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Smut fungi of New Zealand: An introduction, and list of recorded species

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Abstract An overview of the smut fungi (Basidiomycota) is presented as an introduction towards a new smut mycoflora for New Zealand. Many of the New Zealand smuts have undergone taxonomic re-evaluation in the last two or three years. All species recorded from New Zealand are listed, together with details on their host plants, a reference to the first New Zealand record of each unique smut/host combination, and a separate alphabetical list of host plants and the smut fungi that parasitise them. A total of 94 smut species are recorded from New Zealand, distributed within 24 genera. Most smuts (60%) are introduced. There are few examples of introduced species attacking native host plants, or of indigenous smuts parasitising exotic hosts. Six smut species are recorded in New Zealand for the first time, and 12 new host records are listed for smut fungi previously recorded in New Zealand. The endemic smut fungus *Sorosporium neillii* is better accommodated in the genus *Tolyposporium* and the appropriate recombination is made.

Keywords Ustilaginales; smuts; checklist; host list; new records

INTRODUCTION

Smut fungi are microscopic basidiomycetes that grow as biotrophic plant parasites both within and between plant cells. Many species have been grown on artificial media where they often produce a slimy, yeast-like growth. Of the approximately 1450 described species, about 53% infect grasses and cereals (Poaceae) and about 14% infect sedges (Cyperaceae). They are restricted to angiosperms apart from two species of *Melaniella* on *Selaginella* (Selaginellaceae), one species of *Exoteliopsis* on *Osmunda* (Osmundaceae), and two species of *Uleiella* on *Araucaria* (Araucariaceae). They commonly produce fruiting bodies (sori) within flowers, attacking the ovaries or anthers, and seeds may become filled with a mass of black spores. Depending on the species of smut fungus, sori may also form on stems and leaves; the genus *Entorrhiza* forms galls on plant roots. Smut fungi often grow systemically as host-specific endophytes so that all stems/tillers and flowers on a plant will be infected. Infected plants may be stunted and may have excess tillering.

Traditionally, smut fungi were accommodated in two families, the Ustilaginaceae and the Tilletiaceae, within the Order Ustilaginales (Tulasne & Tulasne 1847). Modern molecular studies (Blanz & Gottschalk 1984; Begerow et al. 1997), biochemical work (Prillinger et al. 1991), and ultrastructural studies (Bauer et al. 2001) have resulted in a very different classificatory system. The most recent system, summarised by Vánky (1999a), has most smut fungi distributed within eight orders in the Class Ustilaginomycetes. A ninth, non-smut order, the Exobasidiales, includes gall-forming, biotrophic pathogens found mainly on Ericaceae. Eight smut genera, in the Order Microbotryales, have been placed in Class Urediniomycetes, which includes the rust fungi (Order Uredinales). Although taxonomically isolated from the rest of the smuts, the Microbotryales appear to be true smuts rather than rusts.

Smut fungi commonly produce only two kinds of spores, the ustilospores (ustospores,

chlamydospores, teliospores, brand spores) and, following meiosis, basidiospores (sporidia). Some smuts, especially *Entyloma*, may produce asexual conidia on the host plant. The ustilospores are often exposed as a black, powdery mass, but are sometimes covered by a fungal membrane or by host tissues. However, ustilospores of *Entyloma* may be pale in colour, while those of *Microbotryum* are violet-tinted, and those of *Bauerago* are yellow or yellowish red.

Until the 20th century little was known about smut fungi in New Zealand, and only seven species had been recorded by 1900. Several of these early records cannot, in the absence of voucher specimens, be identified with species currently accepted as occurring in New Zealand. Smut fungi were first recorded from New Zealand by Berkeley (1855). He recorded *Ustilago candollei* var. α *berkeleyana* on *Polygonum prostratum*, and described two new species, *U. endotricha* (\equiv *Farysporium endotrichum*) on *Gahnia* sp. and *U. bullata* on *Triticum scabrum* (\equiv *Elymus rectisetus*). The name *U. bullata* has been used by mycologists in a broad sense for the floral, bullate smut of *Agropyron*, *Brachypodium*, *Bromus*, *Elymus*, *Festuca*, *Hordeum*, *Lolium*, and *Sitanion* species, and until recently the fungus was considered to be worldwide in distribution. However, the type of *U. bullata* is on *Elymus rectisetus*, and both the sori and spores of this fungus are markedly different from the bullate smut fungus on *Bromus* and other grass genera. Vánky (2001) considered the New Zealand fungus (*U. bullata*) to be restricted to *Elymus* spp., and has used the next valid name, *U. bromivora*, for the smut on *Bromus* spp. The three smut fungi recorded by Berkeley (1855) were also noted by Hooker (1867), although he listed *U. candollei* as var. α *tulasne*. In addition, Hooker (1867) recorded *U. urceolorum* on *Carex ternaria* from the North Island. However, *C. ternaria* is known only from some of the outlying islands of New Zealand, and it is probable that the smut is either *Anthracoidea heterospora* or one of the *Farysia* spp. Cooke (1879) also listed the same smut on *C. ternaria*, from a collection made by S. Berggren at "Lake Taupo, Tauranga". The smut/host records listed under *Farysia caricis-filicinae* require further study. Unfortunately, there is no recent monograph of the genus *Farysia*. It is probable that *F. caricis-filicinae* is a synonym of *F. butleri* and that *F. pseudocyperi* is another species, but a nomen ambiguum (Ling 1949).

