuren, B-1 150 Brussels, Belgium, registration number C/ES/96/02.

6. **1507 Maize** from Pioneer Overseas Corporation, Avenue Tedesco, 7 B-1 160 Brussels, Belgium, registration number C/NL/00/10. Genetically modified maize for the expression of the protein Cry1 F for achieving resistance to certain Lepidoptera insects and of the PAT protein for achieving tolerance to the herbicide glufosinate ammonium.

7. **NK603 × MON 810 Maize** from Monsanto Europe S.A. 270-272 Avenue de Tervuren, B-1 150 Brussels, Belgium, registration number C/GB/02/M3/03. Consists of conventionally bred hybrid maize varieties by crossing the genetically modified varieties NK603 and MON 810. NK603 x MON 810 Maize transgenically expresses the protein CP4 EPSPS, obtained from *Agrobacterium sp.* strain CP4, which imparts tolerance to the herbicide Roundup® (contains glyphosate), and also a CrylAb toxin obtained from *Bacillus thuringiensis subsp. kurstaki* which brings about tolerance to certain Lepidoptera, include the European corn borer.

The term "locus" as used herein means fields in or on which plants are growing, or where seeds of cultivated plants are sown, or where seed will be placed into the soil. It includes soil, seeds, and seedlings, as well as established vegetation.

The term "plants" refers to all physical parts of a plant, including seeds, seedlings, saplings, roots, tubers, stems, stalks, foliage, and fruits.

The term "plant propagation material" is understood to denote generative parts of the plant, such as seeds, which can be used for the multiplication of the latter, and vegetative material, such as cuttings or tubers, for example potatoes. There may be mentioned for example seeds (in the strict sense), roots, fruits, tubers, bulbs, rhizomes and parts of plants. Germinated plants and young plants which are to be transplanted after germination or after emergence from the soil, may also be mentioned. These young plants may be protected before transplantation by a total or partial treatment by immersion. Preferably "plant propagation material" is understood to denote seeds.

Pesticidal agents referred to herein using their common name are known, for example, from "The Pesticide Manual", 15th Ed., British Crop Protection Council 2009.

The compounds of formula (I) may be used in unmodified form or, preferably, together with the adjuvants conventionally employed in the art of formulation. To this end they may be conveniently formulated in known manner to emulsifiable concentrates, coatable pastes, directly sprayable or dilutable solutions or suspensions, dilute emulsions, wettable powders, soluble powders, dusts, granulates, and also encapsulations e.g. in polymeric substances. As with the type of the compositions, the methods of application, such as spraying, atomising, dusting, scattering, coating or pouring, are chosen in accordance with the intended objectives and the prevailing circumstances. The compositions may also contain further adjuvants such as stabilizers, antifoams, viscosity regulators, binders or tackifiers as well as fertilizers, micronutrient donors or other formulations for obtaining special effects.

Suitable carriers and adjuvants, e.g. for agricultural use, can be solid or liquid and are substances useful in formulation technology, e.g. natural or regenerated mineral substances,

solvents, dispersants, wetting agents, tackifiers, thickeners, binders or fertilizers. Such carriers are for example described in WO 97/33890.

Suspension concentrates are aqueous formulations in which finely divided solid particles of the active compound are suspended. Such formulations include anti-settling agents and dispersing agents and may further include a wetting agent to enhance activity as well an anti-foam and a crystal growth inhibitor. In use, these concentrates are diluted in water and normally applied as a spray to the area to be treated. The amount of active ingredient may range from 0.5% to 95% of the concentrate.

Wettable powders are in the form of finely divided particles which disperse readily in water or other liquid carriers. The particles contain the active ingredient retained in a solid matrix. Typical solid matrices include fuller's earth, kaolin clays, silicas and other readily wet organic or inorganic solids. Wettable powders normally contain from 5% to 95% of the active ingredient plus a small amount of wetting, dispersing or emulsifying agent.

Emulsifiable concentrates are homogeneous liquid compositions dispersible in water or other liquid and may consist entirely of the active compound with a liquid or solid emulsifying agent, or may also contain a liquid carrier, such as xylene, heavy aromatic naphthas, isophorone and other non-volatile organic solvents. In use, these concentrates are dispersed in water or other liquid and normally applied as a spray to the area to be treated. The amount of active ingredient may range from 0.5% to 95% of the concentrate.

Granular formulations include both extrudates and relatively coarse particles and are usually applied without dilution to the area in which treatment is required. Typical carriers for granular formulations include sand, fuller's earth, attapulgite clay, bentonite clays, montmorillonite clay, vermiculite, perlite, calcium carbonate, brick, pumice, pyrophyllite, kaolin, dolomite, plaster, wood flour, ground corn cobs, ground peanut hulls, sugars, sodium chloride, sodium sulphate, sodium silicate, sodium borate, magnesia, mica, iron oxide, zinc oxide, titanium oxide, antimony oxide, cryolite, gypsum, diatomaceous earth, calcium sulphate and other organic or inorganic materials which absorb or which can be coated with the active compound. Granular formulations normally contain 5% to 25% of active ingredients which may include surface-active agents such as heavy aromatic naphthas, kerosene and other petroleum fractions, or vegetable oils; and/or stickers such as dextrins, glue or synthetic resins.

Dusts are free-flowing admixtures of the active ingredient with finely divided solids such as talc, clays, flours and other organic and inorganic solids which act as dispersants and carriers.

Microcapsules are typically droplets or granules of the active ingredient enclosed in an inert porous shell which allows escape of the enclosed material to the surroundings at controlled rates. Encapsulated droplets are typically 1 to 50 microns in diameter. The

enclosed liquid typically constitutes 50 to 95% of the weight of the capsule and may include solvent in addition to the active compound. Encapsulated granules are generally porous granules with porous membranes sealing the granule pore openings, retaining the active species in liquid form inside the granule pores. Granules typically range from 1 millimetre to 1 centimetre and preferably 1 to 2 millimetres in diameter. Granules are formed by extrusion, agglomeration or prilling, or are naturally occurring. Examples of such materials are vermiculite, sintered clay, kaolin, attapulgite clay, sawdust and granular carbon. Shell or membrane materials include natural and synthetic rubbers, cellulosic materials, styrene-butadiene copolymers, polyacrylonitriles, polyacrylates, polyesters, polyamides, polyureas, polyurethanes and starch xanthates.

Other useful formulations for agrochemical applications include simple solutions of the active ingredient in a solvent in which it is completely soluble at the desired concentration, such as acetone, alkylated naphthalenes, xylene and other organic solvents. Pressurised sprayers, wherein the active ingredient is dispersed in finely-divided form as a result of vaporisation of a low boiling dispersant solvent carrier, may also be used.

Suitable agricultural adjuvants and carriers that are useful in formulating the compositions of the invention in the formulation types described above are well known to those skilled in the art.

Liquid carriers that can be employed include, for example, water, toluene, xylene, petroleum naphtha, crop oil, acetone, methyl ethyl ketone, cyclohexanone, acetic anhydride, acetonitrile, acetophenone, amyl acetate, 2-butanone, chlorobenzene, cyclohexane, cyclohexanol, alkyl acetates, diacetonalcohol, 1,2-dichloropropane, diethanolamine, p-diethylbenzene, diethylene glycol, diethylene glycol abietate, diethylene glycol butyl ether, diethylene glycol ethyl ether, diethylene glycol methyl ether, N,N-dimethyl formamide, dimethyl sulfoxide, 1,4-dioxane, dipropylene glycol, dipropylene glycol methyl ether, dipropylene glycol dibenzoate, diproxitol, alkyl pyrrolidinone, ethyl acetate, 2-ethyl hexanol, ethylene carbonate, 1,1,1-trichloroethane, 2-heptanone, alpha pinene, d-limonene, ethylene glycol, ethylene glycol butyl ether, ethylene glycol methyl ether, gamma-butyrolactone, glycerol, glycerol diacetate, glycerol monoacetate, glycerol triacetate, hexadecane, hexylene glycol, isoamyl acetate, isobornyl acetate, isooctane, isophorone, isopropyl benzene, isopropyl myristate, lactic acid, laurylamine, mesityl oxide, methoxy-propanol, methyl isoamyl ketone, methyl isobutyl ketone, methyl laurate, methyl octanoate, methyl oleate, methylene chloride, m-xylene, n-hexane, n-octylamine, octadecanoic acid, octyl amine acetate, oleic acid, oleylamine, o-xylene, phenol, polyethylene glycol (PEG400), propionic acid, propylene glycol, propylene glycol monomethyl ether, p-xylene, toluene, triethyl phosphate, triethylene glycol, xylene sulfonic acid, paraffin, mineral oil, trichloroethylene, perchloroethylene, ethyl acetate, amyl acetate, butyl acetate, methanol, ethanol, isopropanol, and higher molecular

weight alcohols such as amyl alcohol, tetrahydrofurfuryl alcohol, hexanol, octanol, etc., ethylene glycol, propylene glycol, glycerine and N-methyl-2-pyrrolidinone. Water is generally the carrier of choice for the dilution of concentrates.

Suitable solid carriers include, for example, talc, titanium dioxide, pyrophyllite clay, silica, attapulgite clay, kieselguhr, chalk, diatomaxeous earth, lime, calcium carbonate, bentonite clay, fuller's earth, cotton seed hulls, wheat flour, soybean flour, pumice, wood flour, walnut shell flour and lignin.

A broad range of surface-active agents are advantageously employed in both said liquid and solid compositions, especially those designed to be diluted with carrier before application. These agents, when used, normally comprise from 0.1% to 15% by weight of the formulation. They can be anionic, cationic, non-ionic or polymeric in character and can be employed as emulsifying agents, wetting agents, suspending agents or for other purposes. Typical surface active agents include salts of alkyl sulfates, such as diethanolammonium lauryl sulphate; alkylarylsulfonate salts, such as calcium dodecylbenzenesulfonate; alkylphenol-alkylene oxide addition products, such as nonylphenol-C.sub. 18 ethoxylate; alcohol-alkylene oxide addition products, such as tridecyl alcohol-C.sub. 16 ethoxylate; soaps, such as sodium stearate; alkylnaphthalenesulfonate salts, such as sodium dibutylnaphthalenesulfonate; dialkyl esters of sulfosuccinate salts, such as sodium di(2-ethylhexyl) sulfosuccinate; sorbitol esters, such as sorbitol oleate; quaternary amines, such as lauryl trimethylammonium chloride; polyethylene glycol esters of fatty acids, such as polyethylene glycol stearate; block copolymers of ethylene oxide and propylene oxide; and salts of mono and dialkyl phosphate esters.

Other adjuvants commonly utilized in agricultural compositions include crystallisation inhibitors, viscosity modifiers, suspending agents, spray droplet modifiers, pigments, antioxidants, foaming agents, anti-foaming agents, light-blocking agents, compatibilizing agents, antifoam agents, sequestering agents, neutralising agents and buffers, corrosion inhibitors, dyes, odorants, spreading agents, penetration aids, micronutrients, emollients, lubricants and sticking agents.

In addition, further, other biocidally active ingredients or compositions may be combined with the compositions of the invention and used in the methods of the invention and applied simultaneously or sequentially with the compositions of the invention. When applied simultaneously, these further active ingredients may be formulated together with the compositions of the invention or mixed in, for example, the spray tank. These further biocidally active ingredients may be fungicides, herbicides, insecticides, bactericides, acaricides, nematicides and/or plant growth regulators.

In addition, the compositions of the invention may also be applied with one or more systemically acquired resistance inducers ("SAR" inducer). SAR inducers are known and

described in, for example, United States Patent No. US 6,919,298 and include, for example, salicylates and the commercial SAR inducer acibenzolar-S-methyl.

The compounds of formula (I) are normally used in the form of compositions and can be applied to the crop area or plant to be treated, simultaneously or in succession with further compounds. These further compounds can be e.g. fertilizers or micronutrient donors or other preparations, which influence the growth of plants. They can also be selective herbicides or non-selective herbicides as well as insecticides, fungicides, bactericides, nematicides, molluscicides or mixtures of several of these preparations, if desired together with further carriers, surfactants or application promoting adjuvants customarily employed in the art of formulation.

The compounds of formula (I) may be used in the form of (fungicidal) compositions for controlling or protecting against phytopathogenic microorganisms, comprising as active ingredient at least one compound of formula (I) or of at least one preferred individual compound as above-defined, in free form or in agrochemically usable salt form, and at least one of the above-mentioned adjuvants.

The invention therefore provides a composition, preferably a fungicidal composition, comprising at least one compound formula (I) an agriculturally acceptable carrier and optionally an adjuvant. An agricultural acceptable carrier is for example a carrier that is suitable for agricultural use. Agricultural carriers are well known in the art. Preferably said composition may comprise at least one or more pesticidally active compounds, for example an additional fungicidal active ingredient in addition to the compound of formula (I).

The compound of formula (I) may be the sole active ingredient of a composition or it may be admixed with one or more additional active ingredients such as a pesticide, fungicide, synergist, herbicide or plant growth regulator where appropriate. An additional active ingredient may, in some cases, result in unexpected synergistic activities.

Examples of suitable additional active ingredients include the following: 1,2,4-thiadiazoles, 2,6-dinitroanilines, acylalanines, aliphatic nitrogenous compounds, amidines, aminopyrimidinols, anilides, anilino-pyrimidines, anthraquinones, antibiotics, aryl-phenylketones, benzamides, benzene-sulfonamides, benzimidazoles, benzothiazoles, benzothiodiazoles, benzothiophenes, benzoylpyridines, benzthiadiazoles, benzylcarbamates, butylamines, carbamates, carboxamides, carpropamids, chloronitriles, cinnamic acid amides, copper containing compounds, cyanoacetamideoximes, cyanoacrylates, cyanoimidazoles, cyanomethylene-thiazolidines, dicarbonitriles, dicarboxamides, dicarboximides, dimethylsulphamates, dinitrophenol carbonates, dinitrophenysl, dinitrophenyl crotonates, diphenyl phosphates, dithiino compounds, dithiocarbamates, dithioethers, dithiolanes, ethyl-amino-thiazole carboxamides, ethyl-phosphonates, furan carboxamides, glucopyranosyls, glucopyranoxyls, glutaronitriles, guanidines, herbicides/plant growth regulatosr,

hexopyranosyl antibiotics, hydroxy(2-amino)pyrimidines, hydroxyanilides, hydroxyisoxazoles, imidazoles, imidazolinones, insecticides/plant growth regulators, isobenzofuranones, isoxazolidinyl-pyridines, isoxazolines, maleimides, mandelic acid amides, mectin derivatives, morpholines, norpholines, n-phenyl carbamates, organotin compounds, oxathiin carboxamides, oxazoles, oxazolidine-diones, phenols, phenoxy quinolines, phenyl-acetamides, phenylamides, phenylbenzamides, phenyl-oxo-ethyl-thiophenes amides, phenylpyrroles, phenylureas, phosphorothiolates, phosphorus acids, phthalamic acids, phthalimides, picolinamides, piperazines, piperidines, plant extracts, polyoxins, propionamides, pthalimides, pyrazole-4-carboxamides, pyrazolinones, pyridazinones, pyridines, pyridine carboxamides, pyridinyl-ethyl benzamides, pyrimdinamines, pyrimidines, pyrimidine-amines, pyrimidione-hydrazone, pyrrolidines, pyrrolquinoliones, quinazolinones, quinolines, quinoline derivatives, quinoline-7-carboxylic acids, quinoxalines, spiroketalamines, strobilurins, sulfamoyl triazoles, sulphamides, tetrazolyloximes, thiadiazines, thiadiazole carboxamides, thiazole carboxanides, thiocyanates, thiophene carboxamides, toluamides, triazines, triazobenthiazoles, triazoles, triazole-thiones, triazolo-pyrimidylamine, valinamide carbamates, ammonium methyl phosphonates, arsenic-containing compounds, benyimidazolylcarbamates, carbonitriles, carboxanilides, carboximidamides, carboxylic phenylamides, diphenyl pyridines, furanilides, hydrazine carboxamides, imidazoline acetates, isophthalates, isoxazolones, mercury salts, organomercury compounds, organophosphates, oxazolidinediones, pentylsulfonyl benzenes, phenyl benzamides, phosphonothionates, phosphorothioates, pyridyl carboxamides, pyridyl furfuryl ethers, pyridyl methyl ethers, SDHIs, thiadiazinanethiones, thiazolidines.