Armstrong (1880) listed four smut fungi from Canterbury, without any indication of the host plants.

Three of the smuts, *Ustilago bullata*, *U. candollei*, and *U. endotricha* were those listed by Berkeley (1855) and by Hooker (1867). The fourth smut, *U. segetum*, is probably *U. tritici*, but it may be *U. avenae*, *U. hordei*, or *U. nuda*. Cooke (1888) described the indigenous *U. sclerotiformis* (\equiv *Anthracoidea sclerotiformis*) on *Uncinia caespitosa* (\equiv *Uncinia leptostachya*). Colenso (1891) recorded *Cintractia axicola* on an unnamed host from New Zealand. However, this species, which is known in the tropics and subtropics on *Cyperus* spp. and *Fimbristylis* spp., has not been re-collected in New Zealand. It is considered probable that Colenso's fungus was a species of *Anthracoidea*, perhaps on a *Carex*.

Kirk (1904, 1905, 1906) recorded five smuts on cereals, but it was not until Cunningham (1924) that the first, and only, taxonomic compilation of New Zealand smut fungi was made. Cunningham's original work was supplemented by several additions (Cunningham 1926a, 1926b, 1928, 1930, 1945a, 1945b). Since 1945 the number of smuts known in New Zealand has more than doubled, with many species recorded in the plant pathological literature, and numerous new host records have been found.

Smut taxonomy has been drastically revised since Cunningham's time, and of the 40 species treated by Cunningham (1945c), less than 40% were recorded under a name that is acceptable today. In preparation for an updated monograph on the smut fungi of New Zealand, specimens held in Herbarium PDD have been critically re-examined, and several species have been redetermined or deleted from the New Zealand records. For instance, three records of *Entyloma* (Dingley 1969) have proved to be erroneous. *Entyloma compositarum* on *Crepis capillaris* and on *Lapsana communis*, and *E. picridis* on *Picris echioides* were based on conidial fungi, mistaken for the conidial stage of *Entyloma* spp. In addition, the record of *Entorrhiza scirpicola* on *Isolepis setacea* (Fineran 1978; Fineran & Fineran 1992) may be an error. The specimen (CANU 16055) on which this record is presumably based contains a sorus of *E. casparyana* that occurs only on *Juncus* spp. Either the host plant was misidentified or material has been mixed. Many of the New Zealand specimens have been reassessed and some well-known species have been eliminated from the records (e.g., *Anthracoidea caricis* on *Carex* spp. is deemed to be *A. heterospora*). New species have been described. For example, *Anthracoidea wakatipu* on *Carex wakatipu* was segregated from *A. heterospora* and described as a new species (Vánky 2000), while *Mundkurella*

schefflerae is a newly discovered species (Vánky et al. 1999). Fineran (1971, 1978) and Fineran & Fineran (1992) made an intensive study of the genus *Entorrhiza*, collecting and describing several species from New Zealand. Vánky (1992a, 1998) re-examined the Finerans' New Zealand specimens and segregated and described two new species from them. *Farysia endotricha* on *Gahnia* spp. has been placed in the new Australasian genus *Farysporium* (Vánky 1999b). Several smuts previously recorded in New Zealand under *Urocystis agropyri* have been separated as *U. alopecuri* on *Alopecurus pratensis*, *U. bolivari* on *Lolium perenne*, *U. roivainenii* on *Anthoxanthum odoratum*, and *U. ulei* on *Schedonorus* spp. Some of the cereal smuts are recorded under names that may be unfamiliar to the general reader. We prefer to treat the varieties of *Ustilago segetum* at the specific level, viz *U. avenae*, *U. hordei*, *U. nuda*, and *U. tritici*. In addition, we use *Tilletia caries* rather than *T. tritici*, as the latter is invalid, based on a nomen nudum (Vánky 1994).

In the past, smut fungi were the cause of serious diseases, especially in New Zealand cereal crops. The introduction of hot-water treatment of seed, and of copper or mercury seed dusts in the 1920s, effectively controlled most smuts. Today, modern fungicides provide adequate control. However, some smut diseases (e.g., Karnal bunt of wheat caused by *Tilletia indica*, and boil or blister smut of maize caused by *Ustilago zaeae*) are still of considerable economic importance, especially in cereals. These two smuts are also major quarantine pests, and neither occurs in New Zealand. *T. indica* was recently found in the USA, and Murray & Brennan (1998) concluded that if Karnal bunt became established in Australia, loss of domestic and international markets for wheat could cost A\$491 million per year. *Ustilago zaeae*, which is widespread throughout the world, became established in Australia in 1982.