Examples of suitable additional active ingredients also include the following: 3-difluoromethyl-1-methyl-1 H-pyrazole-4-carboxylic acid (9-dichloromethylene-1 ,2,3,4-tetrahydro-1 ,4-methano-naphthalen-5-yl)-amide , 3-difluoromethyl-1-methyl-1 H-pyrazole-4-carboxylic acid methoxy-[1-methyl-2-(2,4,6-trichlorophenyl)-ethyl]-amide , 1-methyl-3-difluoromethyl-1 H-pyrazole-4-carboxylic acid (2-dichloromethylene-3-ethyl-1-methyl-indan-4-yl)-amide (1072957-71-1), 1-methyl-3-difluoromethyl-1 H-pyrazole-4-carboxylic acid (4'-methylsulfanyl-biphenyl-2-yl)-amide, 1-methyl-3-difluoromethyl-4H-pyrazole-4-carboxylic acid [2-(2,4-dichloro-phenyl)-2-methoxy-1-methyl-ethyl]-amide, (5-Chloro-2,4-dimethyl-pyridin-3-yl)-(2,3,4-trimethoxy-6-methyl-phenyl)-methanone, (5-Bromo-4-chloro-2-methoxy-pyridin-3-yl)-(2,3,4-trimethoxy-6-methyl-phenyl)-methanone, 2-{2-[(E)-3-(2,6-Dichloro-phenyl)-1-methyl-prop-2-en-(E)-ylideneaminooxymethyl]-phenyl}-2-[(Z)-methoxyimino]-N-methyl-acetamide, 3-[5-(4-Chloro-phenyl)-2,3-dimethyl-isoxazolidin-3-yl]-pyridine, (E)-N-methyl-2-[2- (2, 5-dimethylphenoxymethyl) phenyl]-2-methoxy-iminoacetamide, 4-bromo-2-cyano-N, N-dimethyl-6-trifluoromethylbenzimidazole-1-sulphonamide, a- [N-(3-chloro-2, 6-xylyl)-2-methoxyacetamido]-y-butyrolactone, 4-chloro-2-cyano-N, - dimethyl-5-p-tolylimidazole-1-

sulfonamide, N-allyl-4, 5,-dimethyl-2-trimethylsilylthiophene-3-carboxamide, N- (l-cyano-1 , 2-dimethylpropyl)-2- (2, 4-dichlorophenoxy) propionamide, N- (2-methoxy-5-pyridyl)-cyclopropane carboxamide, (.+-.)-cis-1-(4-chlorophenyl)-2-(1 H-1 ,2,4-triazol-1-yl)-cycloheptanol, 2-(1-ie/f-butyl)-1-(2-chlorophenyl)-3-(1 ,2,4-triazol-1-yl)-propan-2-ol, 2',6'-dibromo-2-methyl-4-trifluoromethoxy-4'-trifluoromethyl-1 ,3-thiazole- 5-carboxanilide, 1-imidazolyl-1 -(4'-chlorophenoxy)-3,3-dimethylbutan-2-one, methyl (E)-2-[2-[6-(2-cyanophenoxy)pyrimidin-4-yloxy]phenyl]3-methoxyacrylate, methyl (E)-2-[2-[6-(2-thioamidophenoxy)pyrimidin-4-yloxy]phenyl]-3-methoxyacrylat e, methyl (E)-2-[2-[6-(2-fluorophenoxy)pyrimidin-4-yloxy]phenyl]-3-methoxyacrylate, methyl (E)-2-[2-[6-(2,6-difluorophenoxy)pyrimidin-4-yloxy]phenyl]-3-methoxyacryla te, methyl (E)-2-[2-[3-(pyrimidin-2-yloxy)phenoxy]phenyl]-3-methoxyacrylate, methyl (E)-2-[2-[3-(5-methylpyrimidin-2-yloxy)-phenoxy]phenyl]-3-methoxyacrylate, methyl (E)-2-[2-[3-(phenyl-sulphonyloxy)phenoxy]phenyl-3-methoxyacrylate, methyl (E)-2-[2-[3-(4-nitrophenoxy)phenoxy]phenyl]-3-methoxyacrylate, methyl (E)-2-[2-phenoxyphenyl]-3-methoxyacrylate, methyl (E)-2-[2-(3,5-dimethyl-benzoyl)pyrrol-1-yl]-3-methoxyacrylate, methyl (E)-2-[2-(3-methoxyphenoxy)phenyl]-3-methoxyacrylate, methyl (E)-2[2-(2-phenylethen-1 -yl)-phenyl]-3-methoxyacrylate, methyl (E)-2-[2-(3,5-dichlorophenoxy)pyridin-3-yl]-3-methoxyacrylate, methyl (E)-2-(2-(3-(1 ,1 ,2,2-tetrafluoroethoxy)phenoxy)phenyl)-3-methoxyacrylate, methyl (E)-2-(2-[3-(alpha-hydroxybenzyl)phenoxy]phenyl)-3-methoxyacrylate, methyl (E)-2-(2-(4-phenoxypyridin-2-yloxy)phenyl)-3-methoxyacrylate, methyl (E)-2-[2-(3-n-propyloxy-phenoxy)phenyl]3-methoxyacrylate, methyl (E)-2-[2-(3-isopropyloxyphenoxy)phenyl]-3-methoxyacrylate, methyl (E)-2-[2-[3-(2-fluorophenoxy)phenoxy]phenyl]-3-methoxyacrylate, methyl (E)-2-[2-(3-ethoxyphenoxy)phenyl]-3-methoxyacrylate, methyl (E)-2-[2-(4-ie/f-butyl-pyridin-2-yloxy)phenyl]-3-methoxyacrylate, methyl (E)-2-[2-[3-(3-cyanophenoxy)phenoxy]phenyl]-3-methoxyacrylate, methyl (E)-2-[2-[(3-methyl-pyridin-2-yloxymethyl)phenyl]-3-methoxyacrylate, methyl (E)-2-[2-[6-(2-methyl-phenoxy)pyrimidin-4-yloxy]phenyl]-3-methoxyacrylate, methyl (E)-2-[2-(5-bromo-pyridin-2-yloxymethyl)phenyl]-3-methoxyacrylate, methyl (E)-2-[2-(3-(3-iodopyridin-2-yloxy)phenoxy)phenyl]-3-methoxyacrylate, methyl (E)-2-[2-[6-(2-chloropyridin-3-yloxy)pyrimidin-4-yloxy]phenyl]-3-methoxyac rylate, methyl (E),(E)-2-[2-(5,6-dimethylpyrazin-2-ylmethyloximinomethyl)phenyl]-3-methox yacrylate, methyl (E)-2-{2-[6-(6-methylpyridin-2-yloxy)pyrimidin-4-yloxy]phenyl}-3-methoxy-a crylate, methyl (E),(E)-2-{ 2-(3-methoxyphenyl)methyloximinomethyl]-phenyl}-3-methoxyacrylate, methyl (E)-2-{2-(6-(2-azidophenoxy)-pyrimidin-4-yloxy]phenyl}-3-methoxyacrylate, methyl (E),(E)-2-{2-[6-phenylpyrimidin-4-yl)-methyloximinomethyl]phenyl}-3-methox yacrylate, methyl (E),(E)-2-{2-[(4-chlorophenyl)-methyloximinomethyl]-phenyl}-3-methoxyacryl ate, methyl (E)-2-{2-[6-(2-n-propylphenoxy)-1 ,3,5-triazin-4-yloxy]phenyl}-3-methoxyacr ylate, methyl (E),(E)-2-{2-[(3-

nitrophenyl)methyloximinomethyl]phenyl}-3-methoxyacrylate, 3-chloro-7-(2-aza-2,7,7-trimethyl-oct-3-en-5-ine), 2,6-dichloro-N-(4-trifluoromethylbenzyl)-benzamide, 3-iodo-2-propinyl alcohol, 4-chlorophenyl-3-iodopropargyl formal, 3-bromo-2,3-diiodo-2-propenyl ethylcarbamate, 2,3,3-triiodoallyl alcohol, 3-bromo-2,3-diiodo-2-propenyl alcohol, 3-iodo-2-propinyl n-butylcarbamate, 3-iodo-2-propinyl n-hexylcarbamate, 3-iodo-2-propinyl cyclohexyl-carbamate, 3-iodo-2-propinyl phenylcarbamate; phenol derivatives, such as tribromophenol, tetrachlorophenol, 3-methyl-4-chlorophenol, 3,5-dimethyl-4-chlorophenol, phenoxyethanol, dichlorophene, o-phenylphenol, m-phenylphenol, p-phenylphenol, 2-benzyl-4-chlorophenol, 5-hydroxy-2(5H)-furanone; 4,5-dichlorodithiazolinone, 4,5-benzodithiazolinone, 4,5-trimethylenedithiazolinone, 4,5-dichloro-(3H)-1 ,2-dithiol-3-one, 3,5-dimethyl-tetrahydro-1 ,3,5-thiadiazine-2-thione, N-(2-p-chlorobenzoylethyl)-hexaminium chloride, acibenzolar, acypetacs, alanycarb, albendazole, aldimorph, allicin, allyl alcohol, ametoctradin, amisulbrom, amobam, ampropylfos, anilazine, asomate, aureofungin, azaconazole, azafendin, azithiram, azoxystrobin, barium polysulfide, benalaxyl, benalaxyl-M, benodanil, benomyl, benquinox, bentaluron, benthiavalicarb, benthiazole, benzalkonium chloride, benzamacril, benzamorf, benzohydroxamic acid, berberine, bethoxazin, biloxazol, binapacryl, biphenyl, bitertanol, bithionol, bixafen, blasticidin-S, boscalid, bromothalonil, bromuconazole, bupirimate, buthiobate, butylamine calcium polysulfide, captafol, captan, carbamorph, carbendazim, carbendazim chlorhydrate, carboxin, carpropamid, carvone, CGA41396, CGA41397, chinomethionate, chitosan, chlobenthiazone, chloraniformethan, chloranil, chlorfenazole, chloroneb, chloropicrin, chlorothalonil, chlorozolinate, chlozolinate, climbazole, clotrimazole, clozylacon, copper containing compounds such as copper acetate, copper carbonate, copper hydroxide, copper naphthenate, copper oleate, copper oxychloride, copper oxyquinolate, copper silicate, copper sulphate, copper tallate, copper zinc chromate and Bordeaux mixture, cresol, cufraneb, cuprobam, cuprous oxide, cyazofamid, cyclafuramid, cycloheximide, cyflufenamid, cymoxanil, cypendazole, cyproconazole, cyprodinil, dazomet, debacarb, decafentin, dehydroacetic acid, di-2-pyridyl disulphide 1, 1'-dioxide, dichlofluanid, diclomezine, dichlone, dicloran, dichlorophen, dichlozoline, diclobutrazol, diclocymet, diethofencarb, difenoconazole, difenzoquat, diflumetorim, O, O-di-iso-propyl-S-benzyl thiophosphate, dimefluazole, dimetachlone, dimetconazole, dimethomorph, dimethirimol, diniconazole, diniconazole-M, dinobuton, dinocap, dinocton, dinopenton, dinosulfon, dinoterbon, diphenylamine, dipyrithione, disulfiram, ditalimfos, dithianon, dithioether, dodecyl dimethyl ammonium chloride, dodemorph, dodicin, dodine, doguadine, drazoxolon, edifenphos, enestroburin, epoxiconazole, etaconazole, etem, ethaboxam, ethirimol, ethoxyquin, ethilicin, ethyl (Z)-N-benzyl-N ([methyl (methyl-thioethylideneamino- oxycarbonyl) amino] thio)^-alaninate, etridiazole, famoxadone, fenamidone, fenaminosulf, fenapanil, fenarimol, fenbuconazole, fenfuram, fenhexamid,

fenitropan, fenoxanil, fenpiclonil, fenpropidin, fenpropimorph, fenpyrazamine, fentin acetate, fentin hydroxide, ferbam, ferimzone, fluazinam, fludioxonil, flumetover, flumorph, flupicolide, fluopyram, fluoroimide, fluotrimazole, fluoxastrobin, fluquinconazole, flusilazole, flusulfamide, flutanil, flutolanil, flutriafol, fluxapyroxad, folpet, formaldehyde, fosetyl, fuberidazole, furalaxyl, furametpyr, furcarbanil, furconazole, furfural, furmecyclox, furophanate, glyodin, griseofulvin, guazatine, halacrinate, hexa chlorobenzene, hexachlorobutadiene, hexachlorophene, hexaconazole, hexylthiofos, hydrargaphen, hydroxyisoxazole, hymexazole, imazalil, imazalil sulphate, imibenconazole, iminoctadine, iminoctadine triacetate, inezin, iodocarb, ipconazole, iprobenfos, iprodione, iprovalicarb, isopropanyl butyl carbamate, isoprothiolane, isopyrazam, isotianil, isovaledione, izopamfos, kasugamycin, kresoxim-methyl, LY186054, LY211795, LY248908, mancozeb, mandipropamid, maneb, mebenil, mecarbinzid, mefenoxam, mepanipyrim, mepronil, mercuric chloride, mercurous chloride, meptyldinocap, metalaxyl, metalaxyl-M, metam, metazoxolon, metconazole, methasulfocarb, methfuroxam, methyl bromide, methyl iodide, methyl isothiocyanate, metiram, metiram-zinc, metominostrobin, metrafenone, metsulfovax, milneb, moroxydine, mydobutanil, myclozolin, nabam, natamycin, neoasozin, nickel dimethyldithiocarbamate, nitrostyrene, nitrothal-iso- propyl, nuarimol, octhilinone, ofurace, organomercury compounds, orysastrobin, osthol, oxadixyl, oxasulfuron, oxine-copper, oxolinic acid, oxpoconazole, oxycarboxin, parinol, pefurazoate, penconazole, pencycuron, penflufen, pentachlorophenol, penthiopyrad, phenamacril, phenazin oxide, phosdiphen, phosetyl-Al, phosphorus acids, phthalide, picoxystrobin, piperalin, polycarbamate, polyoxin D, polyoxrim, polyram, probenazole, prochloraz, procymidone, propamidine, propamocarb, propiconazole, propineb, propionic acid, proquinazid, prothiocarb, prothioconazole, pyracarbolid, pyraclostrobin, pyrametrostrobin, pyraoxystrobin, pyrazophos, pyribencarb, pyridinitril, pyrifenox, pyrimethanil, pyriofenone, pyroquilon, pyroxychlor, pyroxyfur, pyrrolnitrin, quaternary ammonium compounds, quinacetol, quinazamid, quinconazole, quinomethionate, quinoxyfen, quintozene, rabenzazole, santonin, sedaxane, silthiofam, simeconazole, sipconazole, sodium pentachlorophenate, solatenol, spiroxamine, streptomycin, sulphur, sultropen, tebuconazole, tebfloquin, tecloftalam, tecnazene, tecoram, tetraconazole, thiabendazole, thiadifluor, thicyofen, thifluzamide, 2-(thiocyanomethylthio) benzothiazole, thiophanate-methyl, thioquinox, thiram, tiadinil, timibenconazole, tioxymid, tolclofos-methyl, tolylfluanid, triadimefon, triadimenol, triamiphos, triarimol, triazbutil, triazoxide, tricyclazole, tridemorph, trifloxystrobin, triflumazole, triforine, triflumizole, triticonazole, uniconazole, urbacide, validamycin, valifenalate, vapam, vinclozolin, zarilamid, zineb, ziram, and zoxamide.

The compounds of the invention may also be used in combination with anthelmintic agents. Such anthelmintic agents include, compounds selected from the macrocyclic lactone class of compounds such as ivermectin, avermectin, abamectin, emamectin, eprinomectin,

doramectin, selamectin, moxidectin, nemadectin and milbemycin derivatives as described in EP- 357460, EP-444964 and EP-594291 . Additional anthelmintic agents include semisynthetic and biosynthetic avermectin/milbemycin derivatives such as those described in US-5015630, WO-9415944 and WO-9522552. Additional anthelmintic agents include the benzimidazoles such as albendazole, cambendazole, fenbendazole, flubendazole, mebendazole, oxfendazole, oxibendazole, parbendazole, and other members of the class. Additional anthelmintic agents include imidazothiazoles and tetrahydropyrimidines such as tetramisole, levamisole, pyrantel pamoate, oxantel or morantel. Additional anthelmintic agents include flukicides, such as triclabendazole and clorsulon and the cestocides, such as praziquantel and epsiprantel.

The compounds of the invention may be used in combination with derivatives and analogues of the paraherquamide/marcfortine class of anthelmintic agents, as well as the antiparasitic oxazolines such as those disclosed in US-5478855, US- 4639771 and DE-19520936.

The compounds of the invention may be used in combination with derivatives and analogues of the general class of dioxomorpholine antiparasitic agents as described in WO-9615121 and also with anthelmintic active cyclic depsipeptides such as those described in WO-961 1945, WO-9319053, WO- 9325543, EP-626375, EP-382173, WO-9419334, EP-382173, and EP-503538.

The compounds of the invention may be used in combination with other ectoparasiticides; for example, fipronil; pyrethroids; organophosphates; insect growth regulators such as lufenuron; ecdysone agonists such as tebufenozide and the like; neonicotinoids such as imidacloprid and the like.

The compounds of the invention may be used in combination with terpene alkaloids, for example those described in International Patent Application Publication Numbers W095/19363 or WO04/72086, particularly the compounds disclosed therein.

Other examples of such biologically active compounds that the compounds of the invention may be used in combination with include but are not restricted to the following:

Organophosphates: acephate, azamethiphos, azinphos-ethyl, azinphos- methyl, bromophos, bromophos-ethyl, cadusafos, chlorethoxyphos, chlorpyrifos, chlorfenvinphos, chlormephos, demeton, demeton-S-methyl, demeton-S-methyl sulphone, dialifos, diazinon, dichlorvos, dicrotophos, dimethoate, disulfoton, ethion, ethoprophos, etrimfos, famphur, fenamiphos, fenitrothion, fensulfothion, fenthion, flupyrazofos, fonofos, formothion, fosthiazate, heptenophos, isazophos, isothioate, isoxathion, malathion, methacriphos, methamidophos, methidathion, methyl- parathion, mevinphos, monocrotophos, naled, omethoate, oxydemeton-methyl, paraoxon, parathion, parathion-methyl, phenthoate, phosalone, phosfolan, phosphocarb, phosmet, phosphamidon, phorate, phoxim, pirimiphos,

pirimiphos- methyl, profenofos, propaphos, proetamphos, prothiofos, pyraclofos, pyridapenthion, quinalphos, sulprophos, temephos, terbufos, tebupirimfos, tetrachlorvinphos, thimeton, triazophos, trichlorfon, vamidothion.

Carbamates: alanycarb, aldicarb, 2-sec-butylphenyl methylcarbamate, benfuracarb, carbaryl, carbofuran, carbosulfan, cloethocarb, ethiofencarb, fenoxycarb, fenthiocarb, furathiocarb, HCN-801 , isoprocarb, indoxacarb, methiocarb, methomyl, 5-methyl-m-cumenylbutyryl(methyl)carbamate, oxamyl, pirimicarb, propoxur, thiodicarb, thiofanox, triazamate, UC-51717.

Pyrethroids: acrinathin, allethrin, alphametrin, 5-benzyl-3-furylmethyl (E) -(1 R)-cis-2,2-dimethyl-3-(2-oxothiolan-3-ylidenemethyl)cyclopropanecarboxylate, bifenthrin, beta -cyfluthrin, cyfluthrin, a-cypermethrin, beta -cypermethrin, bioallethrin, bioallethrin((S)-cyclopentylisomer), bioresmethrin, bifenthrin, NCI-85193, cycloprothrin, cyhalothrin, cythithrin, cyphenothrin, deltamethrin, empenthrin, esfenvalerate, ethofenprox, fenfluthrin, fenpropathrin, fenvalerate, flucythrinate, flumethrin, fluvalinate (D isomer), imiprothrin, cyhalothrin, lambda-cyhalothrin, permethrin, phenothrin, prallethrin, pyrethrins (natural products), resmethrin, tetramethrin, transfluthrin, theta-cypermethrin, silafluofen, t-fluvalinate, tefluthrin, tralomethrin, Zeta-cypermethrin.

Arthropod growth regulators: a) chitin synthesis inhibitors: benzoylureas: chlorfluazuron, diflubenzuron, fluazuron, flucycloxuron, flufenoxuron, hexaflumuron, lufenuron, novaluron, teflubenzuron, triflumuron, buprofezin, diofenolan, hexythiazox, etoxazole, chlorfentazine; b) ecdysone antagonists: halofenozide, methoxyfenozide, tebufenozide; c) juvenoids: pyriproxyfen, methoprene (including S-methoprene), fenoxycarb; d) lipid biosynthesis inhibitors: spirodiclofen.