Entyloma ageratinae, a fungus that has been used in Hawaii as part of a highly successful biological control programme, was the first and, to date, the only fungus to have been legally introduced to New Zealand for control of a weed. Fröhlich et al. (1999) provided an account of the importation and release of this smut as part of a programme to control mist flower (*Ageratina riparia*), an invasive weed of natural, rural, and urban areas in the North Island. The fungus has established and is spreading, although no ustilospores have been found in New Zealand, only conidia.

There are 94 named species of smut fungi found in New Zealand and 213 pathogen/host combinations. These species are distributed among 24 genera. Only four genera have more than 10 species in New Zealand: *Ustilago* with 16 species, *Entyloma* with 15, and *Tilletia* and *Urocystis* each with 11. These four genera also contain a high proportion of introduced smut species. Approximately 60% of the smuts are considered to have been introduced to New Zealand, in many cases incidentally with seeds. Many of the introduced smuts are widespread, cosmopolitan species. About 15% of the smuts are endemic to New Zealand, and 25% are indigenous, often occurring also in Australia. It is rare for an introduced smut to infect native hosts, or for a native smut to infect an exotic host. Only three native smuts have been recorded on exotic hosts in New Zealand. Two of these smuts, *Ustilago agropyri* and *U. comburens*, occur on native *Rytidosperma* species and on several *Rytidosperma* species naturalised from Australia. The third native smut to infect exotic hosts is *Farysia thuenenii*, which has been recorded on *Carex longebrachiata*, a plant naturalised from Australia, and *C. riparia*, a weedy species introduced from the Northern Hemisphere. Four cosmopolitan grass smuts, *Jamesdicksonia dactylidis*, *Tranzscheliella williamsii*, *Ustilago hypodytes*, and *U. striiformis*, have been recorded on native hosts in New Zealand. Apart from *T. williamsii*, these smuts have a broad host range. Three other widespread exotic smuts also infect native plants in New Zealand. *Urocystis junci* is known only on the native *Juncus australis* while *U. ranunculi* is found only on the native *Ranunculus insignis*. *Entyloma microsporum* is found on *R. reflexus* as well as on exotic *Ranunculus* spp.

The following "Checklist of smut fungi recorded in New Zealand" is arranged alphabetically by genus and then by species within each genus. Synonyms are given only when they have been used in the New Zealand literature. Each host plant is then listed alphabetically together with the first New Zealand recording of smut on that host. The first use of each synonymous smut name is also referenced. The "Host list for New Zealand smut fungi" is also arranged alphabetically, by host genus and then by species within genera. In this list only the currently accepted names for both the host plants and the smuts are provided. Nine smut/host records (*Cintractia axicola*, *Entorrhiza scirpicola* on *Isolepis setacea*, *Entyloma compositarum* on *Crepis capillaris* and *Lapsana communis*, *E. picridis* on *Picris echioides*,

Farysia pseudocyperi on *Carex dissita*, *C. geminata*, and *C. maorica*, and *Ustilago urceolorum* on *Carex ternaria*), which are enclosed within quotation marks, are considered to be dubious; the reasons have been discussed above.

Within the "Checklist" are 12 new host records for smut fungi previously recorded in New Zealand. An additional six smut species are recorded in New Zealand for the first time. These are: *Doassansiopsis hydrophila* on *Potamogeton cheesemani*; *Entyloma echinaceae* on *Echinacea angustifolia*; *Entyloma eschscholziae* on *Eschscholzia californica*; *Entyloma gaillardianum* on *Gaillardia* sp.; *Restiosporium*

dissimile on *Leptocarpus similis*; and *Urocystis tothii* on *Juncus articulatus*. Another smut, *Tilletia rugispora*, was found in a quarantine glasshouse at Mt Albert Research Centre in 1982 on plants of *Paspalum floridanum*, grown from seed imported from the USA. The plants were destroyed and the smut has not been seen since.

The endemic smut fungus *Sorosporium neillii* does not belong to the genus *Sorosporium* F.Rudolphi (nom. rej. prop. = *Thecaphora* Fingerh., nom. cons. prop). It is better accommodated in the genus *Tolyposporium* Woronin ex J.Schröt., and the appropriate recombination is made.

CHECKLIST OF SMUT FUNGI RECORDED IN NEW ZEALAND

- Anthracoidea carphae*** (Speg.) Vánky, *Bot. Not.* 132: 230, 1979
= *Cintractia waiouru* G.Cunn., *Trans. Roy. Soc. New Zealand* 75: 335, 1945
on *Carpha alpina* (Cunningham 1945b, 1945c — as *Cintractia waiouru*; Vánky 1979).
- Anthracoidea heterospora*** (B.Lindeb.) Kukkonen, *Ann. Bot. Soc. Zool.-Bot. Fenn. "Vanamo"* 34(3): 63, 1963
on *Carex coriacea* (Cunningham 1924 — as *Cintractia caricis* (Pers.) Magnus; Pennycook 1989 — as *Anthracoidea caricis* (Pers.) Bref.); *C. gaudichaudiana* (Cunningham 1924 — as *C. caricis*; Pennycook 1989 — as *A. caricis*); *C. geminata* (Cunningham 1924 — as *C. caricis*; Pennycook 1989 — as *A. caricis*); *C. lessoniana* (new record); *C. sinclairii* (Dingley 1969 — as *C. caricis*; Pennycook 1989 — as *A. caricis*); *C. subdola* (Cunningham 1924 — as *C. caricis*; Pennycook 1989 — as *A. caricis*).
- Anthracoidea schoenus*** (G.Cunn.) Vánky, *Bot. Not.* 132: 230, 1979
= *Cintractia schoenus* G.Cunn., *Trans. New Zealand Inst.* 59: 503, 1928
on *Schoenus maschalinus* (Brook 1957 — as *Cintractia schoenus*; Pennycook 1989); *S. pauciflorus* (Cunningham 1928 — as *C. schoenus*; Vánky 1979).
- Anthracoidea sclerotiformis*** (Cooke & Masee) Kukkonen, *Ann. Bot. Soc. Zool.-Bot. Fenn. "Vanamo"* 34(3): 64, 1963
= *Ustilago sclerotiformis* Cooke & Masee in Cooke, *Grevillea* 17: 8, 1888
= *Cintractia sclerotiformis* (Cooke & Masee) G.Cunn., *Trans. New Zealand Inst.* 55: 421, 1924
on *Uncinia banksii* (Cunningham 1924 — as *Cintractia sclerotiformis*; Pennycook 1989); *U. divaricata* (Kukkonen 1963); *U. egmontiana* (Cunningham 1924 — as *C. sclerotiformis*; Pennycook 1989); *U. involuta* (Brook 1957 — as *C. sclerotiformis*; Pennycook 1989); *U. laxiflora* (Vánky 1986); *U. leptostachya* (Cooke 1888 — as *Ustilago sclerotiformis*; Cunningham 1924 — as *C. sclerotiformis*; Kukkonen 1963); *U. nervosa* (Kukkonen 1963); *U. rubra* (Cunningham 1945b, 1945c — as *C. sclerotiformis*; Kukkonen 1963); *U. scabra* (Cunningham 1924 — as *C. sclerotiformis*; Pennycook 1989); *U. silvestris* (Cunningham 1924 — as *C. sclerotiformis*; Kukkonen 1963); *U. uncinata* (Vánky 1982).
- Anthracoidea wakatipu*** Vánky, *Mycotaxon* 74: 354, 2000
on *Carex wakatipu* (Dingley 1969 — as *Cintractia caricis*; Pennycook 1989 — as *Anthracoidea caricis*; Vánky 2000).
- Bauerago abstrusa*** (Malençon) Vánky, *Mycotaxon* 70: 44, 1999
on *Juncus gregiflorus* (new record); *Juncus* spp. (Vánky 1999a).
- Bauerago gardneri*** (McKenzie & Vánky) Vánky, *Mycotaxon* 70: 46, 1999
= *Ustilago gardneri* McKenzie & Vánky in Vánky, *Mycotaxon* 41: 486, 1991
on *Cyperus ustulatus* f. *grandispiculosus* (Vánky 1991 — as *Ustilago gardneri*; Vánky 1999a).
"Cintractia axicola (Berk.) Cornu, *Ann. Sci. Nat. Bot., Sér. 6, 15: 279, 1883*
host unnamed (Colenso 1891) — doubtful record, see Introduction."
- Cintractia oreoboli*** Vánky & McKenzie, *New Zealand J. Bot.* 28: 249, 1990
on *Oreobolus pectinatus* (new record); *O. strictus* (Vánky & McKenzie 1990).
- Cintractia solida*** (Berk.) M.Piepenbr., *Nova Hedwigia* 70: 310, 2000