Other antiparasitics: acequinocyl, amitraz, AKD-1022, ANS-1 18, azadirachtin, Bacillus thuringiensis, bensultap, bifenazate, binapacryl, bromopropylate, BTG-504, BTG-505, camphechlor, cartap, chlorobenzilate, chlordimeform, chlorfenapyr, chromafenozide, clothianidine, cyromazine, diacloden, diafenthiuron, DBI-3204, dinactin, dihydroxymethyldihydroxypyrrolidine, dinobuton, dinocap, endosulfan, ethiprole, ethofenprox, fenazaquin, flumite, MTI- 800, fenpyroximate, fluacrypyrim, flubenzimine, flubrocythrinate, flufenzine, flufenprox, fluproxyfen, halofenprox, hydramethylnon, IKI-220, kanemite, NC-196, neem guard, nidinorterfuran, nitenpyram, SD-35651 , WL-1 08477, pirydaryl, propargite, protrifenbute, pymethrozine, pyridaben, pyrimidifen, NC-1 111, R-195,RH-0345, RH-2485, RYI-210, S-1283, S-1833, SI-8601 , silafluofen, silomadine, spinosad, tebufenpyrad, tetradifon, tetranactin, thiacloprid, thiocyclam, thiamethoxam, tolfenpyrad, triazamate, triethoxyspinosyn, trinactin, verbutin, vertalec, YI-5301 .

Biological agents: Bacillus thuringiensis ssp aizawai, kurstaki, Bacillus thuringiensis delta endotoxin, baculovirus, entomopathogenic bacteria, virus and fungi.

Bactericides: chlortetracycline, oxytetracycline, streptomycin.

Other biological agents: enrofloxacin, febantel, penethamate, moloxicam, cefalexin, kanamycin, pimobendan, clenbuterol, omeprazole, tiamulin, benazepril, pyriprole, cefquinome, florfenicol, buserelin, cefovecin, tulathromycin, ceftiour, carprofen, metaflumizone, praziquarantel, triclabendazole.

The following mixtures of the compounds of formula I with active ingredients are preferred (the abbreviation "TX" means "one compound selected from the group consisting of the compounds described in Tables A 1 to A14 (above) and Table E (below) of the present invention"):

an adjuvant selected from the group of substances consisting of petroleum oils (alternative name) (628) + TX,

an acaricide selected from the group of substances consisting of 1,1-bis(4-chloro-phenyl)-2-ethoxyethanol (IUPAC name) (910) + TX, 2,4-dichlorophenyl benzenesulfonate (IUPAC/Chemical Abstracts name) (1059) + TX, 2-fluoro-/V-methyl-/V-1-naphthylacetamide (IUPAC name) (1295) + TX, 4-chlorophenyl phenyl sulfone (IUPAC name) (981) + TX, abamectin (1) + TX, acequinocyl (3) + TX, acetoprole [CCN] + TX, acrinathrin (9) + TX, aldicarb (16) + TX, aldoxycarb (863) + TX, alpha-cypermethrin (202) + TX, amidithion (870) + TX, amidoflumet [CCN] + TX, amidothioate (872) + TX, amiton (875) + TX, amiton hydrogen oxalate (875) + TX, amitraz (24) + TX, aramite (881) + TX, arsenous oxide (882) + TX, AVI 382 (compound code) + TX, AZ 60541 (compound code) + TX, azinphos-ethyl (44) + TX, azinphos-methyl (45) + TX, azobenzene (IUPAC name) (888) + TX, azocyclotin (46) + TX, azothoate (889) + TX, benomyl (62) + TX, benoxafos (alternative name) [CCN] + TX, benzoximate (71) + TX, benzyl benzoate (IUPAC name) [CCN] + TX, bifenazate (74) + TX, bifenthrin (76) + TX, binapacryl (907) + TX, brofenvalerate (alternative name) + TX, bromo-cyclen (918) + TX, bromophos (920) + TX, bromophos-ethyl (921) + TX, bromopropylate (94) + TX, buprofezin (99) + TX, butocarboxim (103) + TX, butoxycarboxim (104) + TX, butylpyridaben (alternative name) + TX, calcium polysulfide (IUPAC name) (111) + TX, camphechlor (941) + TX, carbanolate (943) + TX, carbaryl (115) + TX, carbofuran (118) + TX, carbophenothion (947) + TX, CGA 50'439 (development code) (125) + TX, chino-methionat (126) + TX, chlorbenside (959) + TX, chlordimeform (964) + TX, chlordimeform hydrochloride (964) + TX, chlorfenapyr (130) + TX, chlorfenethol (968) + TX, chlorfenson (970) + TX, chlorfensulfide (971) + TX, chlorfenvinphos (131) + TX, chlorobenzilate (975) + TX, chloromebuform (977) + TX, chloromethiuron (978) + TX, chloropropylate (983) + TX, chlorpyrifos (145) + TX, chlorpyrifos-methyl (146) + TX, chlorthiophos (994) + TX, cinerin I (696) + TX, cinerin II (696) + TX, cinerins (696) + TX, clofentezine (158) + TX, closantel (alternative name) [CCN] + TX, coumaphos (174) + TX, crotamiton (alternative name) [CCN] + TX, crotoxyphos (1010) + TX, cufraneb (1013) + TX, cyanthoate (1020) + TX, cyflumetofen

(CAS Reg. No.: 400882-07-7) + TX, cyhalothrin (196) + TX, cyhexatin (199) + TX, cypermethrin (201) + TX, DCPM (1032) + TX, DDT (219) + TX, demephion (1037) + TX, demephion-0 (1037) + TX, demephion-S (1037) + TX, demeton (1038) + TX, demeton-methyl (224) + TX, demeton-0 (1038) + TX, demeton-O-methyl (224) + TX, demeton-S (1038) + TX, demeton-S-methyl (224) + TX, demeton-S-methylsulfon (1039) + TX, diafenthiuron (226) + TX, dialifos (1042) + TX, diazinon (227) + TX, dichlofluanid (230) + TX, dichlorvos (236) + TX, dicliphos (alternative name) + TX, dicofol (242) + TX, dicrotophos (243) + TX, dienochlor (1071) + TX, dimefox (1081) + TX, dimethoate (262) + TX, dinactin (alternative name) (653) + TX, dinex (1089) + TX, dinex-diclexine (1089) + TX, dinobuton (269) + TX, dinocap (270) + TX, dinocap-4 [CCN] + TX, dinocap-6 [CCN] + TX, dinocton (1090) + TX, dinopenton (1092) + TX, dinosulfon (1097) + TX, dinoterbon (1098) + TX, dioxathion (1102) + TX, diphenyl sulfone (IUPAC name) (1103) + TX, disulfiram (alternative name) [CCN] + TX, disulfoton (278) + TX, DNOC (282) + TX, dofenapyn (1113) + TX, doramectin (alternative name) [CCN] + TX, endosulfan (294) + TX, endothion (1121) + TX, EPN (297) + TX, eprinomectin (alternative name) [CCN] + TX, ethion (309) + TX, ethoate-methyl (1134) + TX, etoxazole (320) + TX, etrimfos (1142) + TX, fenazaflor (1147) + TX, fenazaquin (328) + TX, fenbutatin oxide (330) + TX, fenothiocarb (337) + TX, fenpropathrin (342) + TX, fenpyrad (alternative name) + TX, fenpyroximate (345) + TX, fenson (1157) + TX, fentrifanil (1161) + TX, fenvalerate (349) + TX, fipronil (354) + TX, fluacrypyrim (360) + TX, fluazuron (1166) + TX, flubenzimine (1167) + TX, flucycloxuron (366) + TX, flucythrinate (367) + TX, fluenetil (1169) + TX, flufenoxuron (370) + TX, flumethrin (372) + TX, fluorbenside (1174) + TX, fluvalinate (1184) + TX, FMC 1137 (development code) (1185) + TX, formetanate (405) + TX, formetanate hydrochloride (405) + TX, formothion (1192) + TX, formparanate (1193) + TX, gamma-HCH (430) + TX, glyodin (1205) + TX, halfenprox (424) + TX, heptenophos (432) + TX, hexadecyl cyclopropanecarboxylate (IUPAC/Chemical Abstracts name) (1216) + TX, hexythiazox (441) + TX, iodomethane (IUPAC name) (542) + TX, isocarbophos (alternative name) (473) + TX, isopropyl O-(methoxyaminothiophosphoryl)salicylate (IUPAC name) (473) + TX, ivermectin (alternative name) [CCN] + TX, jasmolin I (696) + TX, jasmolin II (696) + TX, jodfenphos (1248) + TX, lindane (430) + TX, lufenuron (490) + TX, malathion (492) + TX, malonoben (1254) + TX, mecarbam (502) + TX, mephosfolan (1261) + TX, mesulfen (alternative name) [CCN] + TX, methacrifos (1266) + TX, methamidophos (527) + TX, methidathion (529) + TX, methiocarb (530) + TX, methomyl (531) + TX, methyl bromide (537) + TX, metolcarb (550) + TX, mevinphos (556) + TX, mexacarbate (1290) + TX, milbemectin (557) + TX, milbemycin oxime (alternative name) [CCN] + TX, mipafox (1293) + TX, monocrotophos (561) + TX, morphothion (1300) + TX, moxidectin (alternative name) [CCN] + TX, naled (567) + TX, NC-184 (compound code) + TX, NC-512 (compound code) + TX, nifluridide (1309) + TX,

nikkomycins (alternative name) [CCN] + TX, nitrilacarb (1313) + TX, nitrilacarb 1:1 zinc chloride complex (1313) + TX, NNI-0101 (compound code) + TX, NNI-0250 (compound code) + TX, omethoate (594) + TX, oxamyl (602) + TX, oxydeprofos (1324) + TX, oxydisulfoton (1325) + TX, pp'-DDT (219) + TX, parathion (615) + TX, permethrin (626) + TX, petroleum oils (alternative name) (628) + TX, phenkapton (1330) + TX, phenthoate (631) + TX, phorate (636) + TX, phosalone (637) + TX, phosfolan (1338) + TX, phosmet (638) + TX, phosphamidon (639) + TX, phoxim (642) + TX, pirimiphos-methyl (652) + TX, polychloroterpenes (traditional name) (1347) + TX, polynactins (alternative name) (653) + TX, proclonol (1350) + TX, profenofos (662) + TX, promacyl (1354) + TX, propargite (671) + TX, propetamphos (673) + TX, propoxur (678) + TX, prothidathion (1360) + TX, prothoate (1362) + TX, pyrethrin I (696) + TX, pyrethrin II (696) + TX, pyrethrins (696) + TX, pyridaben (699) + TX, pyridaphenthion (701) + TX, pyrimidifen (706) + TX, pyrimitate (1370) + TX, quinalphos (711) + TX, quintiofos (1381) + TX, R-1492 (development code) (1382) + TX, RA-17 (development code) (1383) + TX, rotenone (722) + TX, schradan (1389) + TX, sebufos (alternative name) + TX, selamectin (alternative name) [CCN] + TX, SI-0009 (compound code) + TX, sophamide (1402) + TX, spirodiclofen (738) + TX, spiromesifen (739) + TX, SSI-121 (development code) (1404) + TX, sulfiram (alternative name) [CCN] + TX, sulfluramid (750) + TX, sulfotep (753) + TX, sulfur (754) + TX, SZI-121 (development code) (757) + TX, tau-fluvalinate (398) + TX, tebufenpyrad (763) + TX, TEPP (1417) + TX, terbam (alternative name) + TX, tetrachlorvinphos (777) + TX, tetradifon (786) + TX, tetranactin (alternative name) (653) + TX, tetrasul (1425) + TX, thiafenox (alternative name) + TX, thiocarboxime (1431) + TX, thiofanox (800) + TX, thiometon (801) + TX, thioquinox (1436) + TX, thuringiensin (alternative name) [CCN] + TX, triamiphos (1441) + TX, triarathene (1443) + TX, triazophos (820) + TX, triazuron (alternative name) + TX, trichlorfon (824) + TX, trifenofos (1455) + TX, trinactin (alternative name) (653) + TX, vamidothion (847) + TX, vaniliprole [CCN] and YI-5302 (compound code) + TX,

an algicide selected from the group of substances consisting of bethoxazin [CCN] + TX, copper dioctanoate (IUPAC name) (170) + TX, copper sulfate (172) + TX, cybutryne [CCN] + TX, dichlone (1052) + TX, dichlorophen (232) + TX, endothal (295) + TX, fentin (347) + TX, hydrated lime [CCN] + TX, nabam (566) + TX, quinoclamine (714) + TX, quinonamid (1379) + TX, simazine (730) + TX, triphenyltin acetate (IUPAC name) (347) and triphenyltin hydroxide (IUPAC name) (347) + TX,

an anthelmintic selected from the group of substances consisting of abamectin (1) + TX, crufomate (1011) + TX, doramectin (alternative name) [CCN] + TX, emamectin (291) + TX, emamectin benzoate (291) + TX, eprinomectin (alternative name) [CCN] + TX, ivermectin (alternative name) [CCN] + TX, milbemycin oxime (alternative name) [CCN] + TX,

moxidectin (alternative name) [CCN] + TX, piperazine [CCN] + TX, selamectin (alternative name) [CCN] + TX, spinosad (737) and thiophanate (1435) + TX,

an avicide selected from the group of substances consisting of chloralose (127) + TX, endrin (1122) + TX, fenthion (346) + TX, pyridin-4-amine (IUPAC name) (23) and strychnine (745) + TX,

a bactericide selected from the group of substances consisting of 1-hydroxy-1/-/-pyridine-2-thione (IUPAC name) (1222) + TX, 4-(quinoxalin-2-ylamino)benzenesulfonamide (IUPAC name) (748) + TX, 8-hydroxyquinoline sulfate (446) + TX, bronopol (97) + TX, copper dioctanoate (IUPAC name) (170) + TX, copper hydroxide (IUPAC name) (169) + TX, cresol [CCN] + TX, dichlorophen (232) + TX, dipyrithione (1105) + TX, dodicin (1112) + TX, fenaminosulf (1144) + TX, formaldehyde (404) + TX, hydrargaphen (alternative name) [CCN] + TX, kasugamycin (483) + TX, kasugamycin hydrochloride hydrate (483) + TX, nickel bis(dimethyldithiocarbamate) (IUPAC name) (1308) + TX, nitrapyrin (580) + TX, octhilinone (590) + TX, oxolinic acid (606) + TX, oxytetracycline (611) + TX, potassium hydroxyquinoline sulfate (446) + TX, probenazole (658) + TX, streptomycin (744) + TX, streptomycin sesquisulfate (744) + TX, tecloftalam (766) + TX, and thiomersal (alternative name) [CCN] + TX,

a biological agent selected from the group of substances consisting of *Adoxophyes orana* GV (alternative name) (12) + TX, *Agrobacterium radiobacter* (alternative name) (13) + TX, *Amblyseius* spp. (alternative name) (19) + TX, *Anagrapha falcifera* NPV (alternative name) (28) + TX, *Anagrus atomus* (alternative name) (29) + TX, *Aphelinus abdominalis* (alternative name) (33) + TX, *Aphidius colemani* (alternative name) (34) + TX, *Aphidoletes aphidimyza* (alternative name) (35) + TX, *Autographa californica* NPV (alternative name) (38) + TX, *Bacillus firmus* (alternative name) (48) + TX, *Bacillus sphaericus* Neide (scientific name) (49) + TX, *Bacillus thuringiensis* Berliner (scientific name) (51) + TX, *Bacillus thuringiensis* subsp. *aizawai* (scientific name) (51) + TX, *Bacillus thuringiensis* subsp. *israelensis* (scientific name) (51) + TX, *Bacillus thuringiensis* subsp. *japonensis* (scientific name) (51) + TX, *Bacillus thuringiensis* subsp. *kurstaki* (scientific name) (51) + TX, *Bacillus thuringiensis* subsp. *tenebrionis* (scientific name) (51) + TX, *Beauveria bassiana* (alternative name) (53) + TX, *Beauveria brongniartii* (alternative name) (54) + TX, *Chrysoperla carnea* (alternative name) (151) + TX, *Cryptolaemus montrouzieri* (alternative name) (178) + TX, *Cydia pomonella* GV (alternative name) (191) + TX, *Dacnusa sibirica* (alternative name) (212) + TX, *Diglyphus isaea* (alternative name) (254) + TX, *Encarsia formosa* (scientific name) (293) + TX, *Eretmocerus eremicus* (alternative name) (300) + TX, *Helicoverpa zea* NPV (alternative name) (431) + TX, *Heterorhabditis bacteriophora* and *H. megidis* (alternative name) (433) + TX, *Hippodamia convergens* (alternative name) (442) + TX, *Leptomastix dactylopii* (alternative name) (488) + TX, *Macrolophus caliginosus* (alternative

name) (491) + TX, *Mamestra brassicae* NPV (alternative name) (494) + TX, *Metaphycus helvolus* (alternative name) (522) + TX, *Metarhizium anisopliae* var. *acridum* (scientific name) (523) + TX, *Metarhizium anisopliae* var. *anisopliae* (scientific name) (523) + TX, *Neodiprion sertifer* NPV and *N. lecontei* NPV (alternative name) (575) + TX, *Orius* spp. (alternative name) (596) + TX, *Paecilomyces fumosoroseus* (alternative name) (613) + TX, *Phytoseiulus persimilis* (alternative name) (644) + TX, *Spodoptera exigua* multicapsid nuclear polyhedrosis virus (scientific name) (741) + TX, *Steinernema bibionis* (alternative name) (742) + TX, *Steinernema carpocapsae* (alternative name) (742) + TX, *Steinernema feltiae* (alternative name) (742) + TX, *Steinernema glaseri* (alternative name) (742) + TX, *Steinernema riobrave* (alternative name) (742) + TX, *Steinernema riobravis* (alternative name) (742) + TX, *Steinernema scapterisci* (alternative name) (742) + TX, *Steinernema* spp. (alternative name) (742) + TX, *Trichogramma* spp. (alternative name) (826) + TX, *Typhlodromus occidentalis* (alternative name) (844) and *Verticillium lecanii* (alternative name) (848) + TX,

a soil sterilant selected from the group of substances consisting of iodomethane (IUPAC name) (542) and methyl bromide (537) + TX,

a chemosterilant selected from the group of substances consisting of apholate [CCN] + TX, bisazir (alternative name) [CCN] + TX, busulfan (alternative name) [CCN] + TX, diflubenzuron (250) + TX, dimatif (alternative name) [CCN] + TX, hemel [CCN] + TX, hempa [CCN] + TX, metepa [CCN] + TX, methiotepa [CCN] + TX, methyl apholate [CCN] + TX, morzid [CCN] + TX, penfluron (alternative name) [CCN] + TX, tepa [CCN] + TX, thiohempa (alternative name) [CCN] + TX, thiotepa (alternative name) [CCN] + TX, tretamine (alternative name) [CCN] and uredepa (alternative name) [CCN] + TX,