- ≡ *Sorosporium solidum* (Berk.) McAlpine, *Smuts Australia*: 185, 1910
 on *Schoenus apogon* var. *apogon* (McKenzie 1990 — as *Sorosporium solidum*; Piepenbring 2000); *S. maschalinus* (Vánky & Websdane 1995 — as *S. solidum*); *S. nitens* var. *concinus* (Cunningham 1945b, 1945c — as *S. solidum*); *S. pauciflorus* (Vánky & Websdane 1995 — as *S. solidum*).
- Doassansiopsis hydrophila*** (A.Dietr.) Lavrov, *Sist. Zametki Mater. Gerb. Krylova Tomsk. Gosud. Univ. Kujbyševa* 11: 4, 1937
 on *Potamogeton cheesemanii* (new record).
- Entorrhiza aschersoniana*** (Magnus) Lagerh., *Hedwigia* 27: 262, 1888
 on *Juncus bufonius* (Fineran 1978).
- Entorrhiza caricicola*** Ferd. & Winge, *Dansk. Bot. Ark.* 2: 10, 1914
 on *Carex echinata* (Fineran & Fineran 1992); *C. gaudichaudiana* (Fineran 1978); *C. resectans* (Fineran 1978); *C. sinclairii* (Fineran 1978); *Eleocharis gracilis* (Fineran 1978); *Juncus pusillus* (Fineran 1978); *Juncus* sp. (Fineran 1978).
- Entorrhiza casparyana*** (Magnus) Lagerh., *Hedwigia* 27: 262, 1888
 = *Entorrhiza digitata* Lagerh., *Hedwigia* 27: 264, 1888
 on *Juncus articulatus* (Fineran 1971 — as *Entorrhiza digitata*; Fineran 1978); *J. bufonius* (Fineran 1978); *J. effusus* (Fineran 1978); *J. gregiflorus* (Fineran 1971 — as *E. digitata*; Fineran 1978); *Juncus* sp. (Fineran 1971 — as *E. digitata*; Fineran 1978).
- Entorrhiza casparyanella*** Vánky, *Mycotaxon* 68: 342, 1998
 on *Juncus gregiflorus* (Fineran 1978 — as *Entorrhiza casparyana*; Vánky 1998).
- Entorrhiza fineranii*** Vánky, *Mycotaxon* 43: 419, 1992
 on *Isolepis basilaris* (Fineran 1971 — as *Entorrhiza scirpicola*; Vánky 1992a); *I. cernua* (Fineran 1971 — as *E. scirpicola*; Vánky 1992a); *I. inundata* (new record); *I. reticularis* (new record).
- Entorrhiza scirpicola*** (Correns) Sacc. & P.Syd. in Sacc., *Syll. Fung.* 14: 425, 1899
 on *Isolepis basilaris* (new record); *I. cernua* (new record); “*I. setacea* (Fineran 1978; Fineran & Fineran 1992) — doubtful record, see Introduction”.
- Entyloma ageratinae*** R.W.Barreto & H.C.Evans, *Trans. Brit. Mycol. Soc.* 91: 93, 1988
 on *Ageratina riparia* (Fröhlich et al. 1999).
- Entyloma australe*** Speg., *Anales Soc. Ci. Argent.* 10: 5, 1880
 on *Physalis ixocarpa* (McKenzie & Dingley 1996); *P. peruviana* (Cunningham 1945b, 1945c).
- Entyloma brizae*** Unamuno & Cif. in Unamuno, *Bol. Soc. Esp. Hist. Nat.* 31: 335, 1931
 on *Briza minor* (McKenzie & Latch 1981).
- Entyloma calendulae*** (Oudem.) de Bary, *Bot. Zeitung (Berlin)* 32: 102, 1874
 on *Calendula officinalis* (Cunningham 1944).
- “*Entyloma compositarum* Farl., *Bot. Gaz. (Crawfordsville)* 8: 275, 1883
 on *Crepis capillaris* (Dingley 1959 — as *Ramularia eximia* Bubák; Dingley 1969); *Lapsana communis* (Dingley 1969) — doubtful records, see Introduction.”
- Entyloma dahliae*** Syd. & P.Syd., *Ann. Mycol.* 10: 36, 1912
 on *Dahlia coccinea* × *D. pinnata* (Brien 1939).
- Entyloma echinaceae*** Vánky & McKenzie, ined.
 on *Echinacea angustifolia* (new record).
- Entyloma eschscholziae*** Harkn., *Bull. Calif. Acad. Sci.* 1: 40, 1884
 on *Eschscholzia californica* (new record).
- Entyloma fergussonii*** (Berk. & Broome) Plowr., *Monogr. Brit. Ured.*: 289, 1889
 on *Myosotis arvensis* (McKenzie 1987); *M. laxa* ssp. *caespitosa* (new record).
- Entyloma fuscum*** J.Schröt. in Cohn, *Beitr. Biol. Pflanzen* 2: 373, 1877
 on *Papaver rhoeas* (new record); *P. somniferum* (Brook 1957).
- Entyloma gaillardianum*** Vánky, *Mycotaxon* 16: 104, 1982
 on *Gaillardia* sp. (new record).
- Entyloma microsporium*** (Unger) J.Schröt. in Rabenh., *Fungi Europaei Exsiccati*: No. 1872, 1874
 on *Ranunculus reflexus* (McKenzie & Dingley 1996); *R. repens* (Laundon 1970); *R. sardous* (Boesewinkel 1982).