an insect pheromone selected from the group of substances consisting of (£)-dec-5-en-1-yl acetate with (£)-dec-5-en-1-ol (IUPAC name) (222) + TX, (£)-tridec-4-en-1-yl acetate (IUPAC name) (829) + TX, (£)-6-methylhept-2-en-4-ol (IUPAC name) (541) + TX, (£,Z)-tetradeca-4,10-dien-1-yl acetate (IUPAC name) (779) + TX, (Z)-dodec-7-en-1-yl acetate (IUPAC name) (285) + TX, (Z)-hexadec-l 1-enal (IUPAC name) (436) + TX, (Z)-hexadec-l 1-en-1-yl acetate (IUPAC name) (437) + TX, (Z)-hexadec-13-en-1 1-yn-1-yl acetate (IUPAC name) (438) + TX, (Z)-icos-13-en-10-one (IUPAC name) (448) + TX, (Z)-tetradec-7-en-1-al (IUPAC name) (782) + TX, (Z)-tetradec-9-en-1-ol (IUPAC name) (783) + TX, (Z)-tetradec-9-en-1-yl acetate (IUPAC name) (784) + TX, (7£,9Z)-dodeca-7,9-dien-1-yl acetate (IUPAC name) (283) + TX, (9Z,1 1£)-tetradeca-9,1 1-dien-1-yl acetate (IUPAC name) (780) + TX, (9Z,12£)-tetradeca-9,12-dien-1-yl acetate (IUPAC name) (781) + TX, 14-methyloctadec-1-ene (IUPAC name) (545) + TX, 4-methylnonan-5-ol with 4-methylnonan-5-one (IUPAC name) (544) + TX, alpha-multistriatin (alternative name) [CCN] + TX, brevicomin (alternative name) [CCN] + TX, codlelure (alternative name) [CCN] + TX, codlemone (alternative name) (167) + TX, cuelure (alternative name) (179) + TX, disparlure (277) + TX, dodec-8-en-1-yl

acetate (IUPAC name) (286) + TX, dodec-9-en-1-yl acetate (IUPAC name) (287) + TX, dodeca-8 + TX, 10-dien-1 -yl acetate (IUPAC name) (284) + TX, dominicalure (alternative name) [CCN] + TX, ethyl 4-methyloctanoate (IUPAC name) (317) + TX, eugenol (alternative name) [CCN] + TX, frontalin (alternative name) [CCN] + TX, gossyplure (alternative name) (420) + TX, grandlure (421) + TX, grandlure I (alternative name) (421) + TX, grandlure II (alternative name) (421) + TX, grandlure III (alternative name) (421) + TX, grandlure IV (alternative name) (421) + TX, hexalure [CCN] + TX, ipsdienol (alternative name) [CCN] + TX, ipsenol (alternative name) [CCN] + TX, japonilure (alternative name) (481) + TX, lineatin (alternative name) [CCN] + TX, litlure (alternative name) [CCN] + TX, looplure (alternative name) [CCN] + TX, medlure [CCN] + TX, megatomoic acid (alternative name) [CCN] + TX, methyl eugenol (alternative name) (540) + TX, muscalure (563) + TX, octadeca-2,13-dien-1-yl acetate (IUPAC name) (588) + TX, octadeca-3,13-dien-1-yl acetate (IUPAC name) (589) + TX, orfralure (alternative name) [CCN] + TX, oryctalure (alternative name) (317) + TX, ostramone (alternative name) [CCN] + TX, siglure [CCN] + TX, sordidin (alternative name) (736) + TX, sulcatol (alternative name) [CCN] + TX, tetradec-1 1-en-1-yl acetate (IUPAC name) (785) + TX, trimedlure (839) + TX, trimedlure A (alternative name) (839) + TX, trimedlure **Bi** (alternative name) (839) + TX, trimedlure **B2** (alternative name) (839) + TX, trimedlure C (alternative name) (839) and trunc-call (alternative name) [CCN] + TX,

an insect repellent selected from the group of substances consisting of 2-(octylthio)-ethanol (IUPAC name) (591) + TX, butopyronoxyl (933) + TX, butoxy(polypropylene glycol) (936) + TX, dibutyl adipate (IUPAC name) (1046) + TX, dibutyl phthalate (1047) + TX, dibutyl succinate (IUPAC name) (1048) + TX, diethyltoluamide [CCN] + TX, dimethyl carbate [CCN] + TX, dimethyl phthalate [CCN] + TX, ethyl hexanediol (1137) + TX, hexamide [CCN] + TX, methoquin-butyl (1276) + TX, methylneodecanamide [CCN] + TX, oxamate [CCN] and picaridin [CCN] + TX,

an insecticide selected from the group of substances consisting of 1-dichloro-1 -nitroethane (IUPAC/Chemical Abstracts name) (1058) + TX, 1,1-dichloro-2,2-bis(4-ethylphenyl)ethane (IUPAC name) (1056), + TX, 1,2-dichloropropane (IUPAC/Chemical Abstracts name) (1062) + TX, 1,2-dichloropropane with 1,3-dichloropropene (IUPAC name) (1063) + TX, 1-bromo-2-chloroethane (IUPAC/Chemical Abstracts name) (916) + TX, 2,2,2-trichloro-1-(3,4-dichlorophenyl)ethyl acetate (IUPAC name) (1451) + TX, 2,2-dichlorovinyl 2-ethylsulfinylethyl methyl phosphate (IUPAC name) (1066) + TX, 2-(1 ,3-dithiolan-2-yl)phenyl dimethylcarbamate (IUPAC/ Chemical Abstracts name) (1109) + TX, 2-(2-butoxyethoxy)ethyl thiocyanate (IUPAC/Chemical Abstracts name) (935) + TX, 2-(4,5-dimethyl-1 ,3-dioxolan-2-yl)phenyl methylcarbamate (IUPAC/ Chemical Abstracts name) (1084) + TX, 2-(4-chloro-3,5-xylyloxy)ethanol (IUPAC name) (986) + TX, 2-chlorovinyl diethyl phosphate (IUPAC name) (984) + TX, 2-imidazolidone (IUPAC name) (1225) + TX, 2-isovalerylindan-1 ,3-dione (IUPAC

name) (1246) + TX, 2-methyl(prop-2-ynyl)aminophenyl methylcarbamate (IUPAC name) (1284) + TX, 2-thiocyanatoethyl laurate (IUPAC name) (1433) + TX, 3-bromo-1-chloroprop-1-ene (IUPAC name) (917) + TX, 3-methyl-1-phenylpyrazol-5-yl dimethylcarbamate (IUPAC name) (1283) + TX, 4-methyl(prop-2-ynyl)amino-3,5-xylyl methylcarbamate (IUPAC name) (1285) + TX, 5,5-dimethyl-3-oxocyclohex-1-enyl dimethylcarbamate (IUPAC name) (1085) + TX, abamectin (1) + TX, acephate (2) + TX, acetamiprid (4) + TX, acethion (alternative name) [CCN] + TX, acetoprole [CCN] + TX, acrinathrin (9) + TX, acrylonitrile (IUPAC name) (861) + TX, alanycarb (15) + TX, aldicarb (16) + TX, aldoxycarb (863) + TX, aldrin (864) + TX, allethrin (17) + TX, allosamidin (alternative name) [CCN] + TX, allyxycarb (866) + TX, alpha-cypermethrin (202) + TX, alpha-ecdysone (alternative name) [CCN] + TX, aluminium phosphide (640) + TX, amidithion (870) + TX, amidothioate (872) + TX, aminocarb (873) + TX, amiton (875) + TX, amiton hydrogen oxalate (875) + TX, amitraz (24) + TX, anabasine (877) + TX, athidathion (883) + TX, AVI 382 (compound code) + TX, AZ 60541 (compound code) + TX, azadirachtin (alternative name) (41) + TX, azamethiphos (42) + TX, azinphos-ethyl (44) + TX, azinphos-methyl (45) + TX, azothoate (889) + TX, *Bacillus thuringiensis* delta endotoxins (alternative name) (52) + TX, barium hexafluorosilicate (alternative name) [CCN] + TX, barium polysulfide (IUPAC/Chemical Abstracts name) (892) + TX, barthrin [CCN] + TX, Bayer 22/190 (development code) (893) + TX, Bayer 22408 (development code) (894) + TX, bendiocarb (58) + TX, benfuracarb (60) + TX, bensultap (66) + TX, beta-cyfluthrin (194) + TX, beta-cypermethrin (203) + TX, bifenthrin (76) + TX, bioallethrin (78) + TX, bioallethrin S-cyclopentenyl isomer (alternative name) (79) + TX, bioethanomethrin [CCN] + TX, biopermethrin (908) + TX, bioresmethrin (80) + TX, bis(2-chloroethyl) ether (IUPAC name) (909) + TX, bistrifluron (83) + TX, borax (86) + TX, brofenvalerate (alternative name) + TX, bromfenvinfos (914) + TX, bromocyclen (918) + TX, bromo-DDT (alternative name) [CCN] + TX, bromophos (920) + TX, bromophos-ethyl (921) + TX, bufencarb (924) + TX, buprofezin (99) + TX, butacarb (926) + TX, butathiofos (927) + TX, butocarboxim (103) + TX, butonate (932) + TX, butoxycarboxim (104) + TX, butylpyridaben (alternative name) + TX, cadusafos (109) + TX, calcium arsenate [CCN] + TX, calcium cyanide (444) + TX, calcium polysulfide (IUPAC name) (1 11) + TX, camphechlor (941) + TX, carbanolate (943) + TX, carbaryl (1 15) + TX, carbofuran (1 18) + TX, carbon disulfide (IUPAC/Chemical Abstracts name) (945) + TX, carbon tetrachloride (IUPAC name) (946) + TX, carbophenothion (947) + TX, carbosulfan (1 19) + TX, cartap (123) + TX, cartap hydrochloride (123) + TX, cevadine (alternative name) (725) + TX, chlorbicyclen (960) + TX, chlordane (128) + TX, chlordecone (963) + TX, chlordimeform (964) + TX, chlordimeform hydrochloride (964) + TX, chlorethoxyfos (129) + TX, chlorfenapyr (130) + TX, chlorfenvinphos (131) + TX, chlorfluazuron (132) + TX, chlormephos (136) + TX, chloroform [CCN] + TX, chloropicrin (141) + TX, chlorphoxim (989) + TX, chlorprazophos (990) + TX, chlorpyrifos (145) + TX, chlorpyrifos-methyl (146) + TX,

chlorthiophos (994) + TX, chromafenozide (150) + TX, cinerin I (696) + TX, cinerin II (696) + TX, cinerins (696) + TX, cis-resmethrin (alternative name) + TX, cismethrin (80) + TX, clocythrin (alternative name) + TX, cloethocarb (999) + TX, closantel (alternative name) [CCN] + TX, clothianidin (165) + TX, copper acetoarsenite [CCN] + TX, copper arsenate [CCN] + TX, copper oleate [CCN] + TX, coumaphos (174) + TX, coumithoate (1006) + TX, crotamiton (alternative name) [CCN] + TX, crotoxyphos (1010) + TX, crufomate (1011) + TX, cryolite (alternative name) (177) + TX, CS 708 (development code) (1012) + TX, cyanofenphos (1019) + TX, cyanophos (184) + TX, cyanthoate (1020) + TX, cyclethrin [CCN] + TX, cycloprothrin (188) + TX, cyfluthrin (193) + TX, cyhalothrin (196) + TX, cypermethrin (201) + TX, cyphenothrin (206) + TX, cyromazine (209) + TX, cythioate (alternative name) [CCN] + TX, d-limonene (alternative name) [CCN] + TX, cZ-tetramethrin (alternative name) (788) + TX, DAEP (1031) + TX, dazomet (216) + TX, DDT (219) + TX, decarbofuran (1034) + TX, deltamethrin (223) + TX, demephion (1037) + TX, demephion-0 (1037) + TX, demephion-S (1037) + TX, demeton (1038) + TX, demeton-methyl (224) + TX, demeton-O (1038) + TX, demeton-O-methyl (224) + TX, demeton-S (1038) + TX, demeton-S-methyl (224) + TX, demeton-S-methylsulphon (1039) + TX, diafenthiuron (226) + TX, dialifos (1042) + TX, diamidafos (1044) + TX, diazinon (227) + TX, dicapthon (1050) + TX, dichlofenthion (1051) + TX, dichlorvos (236) + TX, dicliphos (alternative name) + TX, dicresyl (alternative name) [CCN] + TX, dicrotophos (243) + TX, dicyclanil (244) + TX, dieldrin (1070) + TX, diethyl 5-methylpyrazol-3-yl phosphate (IUPAC name) (1076) + TX, diflubenzuron (250) + TX, dilor (alternative name) [CCN] + TX, dimefluthrin [CCN] + TX, dimefox (1081) + TX, dimetan (1085) + TX, dimethoate (262) + TX, dimethrin (1083) + TX, dimethylvinphos (265) + TX, dimetilan (1086) + TX, dinex (1089) + TX, dinex-diclexine (1089) + TX, dinoprop (1093) + TX, dinosam (1094) + TX, dinoseb (1095) + TX, dinotefuran (271) + TX, diofenolan (1099) + TX, dioxabenzofos (1100) + TX, dioxacarb (1101) + TX, dioxathion (1102) + TX, disulfoton (278) + TX, dithicrofos (1108) + TX, DNOC (282) + TX, doramectin (alternative name) [CCN] + TX, DSP (1115) + TX, ecdysterone (alternative name) [CCN] + TX, EI 1642 (development code) (1118) + TX, emamectin (291) + TX, emamectin benzoate (291) + TX, EMPC (1120) + TX, empenthrin (292) + TX, endosulfan (294) + TX, endothion (1121) + TX, endrin (1122) + TX, EPBP (1123) + TX, EPN (297) + TX, epofenonane (1124) + TX, eprinomectin (alternative name) [CCN] + TX, esfenvalerate (302) + TX, etaphos (alternative name) [CCN] + TX, ethiofencarb (308) + TX, ethion (309) + TX, ethiprole (310) + TX, ethoate-methyl (1134) + TX, ethoprophos (312) + TX, ethyl formate (IUPAC name) [CCN] + TX, ethyl-DDD (alternative name) (1056) + TX, ethylene dibromide (316) + TX, ethylene dichloride (chemical name) (1136) + TX, ethylene oxide [CCN] + TX, etofenprox (319) + TX, etrimfos (1142) + TX, EXD (1143) + TX, famphur (323) + TX, fenamiphos (326) + TX, fenazaflor (1147) + TX, fenchlorphos (1148) + TX, fenethacarb (1149) + TX, fenfluthrin (1150) + TX, fenitrothion

(335) + TX, fenobucarb (336) + TX, fenoxacrim (1153) + TX, fenoxycarb (340) + TX, fenpirithrin (1155) + TX, fenpropathrin (342) + TX, fenpyrad (alternative name) + TX, fensulfothion (1158) + TX, fenthion (346) + TX, fenthion-ethyl [CCN] + TX, fenvalerate (349) + TX, fipronil (354) + TX, flonicamid (358) + TX, flubendiamide (CAS. Reg. No.: 272451-65-7) + TX, flucofuron (1168) + TX, flucycloxuron (366) + TX, flucythrinate (367) + TX, fluenetil (1169) + TX, flufenerim [CCN] + TX, flufenoxuron (370) + TX, flufenprox (1171) + TX, flumethrin (372) + TX, fluvalinate (1184) + TX, FMC 1137 (development code) (1185) + TX, fonofos (1191) + TX, formetanate (405) + TX, formetanate hydrochloride (405) + TX, formothion (1192) + TX, formparanate (1193) + TX, fosmethilan (1194) + TX, fospirate (1195) + TX, fosthiazate (408) + TX, fosthietan (1196) + TX, furathiocarb (412) + TX, furethrin (1200) + TX, gamma-cyhalothrin (197) + TX, gamma-HCH (430) + TX, guazatine (422) + TX, guazatine acetates (422) + TX, GY-81 (development code) (423) + TX, halfenprox (424) + TX, halofenozide (425) + TX, HCH (430) + TX, HEOD (1070) + TX, heptachlor (1211) + TX, heptenophos (432) + TX, heterophos [CCN] + TX, hexaflumuron (439) + TX, HHDN (864) + TX, hydramethylnon (443) + TX, hydrogen cyanide (444) + TX, hydroprene (445) + TX, hyquincarb (1223) + TX, imidacloprid (458) + TX, imiprothrin (460) + TX, indoxacarb (465) + TX, iodomethane (IUPAC name) (542) + TX, IPSP (1229) + TX, isazofos (1231) + TX, isobenzan (1232) + TX, isocarbophos (alternative name) (473) + TX, isodrin (1235) + TX, isofenphos (1236) + TX, isolane (1237) + TX, isoprocarb (472) + TX, isopropyl 0-(methoxy-aminothiophosphoryl)salicylate (IUPAC name) (473) + TX, isoprothiolane (474) + TX, isothioate (1244) + TX, isoxathion (480) + TX, ivermectin (alternative name) [CCN] + TX, jasmolin I (696) + TX, jasmolin II (696) + TX, jodfenphos (1248) + TX, juvenile hormone I (alternative name) [CCN] + TX, juvenile hormone II (alternative name) [CCN] + TX, juvenile hormone III (alternative name) [CCN] + TX, kelevan (1249) + TX, kinoprene (484) + TX, lambda-cyhalothrin (198) + TX, lead arsenate [CCN] + TX, lepimectin (CCN) + TX, leptophos (1250) + TX, lindane (430) + TX, lirimfos (1251) + TX, lufenuron (490) + TX, lythidathion (1253) + TX, m-cumenyl methylcarbamate (IUPAC name) (1014) + TX, magnesium phosphide (IUPAC name) (640) + TX, malathion (492) + TX, malonoben (1254) + TX, mazidox (1255) + TX, mecarbam (502) + TX, mecarphon (1258) + TX, menazon (1260) + TX, mephosfolan (1261) + TX, mercurous chloride (513) + TX, mesulfenfos (1263) + TX, metaflumizone (CCN) + TX, metam (519) + TX, metam-potassium (alternative name) (519) + TX, metam-sodium (519) + TX, methacrifos (1266) + TX, methamidophos (527) + TX, methanesulfonyl fluoride (IUPAC/Chemical Abstracts name) (1268) + TX, methidathion (529) + TX, methiocarb (530) + TX, methocrotophos (1273) + TX, methomyl (531) + TX, methoprene (532) + TX, methoquin-butyl (1276) + TX, methothrin (alternative name) (533) + TX, methoxychlor (534) + TX, methoxyfenozide (535) + TX, methyl bromide (537) + TX, methyl isothiocyanate (543) + TX, methylchloroform (alternative name) [CCN] + TX,

methylene chloride [CCN] + TX, metofluthrin [CCN] + TX, metolcarb (550) + TX, metoxadiazone (1288) + TX, mevinphos (556) + TX, mexacarbate (1290) + TX, milbemectin (557) + TX, milbemycin oxime (alternative name) [CCN] + TX, mipafox (1293) + TX, mirex (1294) + TX, monocrotophos (561) + TX, morphothion (1300) + TX, moxidectin (alternative name) [CCN] + TX, naftalofos (alternative name) [CCN] + TX, naled (567) + TX, naphthalene (IUPAC/Chemical Abstracts name) (1303) + TX, NC-170 (development code) (1306) + TX, NC-184 (compound code) + TX, nicotine (578) + TX, nicotine sulfate (578) + TX, nifluridide (1309) + TX, nitenpyram (579) + TX, nithiazine (1311) + TX, nitrilacarb (1313) + TX, nitrilacarb 1:1 zinc chloride complex (1313) + TX, NNI-0101 (compound code) + TX, NNI-0250 (compound code) + TX, nornicotine (traditional name) (1319) + TX, novaluron (585) + TX, noviflumuron (586) + TX, 0-5-dichloro-4-iodophenyl O-ethyl ethylphosphonothioate (IUPAC name) (1057) + TX, 0,0-diethyl 0-4-methyl-2-oxo-2H-chromen-7-yl phosphorothioate (IUPAC name) (1074) + TX, O,O-diethyl 0-6-methyl-2-propylpyrimidin-4-yl phosphorothioate (IUPAC name) (1075) + TX, *O,O,O',O'*-tetrapropyl dithiopyrophosphate (IUPAC name) (1424) + TX, oleic acid (IUPAC name) (593) + TX, omethoate (594) + TX, oxamyl (602) + TX, oxydemeton-methyl (609) + TX, oxydeprofos (1324) + TX, oxydisulfoton (1325) + TX, pp'-DDT (219) + TX, para-dichlorobenzene [CCN] + TX, parathion (615) + TX, parathion-methyl (616) + TX, penfluron (alternative name) [CCN] + TX, pentachlorophenol (623) + TX, pentachlorophenyl laurate (IUPAC name) (623) + TX, permethrin (626) + TX, petroleum oils (alternative name) (628) + TX, PH 60-38 (development code) (1328) + TX, phenkapton (1330) + TX, phenothrin (630) + TX, phenthoate (631) + TX, phorate (636) + TX, phosalone (637) + TX, phosfolan (1338) + TX, phosmet (638) + TX, phosnichlor (1339) + TX, phosphamidon (639) + TX, phosphine (IUPAC name) (640) + TX, phoxim (642) + TX, phoxim-methyl (1340) + TX, pirimetaphos (1344) + TX, pirimicarb (651) + TX, pirimiphos-ethyl (1345) + TX, pirimiphos-methyl (652) + TX, polychlorodicyclopentadiene isomers (IUPAC name) (1346) + TX, polychloroterpenes (traditional name) (1347) + TX, potassium arsenite [CCN] + TX, potassium thiocyanate [CCN] + TX, prallethrin (655) + TX, precocene I (alternative name) [CCN] + TX, precocene II (alternative name) [CCN] + TX, precocene III (alternative name) [CCN] + TX, primidophos (1349) + TX, profenofos (662) + TX, profluthrin [CCN] + TX, promacyl (1354) + TX, promecarb (1355) + TX, propaphos (1356) + TX, propetamphos (673) + TX, propoxur (678) + TX, prothidathion (1360) + TX, prothiofos (686) + TX, prothoate (1362) + TX, protrifenbute [CCN] + TX, pymetrozine (688) + TX, pyraclofos (689) + TX, pyrazophos (693) + TX, pyresmethrin (1367) + TX, pyrethrin I (696) + TX, pyrethrin II (696) + TX, pyrethrins (696) + TX, pyridaben (699) + TX, pyridalyl (700) + TX, pyridaphenthion (701) + TX, pyrimidifen (706) + TX, pyrimitate (1370) + TX, pyriproxyfen (708) + TX, quassia (alternative name) [CCN] + TX, quinalphos (711) + TX, quinalphos-methyl (1376) + TX, quinothion (1380) + TX, quintiofos (1381) + TX, R-1492 (development

code) (1382) + TX, rafoxanide (alternative name) [CCN] + TX, resmethrin (719) + TX, rotenone (722) + TX, RU 15525 (development code) (723) + TX, RU 25475 (development code) (1386) + TX, ryania (alternative name) (1387) + TX, ryanodine (traditional name) (1387) + TX, sabadilla (alternative name) (725) + TX, schradan (1389) + TX, sebufos (alternative name) + TX, selamectin (alternative name) [CCN] + TX, SI-0009 (compound code) + TX, SI-0205 (compound code) + TX, SI-0404 (compound code) + TX, SI-0405 (compound code) + TX, silafluofen (728) + TX, SN 72129 (development code) (1397) + TX, sodium arsenite [CCN] + TX, sodium cyanide (444) + TX, sodium fluoride (IUPAC/Chemical Abstracts name) (1399) + TX, sodium hexafluorosilicate (1400) + TX, sodium pentachlorophenoxide (623) + TX, sodium selenate (IUPAC name) (1401) + TX, sodium thiocyanate [CCN] + TX, sophamide (1402) + TX, spinosad (737) + TX, spiromesifen (739) + TX, spirotetrmat (CCN) + TX, sulcofuron (746) + TX, sulcofuron-sodium (746) + TX, sulfluramid (750) + TX, sulfotep (753) + TX, sulfuryl fluoride (756) + TX, sulprofos (1408) + TX, tar oils (alternative name) (758) + TX, tau-fluvalinate (398) + TX, tazimcarb (1412) + TX, TDE (1414) + TX, tebufenozide (762) + TX, tebufenpyrad (763) + TX, tebupirimfos (764) + TX, teflubenzuron (768) + TX, tefluthrin (769) + TX, temephos (770) + TX, TEPP (1417) + TX, terallethrin (1418) + TX, terbam (alternative name) + TX, terbufos (773) + TX, tetrachloroethane [CCN] + TX, tetrachlorvinphos (777) + TX, tetramethrin (787) + TX, theta-cypermethrin (204) + TX, thiacloprid (791) + TX, thiafenox (alternative name) + TX, thiamethoxam (792) + TX, thicrofos (1428) + TX, thiocarboxime (1431) + TX, thiocyclam (798) + TX, thiocyclam hydrogen oxalate (798) + TX, thiodicarb (799) + TX, thiofanox (800) + TX, thiometon (801) + TX, thionazin (1434) + TX, thiosultap (803) + TX, thiosultap-sodium (803) + TX, thuringiensin (alternative name) [CCN] + TX, tolfenpyrad (809) + TX, tralomethrin (812) + TX, transfluthrin (813) + TX, transpermethrin (1440) + TX, triamiphos (1441) + TX, triazamate (818) + TX, triazophos (820) + TX, triazuron (alternative name) + TX, trichlorfon (824) + TX, trichlormetaphos-3 (alternative name) [CCN] + TX, trichloronat (1452) + TX, trifenofos (1455) + TX, triflumuron (835) + TX, trimethacarb (840) + TX, triprene (1459) + TX, vamidothion (847) + TX, vaniliprole [CCN] + TX, veratridine (alternative name) (725) + TX, veratrine (alternative name) (725) + TX, XMC (853) + TX, xylylcarb (854) + TX, YI-5302 (compound code) + TX, zeta-cypermethrin (205) + TX, zetamethrin (alternative name) + TX, zinc phosphide (640) + TX, zolaprofos (1469) and ZXI 8901 (development code) (858) + TX, cyantraniliprole [736994-63-19 + TX, chlorantraniliprole [500008-45-7] + TX, cyenopyrafen [560121-52-0] + TX, cyflumetofen [400882-07-7] + TX, pyrifluquinazon [337458-27-2] + TX, spinetoram [187166-40-1 + 187166-15-0] + TX, spirotetramat [203313-25-1] + TX, sulfoxaflor [946578-00-3] + TX, flufiprole [704886-18-0] + TX, meperfluthrin [915288-13-0] + TX, tetramethylfluthrin [84937-88-2] + TX, triflumezopyrim (disclosed in WO 2012/0921 15) + TX,

a molluscicide selected from the group of substances consisting of bis(tributyltin) oxide (IUPAC name) (913) + TX, bromoacetamide [CCN] + TX, calcium arsenate [CCN] + TX, cloethocarb (999) + TX, copper acetoarsenite [CCN] + TX, copper sulfate (172) + TX, fentin (347) + TX, ferric phosphate (IUPAC name) (352) + TX, metaldehyde (518) + TX, methiocarb (530) + TX, niclosamide (576) + TX, niclosamide-olamine (576) + TX, pentachlorophenol (623) + TX, sodium pentachlorophenoxide (623) + TX, tazimcarb (1412) + TX, thiodicarb (799) + TX, tributyltin oxide (913) + TX, trifenmorph (1454) + TX, trimethacarb (840) + TX, triphenyltin acetate (IUPAC name) (347) and triphenyltin hydroxide (IUPAC name) (347) + TX, pyriprole [394730-71-3] + TX,

a nematicide selected from the group of substances consisting of AKD-3088 (compound code) + TX, 1,2-dibromo-3-chloropropane (IUPAC/Chemical Abstracts name) (1045) + TX, 1,2-dichloropropane (IUPAC/ Chemical Abstracts name) (1062) + TX, 1,2-dichloropropane with 1,3-dichloropropene (IUPAC name) (1063) + TX, 1,3-dichloropropene (233) + TX, 3,4-dichlorotetrahydrothiophene 1,1-dioxide (IUPAC/Chemical Abstracts name) (1065) + TX, 3-(4-chlorophenyl)-5-methylrhodanine (IUPAC name) (980) + TX, 5-methyl-6-thioxo-1 ,3,5-thiadiazinan-3-ylacetic acid (IUPAC name) (1286) + TX, 6-isopentenylaminopurine (alternative name) (210) + TX, abamectin (1) + TX, acetoprole [CCN] + TX, alanycarb (15) + TX, aldicarb (16) + TX, aldoxycarb (863) + TX, AZ 60541 (compound code) + TX, benclothiaz [CCN] + TX, benomyl (62) + TX, butylpyridaben (alternative name) + TX, cadusafos (109) + TX, carbofuran (118) + TX, carbon disulfide (945) + TX, carbosulfan (119) + TX, chloropicrin (141) + TX, chlorpyrifos (145) + TX, cloethocarb (999) + TX, cytokinins (alternative name) (210) + TX, dazomet (216) + TX, DBCP (1045) + TX, DCIP (218) + TX, diamidafos (1044) + TX, dichlofenthion (1051) + TX, dicliphos (alternative name) + TX, dimethoate (262) + TX, doramectin (alternative name) [CCN] + TX, emamectin (291) + TX, emamectin benzoate (291) + TX, eprinomectin (alternative name) [CCN] + TX, ethoprophos (312) + TX, ethylene dibromide (316) + TX, fenamiphos (326) + TX, fenpyrad (alternative name) + TX, fensulfothion (1158) + TX, fosthiazate (408) + TX, fosthietan (1196) + TX, furfural (alternative name) [CCN] + TX, GY-81 (development code) (423) + TX, heterophos [CCN] + TX, iodomethane (IUPAC name) (542) + TX, isamidofos (1230) + TX, isazofos (1231) + TX, ivermectin (alternative name) [CCN] + TX, kinetin (alternative name) (210) + TX, mecarphon (1258) + TX, metam (519) + TX, metam-potassium (alternative name) (519) + TX, metam-sodium (519) + TX, methyl bromide (537) + TX, methyl isothiocyanate (543) + TX, milbemycin oxime (alternative name) [CCN] + TX, moxidectin (alternative name) [CCN] + TX, *Myrothecium verrucaria* composition (alternative name) (565) + TX, NC-184 (compound code) + TX, oxamyl (602) + TX, phorate (636) + TX, phosphamidon (639) + TX, phosphocarb [CCN] + TX, sebufos (alternative name) + TX, selamectin (alternative name) [CCN] + TX, spinosad (737) + TX, terbam (alternative name) +

TX, terbufos (773) + TX, tetrachlorothiophene (IUPAC/ Chemical Abstracts name) (1422) + TX, thiafenox (alternative name) + TX, thionazin (1434) + TX, triazophos (820) + TX, triazuron (alternative name) + TX, xylenols [CCN] + TX, YI-5302 (compound code) and zeatin (alternative name) (210) + TX, fluensulfone [318290-98-1] + TX,

a nitrification inhibitor selected from the group of substances consisting of potassium ethylxanthate [CCN] and nitrapyrin (580) + TX,

a plant activator selected from the group of substances consisting of acibenzolar (6) + TX, acibenzolar-S-methyl (6) + TX, probenazole (658) and *Reynoutria sachalinensis* extract (alternative name) (720) + TX,

a rodenticide selected from the group of substances consisting of 2-isovalerylindan-1,3-dione (IUPAC name) (1246) + TX, 4-(quinoxalin-2-ylamino)benzenesulfonamide (IUPAC name) (748) + TX, alpha-chlorohydrin [CCN] + TX, aluminium phosphide (640) + TX, antu (880) + TX, arsenous oxide (882) + TX, barium carbonate (891) + TX, bisthiosemi (912) + TX, brodifacoum (89) + TX, bromadiolone (91) + TX, bromethalin (92) + TX, calcium cyanide (444) + TX, chloralose (127) + TX, chlorophacinone (140) + TX, cholecalciferol (alternative name) (850) + TX, coumachlor (1004) + TX, coumafuryl (1005) + TX, coumatetralyl (175) + TX, crimidine (1009) + TX, difenacoum (246) + TX, difethialone (249) + TX, diphacinone (273) + TX, ergocalciferol (301) + TX, flocoumafen (357) + TX, fluoroacetamide (379) + TX, flupropadine (1183) + TX, flupropadine hydrochloride (1183) + TX, gamma-HCH (430) + TX, HCH (430) + TX, hydrogen cyanide (444) + TX, iodomethane (IUPAC name) (542) + TX, lindane (430) + TX, magnesium phosphide (IUPAC name) (640) + TX, methyl bromide (537) + TX, norbormide (1318) + TX, phosacetim (1336) + TX, phosphine (IUPAC name) (640) + TX, phosphorus [CCN] + TX, pindone (1341) + TX, potassium arsenite [CCN] + TX, pyrinuron (1371) + TX, scilliroside (1390) + TX, sodium arsenite [CCN] + TX, sodium cyanide (444) + TX, sodium fluoroacetate (735) + TX, strychnine (745) + TX, thallium sulfate [CCN] + TX, warfarin (851) and zinc phosphide (640) + TX,

a synergist selected from the group of substances consisting of 2-(2-butoxyethoxy)-ethyl piperonylate (IUPAC name) (934) + TX, 5-(1,3-benzodioxol-5-yl)-3-hexylcyclohex-2-enone (IUPAC name) (903) + TX, farnesol with nerolidol (alternative name) (324) + TX, MB-599 (development code) (498) + TX, MGK 264 (development code) (296) + TX, piperonyl butoxide (649) + TX, piprotal (1343) + TX, propyl isomer (1358) + TX, S421 (development code) (724) + TX, sesamex (1393) + TX, sesasmolin (1394) and sulfoxide (1406) + TX,

an animal repellent selected from the group of substances consisting of anthraquinone (32) + TX, chloralose (127) + TX, copper naphthenate [CCN] + TX, copper oxychloride (171) + TX, diazinon (227) + TX, dicyclopentadiene (chemical name) (1069) + TX, guazatine (422) + TX, guazatine acetates (422) + TX, methiocarb (530) + TX, pyridin-4-

amine (IUPAC name) (23) + TX, thiram (804) + TX, trimethacarb (840) + TX, zinc naphthenate [CCN] and ziram (856) + TX,

a virucide selected from the group of substances consisting of imanin (alternative name) [CCN] and ribavirin (alternative name) [CCN] + TX,

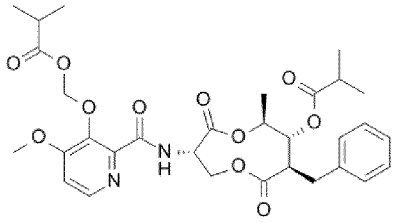
a wound protectant selected from the group of substances consisting of mercuric oxide (512) + TX, octhilinone (590) and thiophanate-methyl (802) + TX,

and biologically active compounds selected from the group consisting of azaconazole (60207-31-0] + TX, benzovindiflupyr [1072957-71-1] + TX, bitertanol [70585-36-3] + TX, bromuconazole [1 16255-48-2] + TX, cyproconazole [94361-06-5] + TX, difenoconazole [1 19446-68-3] + TX, diniconazole [83657-24-3] + TX, epoxiconazole [1 06325-08-0] + TX, fenbuconazole [1 14369-43-6] + TX, fluquinconazole [136426-54-5] + TX, flusilazole [85509-19-9] + TX, flutriafol [76674-21-0] + TX, hexaconazole [79983-71-4] + TX, imazalil [35554-44-0] + TX, imibenconazole [86598-92-7] + TX, ipconazole [125225-28-7] + TX, ipfentrifluconazole [1417782-08-1] + TX, mefentrifluconazole [1417782-03-6] + TX, metconazole [1251 16-23-6] + TX, myclobutanil [88671-89-0] + TX, pefurazoate [101903-30-4] + TX, penconazole [66246-88-6] + TX, prothioconazole [178928-70-6] + TX, pyrifenox [88283-41-4] + TX, prochloraz [67747-09-5] + TX, propiconazole [60207-90-1] + TX, simeconazole [149508-90-7] + TX, tebuconazole [107534-96-3] + TX, tetraconazole [1 12281-77-3] + TX, triadimefon [43121-43-3] + TX, triadimenol [55219-65-3] + TX, triflumizole [99387-89-0] + TX, triticonazole [131983-72-7] + TX, ancymidol [12771-68-5] + TX, fenarimol [60168-88-9] + TX, nuarimol [63284-71-9] + TX, bupirimate [41483-43-6] + TX, dimethirimol [5221-53-4] + TX, ethirimol [23947-60-6] + TX, dodemorph [1593-77-7] + TX, fenpropidine [67306-00-7] + TX, fenpropimorph [67564-91-4] + TX, spiroxamine [1 18134-30-8] + TX, tridemorph [81412-43-3] + TX, cyprodinil [121552-61-2] + TX, mepanipyrim [1 10235-47-7] + TX, pyrimethanil [531 12-28-0] + TX, fenpiclonil [74738-17-3] + TX, fludioxonil [131341-86-1] + TX, benalaxyl [71626-1 1-4] + TX, furalaxyl [57646-30-7] + TX, metalaxyl [57837-19-1] + TX, R-metalaxyl [70630-17-0] + TX, ofurace [58810-48-3] + TX, oxadixyl [77732-09-3] + TX, benomyl [17804-35-2] + TX, carbendazim [10605-21-7] + TX, debacarb [62732-91-6] + TX, fuberidazole [3878-19-1] + TX, thiabendazole [148-79-8] + TX, chlozolinate [84332-86-5] + TX, dichlozoline [24201-58-9] + TX, iprodione [36734-19-7] + TX, myclozoline [54864-61-8] + TX, procymidone [32809-16-8] + TX, vinclozoline [50471-44-8] + TX, boscalid [188425-85-6] + TX, carboxin [5234-68-4] + TX, fenfuram [24691-80-3] + TX, flutolanil [66332-96-5] + TX, mepronil [55814-41-0] + TX, oxycarboxin [5259-88-1] + TX, penthiopyrad [183675-82-3] + TX, thifluzamide [130000-40-7] + TX, guazatine [108173-90-6] + TX, dodine [2439-10-3] [1 12-65-2] (free base) + TX, iminoctadine [13516-27-3] + TX, azoxystrobin [131860-33-8] + TX, dimoxystrobin [149961-52-4] + TX, enestroburin {Proc. BCPC, Int. Congr., Glasgow, 2003, 1, 93} + TX, fluoxastrobin [361377-29-9] + TX, kresoxim-