- Entyloma novae-zelandiae*** McKenzie & Vánky in Vánky, *Mycotaxon* 56: 199, 1995
on *Hydrocotyle heteromeria* (McKenzie 1991 — as *Entyloma heteromeria* ined.; Vánky 1995); *H. novae-zelandiae* (Vánky 1995).
- Entyloma parietariae*** Rayss, *Palestine J. Bot., Jerusalem Ser.* 5: 230, 1952
on *Parietaria debilis* (Brook 1957).
“*Entyloma picridis* Rostr. in A.A.Fisch. Waldh., *Bull. Soc. Imp. Naturalistes Moscou* 52: 308, 1877
on *Picris echioides* (Dingley 1969) — doubtful record, see Introduction.”
- Entyloma saccardianum*** Scalia ex Cif., *Boll. Soc. Bot. Ital.* 1924: 50, 1924
on *Senecio minimus* (Dingley 1969 — as *Entyloma compositarum*; Vánky 1996).
- Entyloma serotinum*** J.Schröt. in Cohn, *Beitr. Biol. Pflanzen* 2: 437, 1877
on *Borago officinalis* (Dingley 1969).
- Farysia caricis-filicinae*** S.Ito, *Trans. Sapporo Nat. Hist. Soc.* 14(2): 91, 1935
“*Farysia pseudocyperi* (De Toni) Zundel, *Mycologia* 23: 297, 1931
on *Carex dissita* (Cunningham 1945a — as *Farysia pseudocyperi*; Brook 1957); *C. geminata* (Dingley 1969); *C. maorica* (Dingley 1969) — pathogen records ambiguous, see Introduction.”
- Farysia nigra*** (G.Cunn.) G.Cunn., *Trans. New Zealand Inst.* 56: 78, 1926
≡ *Elateromyces niger* G.Cunn., *Trans. New Zealand Inst.* 55: 416, 1924
on *Carex dipsacea* (Cunningham 1924 — as *Elateromyces niger*; Cunningham 1945a).
- Farysia thuemenui*** (A.A.Fisch. Waldh.) Nannf. in Lindeb., *Symb. Bot. Upsal.* 16(2): 51, 1959
= *Elateromyces olivaceus* (DC.) Bubák, *Arch. Př. Výzk. Čech* 15(3): 33, 1912
= *Farysia olivacea* (DC.) Syd. & P.Syd., *Ann. Mycol.* 17: 41, 1919
on *Carex dipsacea* (Cunningham 1924 — as *Elateromyces olivaceus*; Cunningham 1945a — as *Farysia olivacea*; Pennycook 1989); *C. dissita* (McKenzie 1987 — as *F. olivacea*; Pennycook 1989); *C. fascicularis* (Brook 1957 — as *F. olivacea*; Pennycook 1989); *C. geminata* (Cunningham 1945a — as *F. olivacea*; Pennycook 1989); *C. lessoniana* (McKenzie 1987 — as *F. olivacea*; Pennycook 1989); *C. longebrachiata* (McKenzie & Dingley 1996); *C. maorica* (Dingley 1969 — as *F. olivacea*; Pennycook 1989); *C. riparia* (Cunningham 1945a — as *F. olivacea*; Pennycook 1989).
- Farysia zeylanica*** Liro, *Mycotheca Fennica. Die Etiketten. No.* 301–600: 110, 1939
on *Carex virgata* (Cunningham 1924 — as *Elateromyces olivaceus*; Sydow 1924 — as *Farysia olivacea*; Liro 1935 — as *F. zeylanica* ined.; Cunningham 1945a, 1945c — as *F. merrillii* (Henn.) Syd. & P.Syd.).
- Farysia endotrichum*** (Berk.) Vánky, *Mycotaxon* 71: 208, 1999
≡ *Ustilago endotricha* Berk. in Hook.f., *Flora Novae-Zelandiae* (2): 196, 1855
≡ *Farysia endotricha* (Berk.) Syd. & P.Syd., *Ann. Mycol.* 17: 41, 1919
≡ *Elateromyces endotrichus* (Berk.) G.Cunn., *Trans. New Zealand Inst.* 55: 416, 1924
on *Gahnia pauciflora* (Cunningham 1926a — as *Farysia endotricha*); *G. procera* (McKenzie 1987 — as *F. endotricha*); *G. setifolia* (Cunningham 1945a — as *F. endotricha*); *G. xanthocarpa* (Cunningham 1945a — as *F. endotricha*); *Gahnia* sp. (Berkeley 1855 — as *Ustilago endotricha*; Cunningham 1924 — as *Elateromyces endotrichus*; Dingley 1969 — as *F. endotricha*).
- Heterotolyposporium piluliforme*** (Berk.) Vánky, *Mycotaxon* 63: 148, 1997
≡ *Sorosporium piluliforme* (Berk.) McAlpine, *Smuts Australia*: 180, 1910
≡ *Tolyposporium piluliforme* (Berk.) M.Piepenbr. & Begerow in M.Piepenbr., *Nova Hedwigia* 70: 329, 2000
on *Juncus* aff. *caespiticus* (Vánky 1992b — as *Sorosporium piluliforme*; McKenzie & Dingley 1996 — as *S. piluliforme*; Piepenbring 2000 — as *Tolyposporium piluliforme*); *J. planifolius* (Brook 1957 — as *S. piluliforme*).
- Jamesdicksonia dactylidis*** (Pass.) R.Bauer, Begerow, A.Nagler & Oberw., *Mycol. Res.* 105: 422, 2001
≡ *Entyloma dactylidis* (Pass.) Cif., *Boll. Soc. Bot. Ital.* 1924(2): 55, 1924
on *Agrostis capillaris* (McKenzie & Latch 1981 — as *Entyloma dactylidis*); *A. stolonifera* (McKenzie & Latch 1981 — as *E. dactylidis*); *Alopecurus geniculatus* (McKenzie 1990 — as *E. dactylidis*); *A. pratensis* (McKenzie & Latch 1981 — as *E. dactylidis*); *Anthoxanthum odoratum* (McKenzie & Latch 1981 — as *E. dactylidis*); *Arrhenatherum elatius* (McKenzie & Latch 1981 — as *E. dactylidis*); *Bromus willdenowii* (McKenzie & Latch 1981 — as *E. dactylidis*); *Dactylis glomerata* (McKenzie & Latch 1981 — as *E. dactylidis*); *Holcus lanatus* (McKenzie & Latch 1981 — as *E. dactylidis*); *Poa pratensis*

- (McKenzie & Latch 1981 — as *E. dactylidis*); *Polypogon monspeliensis* (McKenzie & Latch 1981 — as *E. dactylidis*); *Stenostachys gracilis* (McKenzie 1990 — as *E. dactylidis*); *Trisetum youngii* (McKenzie & Latch 1981 — as *E. dactylidis*).
- Jamesdicksonia irregulare** (Johanson) R. Bauer, Begerow, A. Nagler & Oberw., *Mycol. Res.* 105: 422, 2001
on *Poa annua* (McKenzie & Latch 1981 — as *Entyloma dactylidis*).
- Microbotryum dianthorum** (Liro) H. Scholz & I. Scholz, *Englera* 8: 206, 1988
on *Dianthus caryophyllus* (Robinson 1957 — as *Ustilago violacea* (Pers.) Roussel; Pennycook 1989 — as *Microbotryum violaceum* (Pers.) G. Deml & Oberw.).
- Microbotryum nivale** (Liro) Vánky, *Mycotaxon* 67: 47, 1998
on *Sagina apetala* (Brook 1957 — as *Ustilago duriaeana* Tul. & C. Tul.).
- Microbotryum tenuisporum** (Cif.) Vánky, *Mycotaxon* 67: 50, 1998
= *Ustilago tenuispora* Cif., *Ann. Mycol.* 29: 58, 1931
on *Polygonum hydropiper* (Brook 1957 — as *Ustilago anomala* J. Kunze ex G. Winter); *Polygonum* sp. (Brook 1957 — as *U. anomala*; Vánky & Oberwinkler 1994).
- Moesziomyces bullatus** (J. Schröt.) Vánky, *Bot. Not.* 130: 133, 1977
= *Tolyposporium bullatum* (J. Schröt.) J. Schröt. in Cohn, *Krypt.-Fl. Schlesien* 3(1): 267, 1887
on *Echinochloa crusgalli* (Fullerton 1977 — as *Tolyposporium bullatum*).
- Moreaua kochiana** (Gäum) Vánky, *Mycotaxon* 74: 352, 2000
on *Schoenus carsei* (Cunningham 1924 — as *Sorosporium solidum*).
- Moreaua littoralis** (G. Cunn.) Vánky, *Mycotaxon* 74: 352, 2000
= *Tolyposporium littorale* G. Cunn., *Trans. New Zealand Inst.* 56: 77, 1926
on *Baumea huttonii* (Cunningham 1926a — as *T. littorale*); *B. juncea* (Vánky 1990 — as *T. littorale*).
- Moreaua rodwayi** (McAlpine) Vánky, *Mycotaxon* 74: 353, 2000
= *Tolyposporium rodwayi* McAlpine, *Smuts Australia*: 189, 1910
on *Lepidosperma filiforme* (McKenzie & Dingley 1996 — as *T. rodwayi*); *L. laterale* (McKenzie 1990 — as *T. rodwayi*).
- Moreaua schoeni** (Vánky & McKenzie) Vánky, *Mycotaxon* 74: 353, 2000
= *Tolyposporium schoeni* Vánky & McKenzie in Vánky & Websdane, *Mycotaxon* 56: 227, 1995
on *Schoenus brevifolius* (Vánky & Websdane 1995 — as *T. schoeni*).
- Mundkurella schefflerae** Vánky, C. Vánky & McKenzie, *New Zealand J. Bot.* 37: 330, 1999
on *Schefflera digitata* (Vánky et al. 1999).
- Restiosporium dissimile** Vánky & McKenzie, ined.
on *Leptocarpus similis* (new record).
- Rhamphospora nymphaeae** D. D. Cunn., *Sci. Mem. Off. Med. Dept. Gov. India* 3: 32, 1888
on *Nymphaea alba* × *N. mexicana* (Vánky 1990).
- Schizonella isolepidis** Vánky in Vánky & McKenzie, *New Zealand J. Bot.* 28: 251, 1990
on *Isolepis nodosa* (Vánky & McKenzie 1990).
- Sphacelotheca polygoni-serrulati** Maire, *Bull. Soc. Hist. Nat. Afrique N.* 8: 74, 1917
on *Polygonum hydropiper* (Dingley 1969 — as *S. hydropiperis* (Schumach.) de Bary); *P. persicaria* (Cunningham 1945b, 1945c — as *S. hydropiperis*); *P. punctatum* (Vánky & Oberwinkler 1994 — as *S. koordersiana* (Bref.) Zundel); *P. salicifolium* (Cunningham 1924 — as *S. hydropiperis*; Vánky 1990 — as *S. koordersiana*; Vánky & Oberwinkler 1994 — as *S. koordersiana*).
- Sporisorium destruens** (Schldtl.) Vánky, *Symb. Bot. Upsal.* 24(2): 115, 1985
on *Panicum miliaceum* (Brien 1942 — as *Sphacelotheca panici-leucophaei* (Bref.) G. P. Clinton; Cunningham 1945b, 1945c — as *Sphacelotheca cordobensis* (Speg.) H. S. Jacks.).
- Sporisorium reilianum** (J. G. Kühn) Langdon & Full., *Mycotaxon* 6: 452, 1978
= *Sphacelotheca reiliana* (J. G. Kühn) G. P. Clinton, *J. Mycol.* 8: 141, 1902
= *Sorosporium reilianum* (J. G. Kühn) McAlpine, *Smuts Australia*: 181, 1910
on *Zea mays* (Brien 1939 — as *Sorosporium reilianum*; Brook 1957 — as *Sphacelotheca reiliana*).
- Tilletia anthoxanthi** A. Blytt, *Forh. Vidensk.-Selsk. Kristiania* 1896 (6): 31, 1896
on *Anthoxanthum aristatum* (Brook 1957); *A. odoratum* (Cunningham 1928).
- Tilletia bromi** (Brockm.) Brockm., *Meckl. Krypt. No.* 102, 1864
= *Tilletia fusca* Ellis & Everh., *J. Mycol.* 3: 55, 1887
on *Vulpia bromoides* (Cunningham 1945b, 1945c — as *Tilletia fusca*).