methyl [143390-89-0] + TX, metominostrobin [133408-50-1] + TX, trifloxystrobin [141517-21-7] + TX, orysastrobin [248593-16-0] + TX, picoxystrobin [117428-22-5] + TX, pyraclostrobin [175013-18-0] + TX, ferbam [14484-64-1] + TX, mancozeb [8018-01-7] + TX, maneb [12427-38-2] + TX, metiram [9006-42-2] + TX, propineb [12071-83-9] + TX, thiram [137-26-8] + TX, zineb [12122-67-7] + TX, ziram [137-30-4] + TX, captafol [2425-06-1] + TX, captan [133-06-2] + TX, dichlofluanid [1085-98-9] + TX, fluoroimide [41205-21-4] + TX, folpet [133-07-3] + TX, tolylfluanid [731-27-1] + TX, bordeaux mixture [8011-63-0] + TX, copperhydroxid [20427-59-2] + TX, copperoxychlorid [1332-40-7] + TX, coppersulfat [7758-98-7] + TX, copperoxid [1317-39-1] + TX, mancopper [53988-93-5] + TX, oxine-copper [10380-28-6] + TX, dinocap [131-72-6] + TX, nitrothal-isopropyl [10552-74-6] + TX, edifenphos [17109-49-8] + TX, iprobenphos [26087-47-8] + TX, isoprothiolane [50512-35-1] + TX, phosdiphen [36519-00-3] + TX, pyrazophos [13457-18-6] + TX, tolclofos-methyl [57018-04-9] + TX, acibenzolar-S-methyl [135158-54-2] + TX, anilazine [101-05-3] + TX, benthiavalicarb [413615-35-7] + TX, blasticidin-S [2079-00-7] + TX, chinomethionat [2439-01-2] + TX, chloroneb [2675-77-6] + TX, chlorothalonil *[1897-45-6]* + TX, cyflufenamid *[180409-60-3]* + TX, cymoxanil *[57966-95-7]* + TX, dichlone *[117-80-6]* + TX, diclocymet [139920-32-4] + TX, diclomezine *[62865-36-5]* + TX, dicloran *[99-30-9]* + TX, diethofencarb *[87130-20-9]* + TX, dimethomorph *[110488-70-5]* + TX, SYP-LI90 (Flumorph) *[211867-47-9]* + TX, dithianon *[3347-22-6]* + TX, ethaboxam *[162650-77-3]* + TX, etridiazole *[2593-15-9]* + TX, famoxadone *[131807-57-3]* + TX, fenamidone *[161326-34-7]* + TX, fenoxanil *[115852-48-7]* + TX, fentin *[668-34-8]* + TX, ferimzone *[89269-64-7]* + TX, fluazinam *[79622-59-6]* + TX, fluopicolide [239110-15-7] + TX, flusulfamide [106917-52-6] + TX, fenhexamid [126833-17-8] + TX, fosetyl-aluminium [39148-24-8] + TX, hymexazol [10004-44-1] + TX, iprovalicarb [140923-17-7] + TX, IKF-916 (Cyazofamid) *[120116-88-3]* + TX, kasugamycin [6980-18-3] + TX, methasulfocarb *[66952-49-6]* + TX, metrafenone *[220899-03-6]* + TX, pencycuron *[66063-05-6]* + TX, phthalide [27355-22-2] + TX, polyoxins [11113-80-7] + TX, probenazole [27605-76-1] + TX, propamocarb [25606-41-1] + TX, proquinazid [189278-12-4] + TX, pydiflumetofen [1228284-64-7] + TX, pyroquilon [57369-32-1] + TX, quinoxyfen [124495-18-7] + TX, quintozene [82-68-8] + TX, sulfur [7704-34-9] + TX, Timorex Gold™ (plant extract containing tea tree oil from the Stockton Group) + TX, tiadinil [223580-51-6] + TX, triazoxide [72459-58-6] + TX, tricyclazole [41814-78-2] + TX, triforine [26644-46-2] + TX, validamycin [37248-47-8] + TX, zoxamide (RH7281) [156052-68-5] + TX, mandipropamid [374726-62-2] + TX, isopyrazam [881685-58-1] + TX, sedaxane [874967-67-6] + TX, 3-difluoromethyl-1-methyl-1 H-pyrazole-4-carboxylic acid (9-dichloromethylene-1 ,2,3,4-tetrahydro-1 ,4-methano-naphthalen-5-yl)-amide (dislosed in WO 2007/048556) + TX, 3-difluoromethyl-1-methyl-1 H-pyrazole-4-carboxylic acid (3',4',5'-trifluoro-biphenyl-2-yl)-amide (disclosed in WO 2006/087343) + TX, [(3S,4R,4aR,6S,6aS, 12*R*, 12aS, 12bS)-3-[(cyclopropylcarbonyl)oxy]-

1,3,4,4a,5,6,6a,12,12a,12b-decahydro-6,12-dihydroxy-4,6a,12b-trimethyl-1 1-oxo-9-(3-pyridinyl)-2H,1 1/-/naphtho[2,1-b]pyrano[3,4-e]pyran-4-yl]methyl-cyclopropanecarboxylate [915972-17-7] + TX and 1,3,5-trimethyl-N-(2-methyl-1-oxopropyl)-N-[3-(2-methylpropyl)-4-[2,2,2-trifluoro-1 -methoxy-1 -(trifluoromethyl)ethyl]phenyl]-1 H-pyrazole-4-carboxamide [926914-55-8] + TX,

or a biologically active compound selected from the group consisting of N-[(5-chloro-2-isopropyl-phenyl)methyl]-N-cyclopropyl-3-(difluoromethyl)-5-fluoro-1-methyl-pyrazole-4-carboxamide + TX, 2,6-Dimethyl-1 H,5H-[1 ,4]dithiino[2,3-c:5,6-c']dipyrrole-1 ,3,5,7(2H,6H)-tetrone + TX, 6-ethyl-5,7-dioxo-pyrrolo[4,5][1 ,4]dithiino[1 ,2-c]isothiazole-3-carbonitrile + TX, 4-(2-bromo-4-fluoro-phenyl)-N-(2-chloro-6-fluoro-phenyl)-2,5-dimethyl-pyrazol-3-amine + TX, 3-(difluoromethyl)-N-(7-fluoro-1 ,1 ,3-trimethyl-indan-4-yl)-1-methyl-pyrazole-4-carboxamide + TX, CAS 850881-30-0 + TX, 3-(3,4-dichloro-1 ,2-thiazol-5-ylmethoxy)-1 ,2-benzothiazole 1,1-dioxide + TX, 2-[2-[(2,5-dimethylphenoxy)methyl]phenyl]-2-methoxy-N-methyl-acetamide + TX, 3-(4,4-difluoro-3,4-dihydro-3,3-dimethylisoquinolin-1-yl)quinolone + TX, 2-[2-fluoro-6-[(8-fluoro-2-methyl-3-quinolyl)oxy]phenyl]propan-2-ol + TX, oxathiapiprolin + TX, tert-butyl N-[6-[[[(1-methyltetrazol-5-yl)-phenyl-methylene]amino]oxymethyl]-2-pyridyl]carbamate + TX, N-[2-(3,4-difluorophenyl)phenyl]-3-(trifluoromethyl)pyrazine-2-carboxamide + TX, 3-(difluoromethyl)-1-methyl-N-[(3R)-1 ,1 ,3-trimethylindan-4-yl]pyrazole-4-carboxamide + TX, 2,2,2-trifluoroethyl N-[2-methyl-1-[[(4-methylbenzoyl)amino]methyl]propyl]carbamate + TX, (2RS)-2-[4-(4-chlorophenoxy)-a,a,a-trifluoro-o-tolyl]-1 -(1 H-1 ,2,4-triazol-1 -yl)propan-2-ol + TX, (2RS)-2-[4-(4-chlorophenoxy)-a,a,a-trifluoro-o-tolyl]-3-methyl-1 -(1 H-1 ,2,4-triazoM -yl)butan-2-oI + TX, 2-(difluoromethyl)-N-[(3R)-3-ethyl-1 ,1-dimethyl-indan-4-yl]pyridine-3-carboxamide + TX, 2-(difluoromethyl)-N-[3-ethyl-1 ,1-dimethyl-indan-4-yl]pyridine-3-carboxamide + TX, N'-(2,5-dimethyl-4-phenoxy-phenyl)-N-ethyl-N-methyl-formamidine + TX, N'-[4-(4,5-dichlorothiazol-2-yl)oxy-2,5-dimethyl-phenyl]-N-ethyl-N-methyl-formamidine + TX, [2-[3-[2-[1-[2-[3,5-bis(difluoromethyl)pyrazol-1-yl]acetyl]-4-piperidyl]thiazol-4-yl]-4,5-dihydroisoxazol-5-yl]-3-chloro-phenyl] methanesulfonate + TX, but-3-ynyl N-[6-[[(Z)-[(1-methyltetrazol-5-yl)-phenyl-methylene]amino]oxymethyl]-2-pyridyl]carbamate + TX, methyl N-[[5-[4-(2,4-dimethylphenyl)triazol-2-yl]-2-methyl-phenyl]methyl]carbamate + TX, 3-chloro-6-methyl-5-phenyl-4-(2,4,6-trifluorophenyl)pyridazine + TX, 3-chloro-4-(2,6-difluorophenyl)-6-methyl-5-phenyl-pyridazine + TX, 4-(2,6-difluorophenyl)-6-methyl-5-phenyl-pyridazine-3-carbonitrile + TX, (R)-3-(difluoromethyl)-1-methyl-N-[1 ,1 ,3-trimethylindan-4-yl]pyrazole-4-carboxamide + TX, 1-[2-[[1-(4-chlorophenyl)pyrazol-3-yl]oxymethyl]-3-methyl-phenyl]-4-methyl-tetrazol-5-one + TX, 1-methyl-4-[3-methyl-2-[[2-methyl-4-(3,4,5-trimethylpyrazol-1 -yl)phenoxy]methyl]phenyl]tetrazol-5-one + TX, (Z,2E)-5-[1-(4-chlorophenyl)pyrazol-3-yl]oxy-2-methoxyimino-N,3-dimethyl-pent-3-enamide + TX, (4-phenoxyphenyl)methyl 2-amino-6-methyl-pyridine-3-carboxylate + TX, and



(fenpicoxamid [517875-34-2]) + TX.

The references in brackets behind the active ingredients, e.g. *[3878-19-1]* refer to the Chemical Abstracts Registry number. The above described mixing partners are known. Where the active ingredients are included in "The Pesticide Manual" [The Pesticide Manual - A World Compendium; Thirteenth Edition; Editor: C. D. S. TomLin; The British Crop Protection Council], they are described therein under the entry number given in round brackets hereinabove for the particular compound; for example, the compound "abamectin" is described under entry number (1). Where "[CCN]" is added hereinabove to the particular compound, the compound in question is included in the "Compendium of Pesticide Common Names", which is accessible on the internet [A. Wood; Compendium of Pesticide Common Names, Copyright © 1995-2004]; for example, the compound "acetoprole" is described under the internet address http://www.alanwood.net/pesticides/acetoprole.html.

Most of the active ingredients described above are referred to hereinabove by a so-called "common name", the relevant "ISO common name" or another "common name" being used in individual cases. If the designation is not a "common name", the nature of the designation used instead is given in round brackets for the particular compound; in that case, the lUPAC name, the lUPAC/Chemical Abstracts name, a "chemical name", a "traditional name", a "compound name" or a "develoment code" is used or, if neither one of those designations nor a "common name" is used, an "alternative name" is employed. "CAS Reg. No" means the Chemical Abstracts Registry Number.

The active ingredient mixture of the compounds of formula I selected from Tables A 1 to A14 (above) and Table E (below) with active ingredients described above comprises a compound selected from Tables A 1 to A14 (above) and Table E (below) and an active ingredient as described above preferably in a mixing ratio of from 100:1 to 1:6000, especially from 50:1 to 1:50, more especially in a ratio of from 20:1 to 1:20, even more especially from 10:1 to 1:10, very especially from 5:1 and 1:5, special preference being given to a ratio of from 2:1 to 1:2, and a ratio of from 4:1 to 2:1 being likewise preferred, above all in a ratio of 1:1, or 5:1, or 5:2, or 5:3, or 5:4, or 4:1, or 4:2, or 4:3, or 3:1, or 3:2, or 2:1, or 1:5, or 2:5, or 3:5, or 4:5, or 1:4, or 2:4, or 3:4, or 1:3, or 2:3, or 1:2, or 1:600, or 1:300, or 1:150, or 1:35, or 2:35, or 4:35, or 1:75, or 2:75, or 4:75, or 1:6000, or 1:3000, or 1:1500, or 1:350, or 2:350, or 4:350, or 1:750, or 2:750, or 4:750. Those mixing ratios are by weight.

The mixtures as described above can be used in a method for controlling pests, which comprises applying a composition comprising a mixture as described above to the pests or their environment, with the exception of a method for treatment of the human or animal body by surgery or therapy and diagnostic methods practised on the human or animal body.

The mixtures comprising a compound of formula I selected from Tables A 1 to A14 (above) and Table E (below) and one or more active ingredients as described above can be applied, for example, in a single "ready-mix" form, in a combined spray mixture composed from separate formulations of the single active ingredient components, such as a "tank-mix", and in a combined use of the single active ingredients when applied in a sequential manner, i.e. one after the other with a reasonably short period, such as a few hours or days. The order of applying the compounds of formula I selected from Tables A 1 to A14 (above) and Table E (below) and the active ingredients as described above is not essential for working the present invention.

The compositions according to the invention can also comprise further solid or liquid auxiliaries, such as stabilizers, for example unepoxidized or epoxidized vegetable oils (for example epoxidized coconut oil, rapeseed oil or soya oil), antifoams, for example silicone oil, preservatives, viscosity regulators, binders and/or tackifiers, fertilizers or other active ingredients for achieving specific effects, for example bactericides, fungicides, nematocides, plant activators, molluscicides or herbicides.

The compositions according to the invention are prepared in a manner known per se, in the absence of auxiliaries for example by grinding, screening and/or compressing a solid active ingredient and in the presence of at least one auxiliary for example by intimately mixing and/or grinding the active ingredient with the auxiliary (auxiliaries). These processes for the preparation of the compositions and the use of the compounds I for the preparation of these compositions are also a subject of the invention.

Another aspect of invention is related to the use of a compound of formula I or of a preferred individual compound as above-defined, of a composition comprising at least one compound of formula I or at least one preferred individual compound as above-defined, or of a fungicidal or insecticidal mixture comprising at least one compound of formula I or at least one preferred individual compound as above-defined, in admixture with other fungicides or insecticides as described above, for controlling or preventing infestation of plants, e.g. useful plants such as crop plants, propagation material thereof, e.g. seeds, harvested crops, e.g. harvested food crops, or non-living materials by insects or by phytopathogenic microorganisms, preferably fungal organisms.

A further aspect of invention is related to a method of controlling or preventing an infestation of plants, e.g. useful plants such as crop plants, propagation material thereof, e.g.

seeds, harvested crops, e.g. harvested food crops, or of non-living materials by phytopathogenic or spoilage microorganisms or organisms potentially harmful to man, especially fungal organisms, which comprises the application of a compound of formula (I) or of a preferred individual compound as above-defined as active ingredient to the plants, to parts of the plants or to the locus thereof, to the propagation material thereof, or to any part of the non-living materials.

Controlling or preventing means reducing infestation by insects or by phytopathogenic or spoilage microorganisms or organisms potentially harmful to man, especially fungal organisms, to such a level that an improvement is demonstrated.

A preferred method of controlling or preventing an infestation of crop plants by phytopathogenic microorganisms, especially fungal organisms, or insects which comprises the application of a compound of formula (I), or an agrochemical composition which contains at least one of said compounds, is foliar application. The frequency of application and the rate of application will depend on the risk of infestation by the corresponding pathogen or insect. However, the compounds of formula (I) can also penetrate the plant through the roots via the soil (systemic action) by drenching the locus of the plant with a liquid formulation, or by applying the compounds in solid form to the soil, e.g. in granular form (soil application). In crops of water rice such granulates can be applied to the flooded rice field. The compounds of formula (I) may also be applied to seeds (coating) by impregnating the seeds or tubers either with a liquid formulation of the fungicide or coating them with a solid formulation.

A formulation, e.g. a composition containing the compound of formula (I), and, if desired, a solid or liquid adjuvant or monomers for encapsulating the compound of formula (I), may be prepared in a known manner, typically by intimately mixing and/or grinding the compound with extenders, for example solvents, solid carriers and, optionally, surface active compounds (surfactants).

The application methods for the compositions, that is the methods of controlling pests of the abovementioned type, such as spraying, atomizing, dusting, brushing on, dressing, scattering or pouring - which are to be selected to suit the intended aims of the prevailing circumstances - and the use of the compositions for controlling pests of the abovementioned type are other subjects of the invention. Typical rates of concentration are between 0.1 and 1000 ppm, preferably between 0.1 and 500 ppm, of active ingredient. The rate of application per hectare is preferably 1g to 2000 g of active ingredient per hectare, more preferably 10 to 1000 g/ha, most preferably 10 to 600 g/ha. When used as seed drenching agent, convenient dosages are from 10mg to 1g of active substance per kg of seeds.

When the combinations of the present invention are used for treating seed, rates of 0.001 to 50 g of a compound of formula (I) per kg of seed, preferably from 0.01 to 10g per kg of seed are generally sufficient.

Suitably, a composition comprising a compound of formula (I) according to the present invention is applied either preventative, meaning prior to disease development or curative, meaning after disease development.

The compositions of the invention may be employed in any conventional form, for example in the form of a twin pack, a powder for dry seed treatment (DS), an emulsion for seed treatment (ES), a flowable concentrate for seed treatment (FS), a solution for seed treatment (LS), a water dispersible powder for seed treatment (WS), a capsule suspension for seed treatment (CF), a gel for seed treatment (GF), an emulsion concentrate (EC), a suspension concentrate (SC), a suspo-emulsion (SE), a capsule suspension (CS), a water dispersible granule (WG), an emulsifiable granule (EG), an emulsion, water in oil (EO), an emulsion, oil in water (EW), a micro-emulsion (ME), an oil dispersion (OD), an oil miscible flowable (OF), an oil miscible liquid (OL), a soluble concentrate (SL), an ultra-low volume suspension (SU), an ultra-low volume liquid (UL), a technical concentrate (TK), a dispersible concentrate (DC), a wettable powder (WP) or any technically feasible formulation in combination with agriculturally acceptable adjuvants.

Such compositions may be produced in conventional manner, e.g. by mixing the active ingredients with appropriate formulation inerts (diluents, solvents, fillers and optionally other formulating ingredients such as surfactants, biocides, anti-freeze, stickers, thickeners and compounds that provide adjuvancy effects). Also conventional slow release formulations may be employed where long lasting efficacy is intended. Particularly formulations to be applied in spraying forms, such as water dispersible concentrates (e.g. EC, SC, DC, OD, SE, EW, EO and the like), wettable powders and granules, may contain surfactants such as wetting and dispersing agents and other compounds that provide adjuvancy effects, e.g. the ondensation product of formaldehyde with naphthalene sulphonate, an alkylarylsulphonate, a lignin sulphonate, a fatty alkyl sulphate, and ethoxylated alkylphenol and an ethoxylated fatty alcohol.

A seed dressing formulation is applied in a manner known per se to the seeds employing the combination of the invention and a diluent in suitable seed dressing formulation form, e.g. as an aqueous suspension or in a dry powder form having good adherence to the seeds. Such seed dressing formulations are known in the art. Seed dressing formulations may contain the single active ingredients or the combination of active ingredients in encapsulated form, e.g. as slow release capsules or microcapsules.

In general, the formulations include from 0.01 to 90% by weight of active agent, from 0 to 20% agriculturally acceptable surfactant and 10 to 99.99% solid or liquid formulation inerts and adjuvant(s), the active agent consisting of at least the compound of formula (I) together with component (B) and (C), and optionally other active agents, particularly

microbiocides or conservatives or the like. Concentrated forms of compositions generally contain in between about 2 and 80%, preferably between about 5 and 70% by weight of active agent. Application forms of formulation may for example contain from 0.01 to 20% by weight, preferably from 0.01 to 5% by weight of active agent. Whereas commercial products will preferably be formulated as concentrates, the end user will normally employ diluted formulations.

Whereas it is preferred to formulate commercial products as concentrates, the end user will normally use dilute formulations.

EXAMPLES

The Examples which follow serve to illustrate the invention. Certain compounds of the invention can be distinguished from known compounds by virtue of greater efficacy at low application rates, which can be verified by the person skilled in the art using the experimental procedures outlined in the Examples, using lower application rates if necessary, for example 50 ppm, 12.5 ppm, 6 ppm, 3 ppm, 1.5 ppm, 0.8 ppm or 0.2 ppm.

Throughout this description, temperatures are given in degrees Celsius and "m.p." means melting point. LC/MS means Liquid Chromatography Mass Spectroscopy and the description of the apparatus and the methods are:

Method G:

Spectra were recorded on a Mass Spectrometer from Waters (SQD, SQDII Single quadrupole mass spectrometer) equipped with an electrospray source (Polarity: positive and negative ions), Capillary: 3.00 kV, Cone range: 30 V, Extractor: 2.00 V, Source Temperature: 150°C, Desolvation Temperature: 350°C, Cone Gas Flow: 50 l/h, Desolvation Gas Flow: 650 l/h, Mass range: 100 to 900 Da) and an Acquity UPLC from Waters: Binary pump, heated column compartment , diode-array detector and ELSD detector. Column: Waters UPLC HSS T3 , 1.8 µm, 30 x 2.1 mm, Temp: 60 °C, DAD Wavelength range (nm): 210 to 500, Solvent Gradient: A = water + 5% MeOH + 0.05 % HCOOH, B= Acetonitrile + 0.05 % HCOOH, gradient: 10-100% B in 1.2 min; Flow (ml/min) 0.85

Method H:

Spectra were recorded on a Mass Spectrometer from Waters (SQD, SQDII Single quadrupole mass spectrometer) equipped with an electrospray source (Polarity: positive and negative ions), Capillary: 3.00 kV, Cone range: 30V, Extractor: 2.00 V, Source Temperature: 150°C, Desolvation Temperature: 350°C, Cone Gas Flow: 50 l/h, Desolvation Gas Flow: 650 l/h, Mass range: 100 to 900 Da) and an Acquity UPLC from Waters: Binary pump, heated column compartment , diode-array detector and ELSD detector. Column: Waters UPLC HSS

T3, 1.8 µm, 30 x 2.1 mm, Temp: 60 °C, DAD Wavelength range (nm): 210 to 500, Solvent Gradient: A = water + 5% MeOH + 0.05 % HCOOH, B= Acetonitrile + 0.05 % HCOOH, gradient: 10-100% B in 2.7 min; Flow (ml/min) 0.85

Formulation Examples

Wettable powders	a)	b)	c)
active ingredient [compound of formula (I)]	25 %	50 %	75 %
sodium lignosulfonate	5 %	5 %	-
sodium lauryl sulfate	3 %	-	5 %
sodium diisobutylnaphthalenesulfonate	-	6 %	10 %
phenol polyethylene glycol ether (7-8 mol of ethylene oxide)	-	2 %	-
highly dispersed silicic acid	5 %	10 %	10 %
Kaolin	62 %	27 %	-

The active ingredient is thoroughly mixed with the adjuvants and the mixture is thoroughly ground in a suitable mill, affording wettable powders that can be diluted with water to give suspensions of the desired concentration.

Powders for dry seed treatment	a)	b)	c)
active ingredient [compound of formula (I)]	25 %	50 %	75 %
light mineral oil	5 %	5 %	5 %
highly dispersed silicic acid	5 %	5 %	-
Kaolin	65 %	40 %	-
Talcum	-		20

The active ingredient is thoroughly mixed with the adjuvants and the mixture is thoroughly ground in a suitable mill, affording powders that can be used directly for seed treatment.

Emulsifiable concentrate	
active ingredient [compound of formula (I)]	10 %
octylphenol polyethylene glycol ether (4-5 mol of ethylene oxide)	3 %
calcium dodecylbenzenesulfonate	3 %
castor oil polyglycol ether (35 mol of ethylene oxide)	4 %
Cyclohexanone	30 %
xylene mixture	50 %

Emulsions of any required dilution, which can be used in plant protection, can be obtained from this concentrate by dilution with water.

Dusts	a)	b)	c)
Active ingredient [compound of formula (I)]	5 %	6 %	4 %
talcum	95 %	-	-
Kaolin	-	94 %	-
mineral filler	-	-	96 %

Ready-for-use dusts are obtained by mixing the active ingredient with the carrier and grinding the mixture in a suitable mill. Such powders can also be used for dry dressings for seed.

Extruder granules	
Active ingredient [compound of formula (I)]	15 %
sodium lignosulfonate	2 %
carboxymethylcellulose	1 %
Kaolin	82 %

The active ingredient is mixed and ground with the adjuvants, and the mixture is moistened with water. The mixture is extruded and then dried in a stream of air.

Coated granules	
Active ingredient [compound of formula (I)]	8 %
polyethylene glycol (mol. wt. 200)	3 %
Kaolin	89 %

The finely ground active ingredient is uniformly applied, in a mixer, to the kaolin moistened with polyethylene glycol. Non-dusty coated granules are obtained in this manner.

Suspension concentrate	
active ingredient [compound of formula (I)]	40 %
propylene glycol	10 %
nonylphenol polyethylene glycol ether (15 mol of ethylene oxide)	6 %
Sodium lignosulfonate	10 %
carboxymethylcellulose	1 %
silicone oil (in the form of a 75 % emulsion in water)	1 %
Water	32 %

The finely ground active ingredient is intimately mixed with the adjuvants, giving a suspension concentrate from which suspensions of any desired dilution can be obtained by dilution with water. Using such dilutions, living plants as well as plant propagation material can be treated and protected against infestation by microorganisms, by spraying, pouring or immersion.

Flowable concentrate for seed treatment

active ingredient [compound of formula (I)]	40 %
propylene glycol	5 %
copolymer butanol PO/EO	2 %
tristyrenephenole with 10-20 moles EO	2 %
1,2-benzisothiazolin-3-one (in the form of a 20% solution in water)	0.5 %
monoazo-pigment calcium salt	5 %
Silicone oil (in the form of a 75 % emulsion in water)	0.2 %
Water	45.3 %

The finely ground active ingredient is intimately mixed with the adjuvants, giving a suspension concentrate from which suspensions of any desired dilution can be obtained by dilution with water. Using such dilutions, living plants as well as plant propagation material can be treated and protected against infestation by microorganisms, by spraying, pouring or immersion.

Slow Release Capsule Suspension

28 parts of a combination of the compound of formula (I) are mixed with 2 parts of an aromatic solvent and 7 parts of toluene diisocyanate/polymethylene-polyphenylisocyanate-mixture (8:1). This mixture is emulsified in a mixture of 1.2 parts of polyvinylalcohol, 0.05 parts of a defoamer and 51.6 parts of water until the desired particle size is achieved. To this emulsion a mixture of 2.8 parts 1,6-diaminohexane in 5.3 parts of water is added. The mixture is agitated until the polymerization reaction is completed.

The obtained capsule suspension is stabilized by adding 0.25 parts of a thickener and 3 parts of a dispersing agent. The capsule suspension formulation contains 28% of the active ingredients. The medium capsule diameter is 8-15 microns.

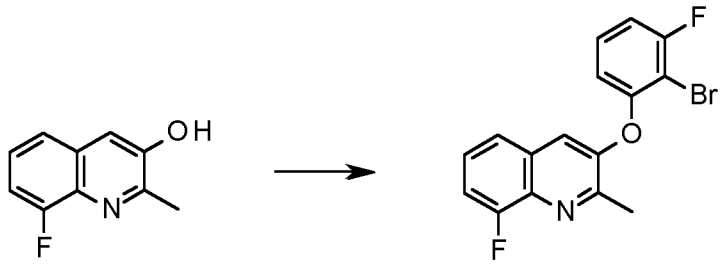
The resulting formulation is applied to seeds as an aqueous suspension in an apparatus suitable for that purpose.

Preparation examples

Using the techniques described both above and below compounds of formula (I) may be prepared.

Example 1: Preparation of [2-fluoro-6-[(8-fluoro-2-methyl-3-quinolyl)oxy]phenyl]-hydroxy-dimethyl-silane

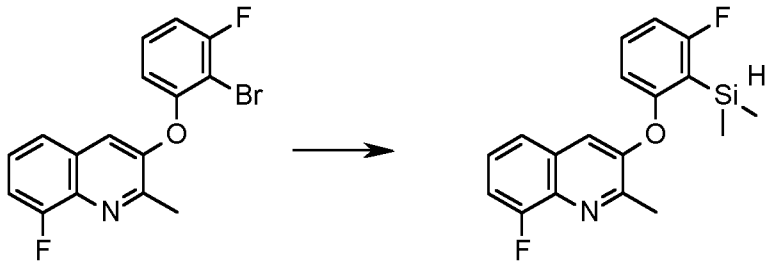
Step 1: Preparation of 3-(2-bromo-3-fluoro-phenoxy)-8-fluoro-2-methyl-quinoline



A suspension of 8-fluoro-2-methyl-quinolin-3-ol (0.40 g, 2.26 mmol, preparation disclosed in WO 201 1/081 174), potassium carbonate (0.38 g, 2.71 mmol) and 1-bromo-2,6-difluorobenzene (1.31 g, 6.77 mmol) in dry DMSO (5 mL) was warmed to 130 °C and stirred for 7 h at this temperature. The reaction mixture was cooled to 20 °C, diluted with water and extracted with ethyl acetate. The organic phase was washed with water, saturated NaHC03 solution, brine, dried over $Na2S0_4$, filtrated and concentrated in vacuo. The residue was purified by flash chromatography on silica gel to afford the title compounds as light brown solid.

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.21-7.43 (m, 5H), 7.05 (dt, 1H), 6.84 (td, 1H), 2.82 (s, 3H).

Step 2: Preparation of [2-fluoro-6-[(8-fluoro-2-methyl-3-quinolyl)oxy]phenyl]-dimethyl-silane

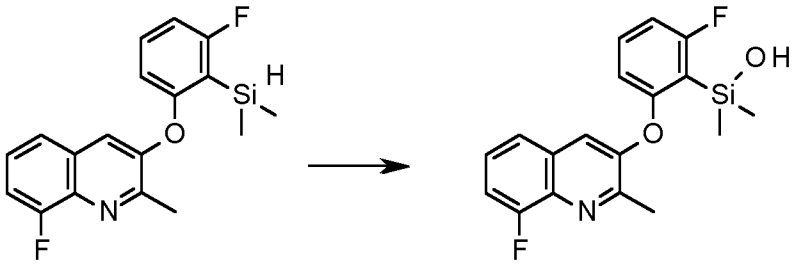


A solution of3-(2-bromo-3-fluoro-phenoxy)-8-fluoro-2-methyl-quinoline (0.33 g, 0.94 mmol) in dry THF (4 mL) was cooled to -78 °C and n-butyl lithium (1.6 M in hexanes, 1.2 mL, 1.98 mmol) was added drop wise. The resulting red solution was aged for 30 minutes at -78 °C and then chlorodimethylsilane (0.1 1 mL, 0.99 mmol) was added drop wise. The reaction was allowed to warm to 0 °C over 30 minutes. Aqueous NH_4Cl was added and the mixture was extracted with ethyl acetate. The organic phase was washed with brine, dried over

Na2SC>4, filtrated and concentrated in vacuo. The residue was purified by flash chromatography on silica gel to afford the title compounds as light yellow oil.

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.25-7.41 (m, 5H), 6.91 (d, 1H), 6.69 (d, 1H), 4.47-4.55 (m, 1H), 2.80 (s, 3H), 0.37 (dd, 6H).

Step 3: Preparation of [2-fluoro-6-[(8-fluoro-2-methyl-3-quinolyl)oxy]phenyl]-hydroxy-dimethyl-silane

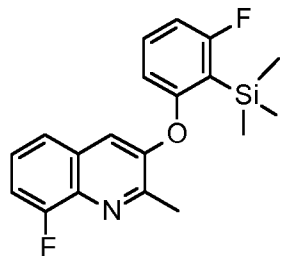


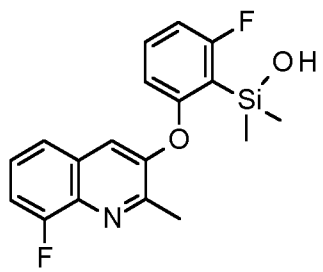
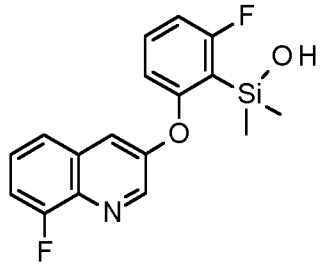
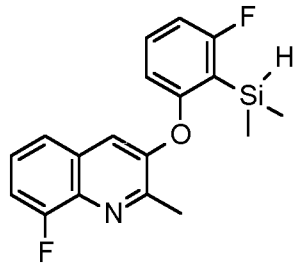
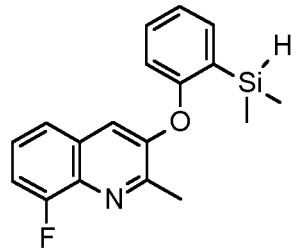
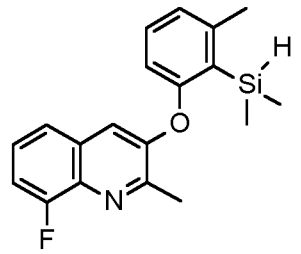
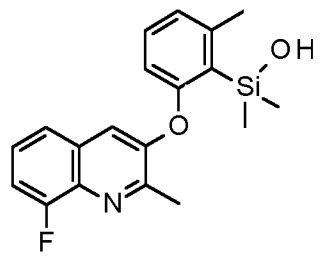
A solution of [2-fluoro-6-[(8-fluoro-2-methyl-3-quinolyl)oxy]phenyl]-dimethyl-silane (0.154 g, 0.47 mmol) in 1,4-dioxane (1.5 mL) was added slowly to a well stirred mixture of palladium on carbon (5%-wt. Pd, 0.005 g) and water (0.025 g, 1.4 mmol) in 1,4-dioxane (0.5 mL) at RT. The resulting suspension was stirred for 60 minutes at 20 °C and then filtrated through a short pad of Celite. The filter cake was rinsed with ethyl acetate and the filtrate was concentrated in vacuo. The residue was purified by flash chromatography on silica gel to afford the title compounds as white solid, m.p. 118 °C.

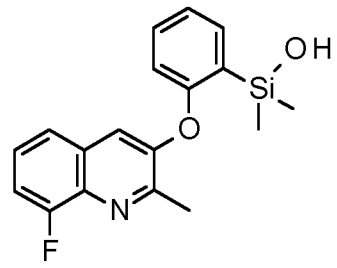
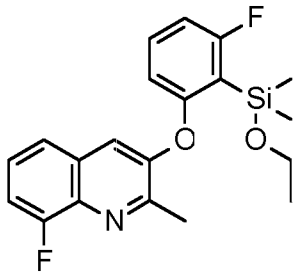
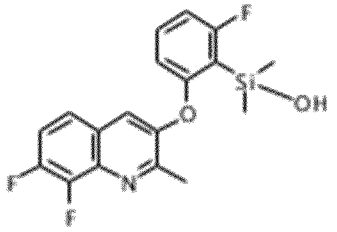
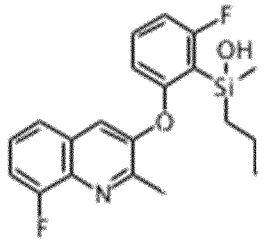
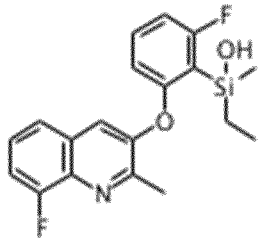
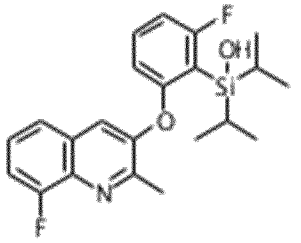
^{1}H NMR (400 MHz, $CDCl_3$) δ 7.46 (d, 1H), 7.28-7.44 (m, 4H), 6.84-6.91 (m, 1H), 6.54 (d, 1H), 2.76 (s, 3H), 2.65 (br. s., 1H), 0.49 (d, 6H)

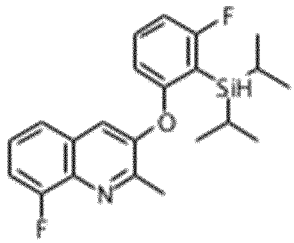
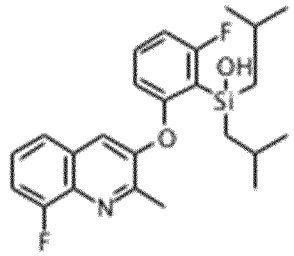
The following table gives analytical data for compounds of formula (I) prepared using synthetic techniques described above.

Table E: Physical data of compounds of formula (I)

Entry	STRUCTURE	RT (min)	[M+H] (measured)	Method	MP °C
E1		1.35	344	G	-

Entry	STRUCTURE	RT (min)	[M+H] (measured)	Method	MP °C
E2		1.09	346	G	118 - 118
E3		1.04	332	G	-
E4		1.31	330	G	-
E5		1.26	312	G	-
E6		1.31	326	G	104 - 105
E7		1.08	342	G	112 - 114

Entry	STRUCTURE	RT (min)	[M+H] (measured)	Method	MP °C
E8		1.03	328	G	133 - 134
E9		1H NMR (400 MHz, CDCl3) δ (Shift in ppm) 7.27-7.40 (m, 5H), 6.86-6.92 (m, 1H), 6.60-6.66 (m, 1H), 3.69 (q, 2H), 2.80 (s, 3H), 1.08 (t, 3H), 0.47 (s, 3H), 0.46 (s, 3H).			
E10		1.13	348	G	135 - 137
E11		0.91	374	G	119 - 121
E12		0.84	360	G	131 - 133
E13		1.07	402	G	137 - 138

Entry	STRUCTURE	RT (min)	[M+H] (measured)	Method	MP °C
E14		1.31	386	G	
E15		1.15	430	G	

Biological examples

Botryotinia fuckeliana (Botrytis cinerea) I liquid culture (Gray mould)

Conidia of the fungus from cryogenic storage are directly mixed into nutrient broth (Vogels broth). After placing a (DMSO) solution of test compound into a microtiter plate (96-well format), the nutrient broth containing the fungal spores is added. The test plates are incubated at 24 °C and the inhibition of growth is determined photometrically 3-4 days after application.

The following compounds of Table E gave at least 80% control of Botryotinia fuckeliana at 200 ppm when compared to untreated control under the same conditions, which showed extensive disease development: E1, E2, E3, E4, E5, E6, E7, E8, E9, E10, E11, E12, E13, E14, E15.

Glomerella lagenarium (Colletotrichum lagenarium) I liquid culture (Anthracnose)

Conidia of the fungus from cryogenic storage are directly mixed into nutrient broth (PDB potato dextrose broth). After placing a (DMSO) solution of test compound into a microtiter plate (96-well format), the nutrient broth containing the fungal spores is added. The test plates are incubated at 24 °C and the inhibition of growth is measured photometrically 3-4 days after application.

The following compounds gave at least 80% control of Glomerella lagenarium at 20 ppm when compared to untreated control under the same conditions, which showed

extensive disease development: E1 , E2 , E3 , E4 , E5 , E6 , E7 , E8 , E9, E10, E11, E12, E13.

Blumeria graminis f. sp. tritici (Erysiphe graminis f. sp. tritici) I wheat / leaf disc preventative (Powdery mildew on wheat)

Wheat leaf segments cv. Kanzler are placed on agar in a multiwell plate (24-well format) and sprayed with the formulated test compound diluted in water. The leaf disks are inoculated by shaking powdery mildew infected plants above the test plates 1 day after application. The inoculated leaf disks are incubated at 20 °C and 60% rh under a light regime of 24 h darkness followed by 12 h light / 12 h darkness in a climate chamber and the activity of a compound is assessed as percent disease control compared to untreated when an appropriate level of disease damage appears on untreated check leaf segments (6 - 8 days after application).

The following compounds gave at least 80% control of Blumeria graminis f. sp. tritici at 200 ppm when compared to untreated control under the same conditions, which showed extensive disease development: E4.

Fusarium culmorum I liquid culture (Head blight)

Conidia of the fungus from cryogenic storage are directly mixed into nutrient broth (PDB potato dextrose broth). After placing a (DMSO) solution of test compound into a microtiter plate (96-well format), the nutrient broth containing the fungal spores is added. The test plates are incubated at 24 °C and the inhibition of growth is determined photometrically 3-4 days after application.

The following compounds gave at least 80% control of Fusarium culmorum at 20 ppm when compared to untreated control under the same conditions, which showed extensive disease development: E1 , E2 , E3 , E4 , E5 , E6 , E7 , E8 , E9, E11, E12.

Fusarium culmorum I wheat / spikelet preventative (Head blight)

Wheat spikelets cv. Monsun are placed on agar in multiwell plates (24-well format) and sprayed with the formulated test compound diluted in water. The spikelets are inoculated with a spore suspension of the fungus 1 day after application. The inoculated spikelets are incubated at 20 °C and 60% rh under a light regime of 72 h semi darkness followed by 12 h light / 12 h darkness in a climate chamber and the activity of a compound is assessed as

percent disease control compared to untreated when an appropriate level of disease damage appears on untreated check spikelets (6 - 8 days after application).

The following compounds gave at least 80% control of Fusarium culmorum at 200 ppm when compared to untreated control under the same conditions, which showed extensive disease development: E5 , E9, E11, E12.

Gaeumannomyces graminis I liquid culture (Take-all of cereals)

Mycelial fragments of the fungus from cryogenic storage were directly mixed into nutrient broth (PDB potato dextrose broth). After placing a (DMSO) solution of test compound into a microtiter plate (96-well format), the nutrient broth containing the fungal spores iss added. The test plates are incubated at 24 °C and the inhibition of growth is determined photometrically 4-5 days after application.

The following compounds gave at least 80% control of Gaeumannomyces graminis at 20 ppm when compared to untreated control under the same conditions, which showed extensive disease development: E1 , E2 , E3 , E4 , E5 , E6 , E7 , E8, E11, E12, E13, E14.

Phaeosphaeria nodorum (Septoria nodorum) I wheat / leaf disc preventative (Glume blotch)

Wheat leaf segments cv. Kanzler are placed on agar in a multiwell plate (24-well format) and sprayed with the formulated test compound diluted in water. The leaf disks are inoculated with a spore suspension of the fungus 2 days after application. The inoculated test leaf disks are incubated at 20 °C and 75% rh under a light regime of 12 h light / 12 h darkness in a climate cabinet and the activity of a compound is assessed as percent disease control compared to untreated when an appropriate level of disease damage appears in untreated check leaf disks (5 - 7 days after application).

The following compounds gave at least 80% control of Phaeosphaeria nodorum at 200 ppm when compared to untreated control under the same conditions, which showed extensive disease development: E7 , E8.

Monographella nivalis (Microdochium nivale) I liquid culture (foot rot cereals)

Conidia of the fungus from cryogenic storage are directly mixed into nutrient broth (PDB potato dextrose broth). After placing a (DMSO) solution of test compound into a microtiter plate (96-well format), the nutrient broth containing the fungal spores is added. The

test plates are incubated at 24 °C and the inhibition of growth is determined photometrically 4-5 days after application.

The following compounds gave at least 80% control of Monographella nivalis at 20 ppm when compared to untreated control under the same conditions, which showed extensive disease development: E1 , E2 , E3 , E4 , E5 , E6 , E7 , E8 , E9, , E11, E12, E14.

Mycosphaerella arachidis (Cercospora arachidicola) I liquid culture (early leaf spot)

Conidia of the fungus from cryogenic storage are directly mixed into nutrient broth (PDB potato dextrose broth). After placing a (DMSO) solution of test compound into a microtiter plate (96-well format), the nutrient broth containing the fungal spores is added. The test plates are incubated at 24 °C and the inhibition of growth is determined photometrically 4-5 days after application.

The following compounds gave at least 80% control of Mycosphaerella arachidis at 20 ppm when compared to untreated control under the same conditions, which showed extensive disease development: E6 , E8.

Puccinia recondita f. sp. tritici / wheat / leaf disc preventative (Brown rust)

Wheat leaf segments cv. Kanzler are placed on agar in multiwell plates (24-well format) and sprayed with the formulated test compound diluted in water. The leaf disks are inoculated with a spore suspension of the fungus 1 day after application. The inoculated leaf segments are incubated at 19 °C and 75% rh under a light regime of 12 h light / 12 h darkness in a climate cabinet and the activity of a compound is assessed as percent disease control compared to untreated when an appropriate level of disease damage appears in untreated check leaf segments (7 - 9 days after application).

The following compounds gave at least 80% control of Puccinia recondita f. sp. tritici at 200 ppm when compared to untreated control under the same conditions, which showed extensive disease development: E7.

Magnaporthe grisea (Pyricularia oryzae) I liquid culture (Rice Blast)

Conidia of the fungus from cryogenic storage are directly mixed into nutrient broth (PDB potato dextrose broth). After placing a (DMSO) solution of test compound into a microtiter plate (96-well format), the nutrient broth containing the fungal spores is added. The

test plates are incubated at 24 °C and the inhibition of growth is determined photometrically 3-4 days after application.

The following compounds gave at least 80% control of Magnaporthe grisea at 20 ppm when compared to untreated control under the same conditions, which showed extensive disease development: E1 , E2 , E3 , E4 , E6 , E9.

Magnaporthe grisea (Pyricularia oryzae) I rice / leaf disc preventative (Rice Blast)

Rice leaf segments cv. Ballila are placed on agar in a multiwell plate (24-well format) and sprayed with the formulated test compound diluted in water. The leaf segments are inoculated with a spore suspension of the fungus 2 days after application. The inoculated leaf segments are incubated at 22 °C and 80% rh under a light regime of 24 h darkness followed by 12 h light / 12 h darkness in a climate cabinet and the activity of a compound is assessed as percent disease control compared to untreated when an appropriate level of disease damage appears in untreated check leaf segments (5 - 7 days after application).

The following compounds gave at least 80% control of Magnaporthe grisea at 200 ppm when compared to untreated control under the same conditions, which showed extensive disease development: E4.

Sclerotinia sclerotiorum I liquid culture (cottony rot)

Mycelia fragments of a newly grown liquid culture of the fungus are directly mixed into nutrient broth (Vogels broth). After placing a (DMSO) solution of test compound into a microtiter plate (96-well format) the nutrient broth containing the fungal material is added. The test plates are incubated at 24 °C and the inhibition of growth is determined photometrically 3-4 days after application.

The following compounds gave at least 80% control of Sclerotinia sclerotiorum at 20 ppm when compared to untreated control under the same conditions, which showed extensive disease development: E1 , E2 , E3 , E4 , E6 , E9, E11, E12.

Mycosphaerella graminicola (Septoria tritici) I liquid culture (Septoria blotch)

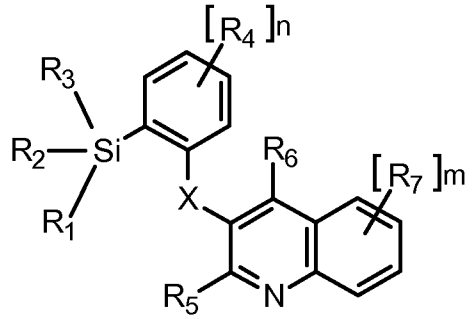
Conidia of the fungus from cryogenic storage are directly mixed into nutrient broth (PDB potato dextrose broth). After placing a (DMSO) solution of test compound into a microtiter plate (96-well format), the nutrient broth containing the fungal spores is added. The

test plates are incubated at 24 °C and the inhibition of growth is determined photometrically 4-5 days after application.

The following compounds gave at least 80% control of Mycosphaerella graminicola at 20 ppm when compared to untreated control under the same conditions, which showed extensive disease development: E4 , E6 , E7 , E9.

CLAIMS

1. A compound of formula (I):



(I)

wherein

X is O or S;

R_1 is hydrogen, C_{1-C4} alkyl, C_{1-C4} alkoxy or hydroxy;

R_2 and R_3 are each independently selected from C_{1-C6} alkyl, C3-C6 cycloalkyi, C_{2-C6} alkenyl, C_{2-C6} alkynyl, hydroxyl and C_{1-C6} alkoxy; or

R_2 and R_3 together represent $-CH_2CH_2CH_2-$, $-CH_2CH_2CH_2CH_2-$, $-CH_2CH_2CH_2CH_2CH_2-$, $-OCH_2CH_20-$, $-OCH_2CH_2CH_20-$, $-CH_2CH_2CH_20-$, $-CH_2CH_2CH_2CH_20-$ or $-CH_2CH_2OCH_2CH_2-$;

each R_4 independently represents halogen, cyano, C_{1-C5} alkyl, C_2-Cs alkenyl, C_2-Cs alkynyl, C3-C6 cycloalkyi, C_{1-C5} alkoxy, C3-C5 alkenyloxy, C3-C5 alkynyloxy or C_{1-C5} alkylthio, in which the alkyl, cycloalkyi, alkenyl, alkynyl, alkoxy, alkenyloxy, alkynyloxy and alkylthio may be optionally substituted with 1 to 3 substituents independently selected from halogen, C_{1-C3} alkyl, C_{1-C3} alkoxy, cyano and C_{1-C3} alkylthio; n is 0, 1, 2, 3 or 4;

Rsand R_6 are each independently hydrogen, halogen, C_{1-C4} alkyl or C_{1-C4} alkoxy, in which the alkyl and alkoxy may be optionally substituted with 1 to 3 halogens;

each R_7 independently represents cyano, halogen, C_{1-C6} alkyl, C_{2-C6} alkenyl, C_{2-C6} alkynyl, C_{1-C6} alkylthio, C3-C7 cycloalkyi, C_{1-C6} alkoxy, C3-C6 alkenyloxy or C3-C6 alkynyloxy, in which the alkyl, cycloalkyi, alkenyl, alkynyl, alkoxy, alkenyloxy, alkynyloxy and alkylthio may be optionally substituted with 1 to 3 substituents independently selected from halogen, C_{1-C3} alkyl, C_{1-C3} alkoxy, cyano and C_{1-C3} alkylthio; and m is 0, 1, 2, 3 or 4;

or a salt or N-oxide thereof.

2. A compound according to claim 1 wherein R_1 is hydrogen, C_{1-C4} alkoxy or hydroxy.

3. A compound according to claim 1 or 2 wherein R_2 and R_3 are each independently selected from C1-C6 alkyl, C2-C6 alkenyl, C2-C6 alkynyl and C1-C6 alkoxy; or R_2 and R_3 together represent -CH2CH2CH2-, -CH2CH2CH2CH2-, -CH2CH2CH2CH2 CH_2-, -OCH2CH2O-, or -$OCH_2CH_2CH_2O$-.

4. A compound according to any one of claims 1, 2 or 3 wherein each R_4 independently represents halogen, cyano, C1-C5 alkyl, C2-C5 alkenyl, C2-C5 alkynyl, $_{C3-C6}$ cycloalkyi, or C1-C5 alkylthio, in which the alkyl, cycloalkyi, alkenyl, alkynyl, and alkylthio may be optionally substituted with 1 to 3 substituents independently selected from halogen, C1-C3 alkyl, C1-C3 alkoxy, cyano and C1-C3 alkylthio; n is 0, 1 or 2.

5. A compound according to any one of claims 1, 2, 3 or 4 wherein R_5 and $_{R6}$ are each independently hydrogen, halogen or Ci-C_4 alkyl.

6. A compound according to any one of claims 1, 2, 3, 4, or 5 wherein each R_7 independently represents cyano, halogen, C1-C3 alkyl, C1-C3 alkylthio, or $_{C3-C5}$ cycloalkyi, in which the cycloalkyi and alkylthio may be optionally substituted with 1 to 3 substituents independently selected from halogen and C1-C2 alkyl; and m is 0, 1 or 2.

7. A compound according to claim 1 wherein X is O or S; Ri is C1-C2 alkoxy or hydroxy; R_2 and R_3 are each independently selected from C1-C3 alkyl and C1-C2 alkoxy; or R_2 and R_3 together represent -OCH2CH2O-, or -OCH2CH2CH2O-; each R_4 independently represents fluoro, chloro, bromo, cyano, methyl, or methylthio; n is 0, 1 or 2; R_5 and $_{R6}$ are each independently hydrogen, chloro or C1-C2 alkyl; each R_7 independently represents cyano, fluoro, chloro, bromo, methyl or methylthio; and m is 0, 1 or 2; or a salt or N-oxide thereof.

8. A compound according to claim 1 wherein X is O or S; Ri is hydroxy; R_2 and R_3 are each independently selected from methyl and ethyl; each R_4 independently represents fluoro, chloro, cyano or methyl; n is 0 or 1; R_5 and $_{R6}$ are each independently hydrogen or methyl; each R_7 independently represents cyano, fluoro, chloro or methyl; and m is 1 or 2; or a salt or N-oxide thereof.

9. A compound according to claim 1 wherein X is O or S; Ri is hydroxy; R_2 and R_3 are both methyl; each R_4 independently represents fluoro or methyl; n is 0 or 1; R_5 is

methyl; R_6 is hydrogen; each R_7 independently represents fluoro; and m is 1 or 2; or a salt or N-oxide thereof.

10. A compound according to any preceding claim wherein X is O.

11. A compound according to any preceding claim wherein X is S.

12. A composition comprising a fungicidally effective amount of a compound of formula (I) as defined in any of claims 1 - 11.

13. A composition according to claim 12, wherein the composition further comprises at least one additional active ingredient and/or a diluent.

14. A method of combating, preventing or controlling phytopathogenic diseases which comprises applying to a phytopathogen, to the locus of a phytopathogen, or to a plant susceptible to attack by a phytopathogen, or to propagation material thereof, a fungicidally effective amount of a compound of formula (I) as defined in any of claims 1 - 11 or a composition comprising a fungicidally effective amount of a compound of formula (I) as defined in any of claims 1 - 11.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/058505

A. CLASSIFICATION OF SUBJECT MATTER
INV. C07D215/20 C07F7/08 A01N43/42 A01N55/10
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
C07D A01N C07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal , CHEM ABS Data, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 326 330 A2 (LILLY CO ELI [US]) 2 August 1989 (1989-08-02) page 2, lines 8-13; claims 1,11	1-14
A	EP 2 522 658 A1 (NIPPON SODA CO [JP]) 14 November 2012 (2012-11-14) cited in the application paragraph [0005]; claims 1,4	1-14
E	WO 2017/072283 A1 (BAYER CROPSCIENCE AG [DE]) 4 May 2017 (2017-05-04) examples;; claims 1,3,12	1-14

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 May 2017	17/05/2017

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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