- Tilletia caries* (DC.) Tul. & C.Tul., *Ann. Sci. Nat. Bot., Sér. 3*, 7: 113, 1847
 = *Tilletia tritici* (Bjerk.) R.Wolff, *Brand Getreid.*: 13, 1874
 on *Triticum aestivum* (Kirk 1906 — as *Tilletia tritici*; Cunningham 1945c).
- Tilletia cathcartae* Durán & G.W.Fisch., *Genus Tilletia*: 44, 1961
 on *Poa pusilla* (McKenzie & Latch 1984); *P. xenica* (new record).
- Tilletia holci* (Westend.) J.Schröt. in Cohn, *Beit. Biol. Pflanzen* 2: 365, 1877
 on *Holcus lanatus* (Cunningham 1924); *H. mollis* (Brook 1957).
- Tilletia inolens* McAlpine, *Agric. Gaz. New South Wales* 7: 154, 1896
 on *Deyeuxia quadriseta* (Cunningham 1945b, 1945c).
- Tilletia laevis* J.G.Kühn, *Hedwigia* 12: 152, 1873
 = *Tilletia foetens* (Berk. & M.A.Curtis) J.Schröt. in Cohn, *Beit. Biol. Pflanzen* 2: 365, 1877
 = *Tilletia foetida* (Wallr.) Liro, *Maanviljelys-taloudellinen Koelaitos, Vuosikirja, 1915–1916*: 27, 1920
 on *Triticum aestivum* (Cunningham 1922; Cunningham 1945c — as *T. foetens*; Dingley 1969 — as *T. foetida*).
- Tilletia lolii* Auersw. ex G.Winter, *Rabenh. Krypto.-Fl. 2. Aufl., 1. Pilze, 1. Abt.*: 109, 1881
 on *Lolium perenne* (Hampton & Matthews 1976).
- Tilletia rugispora* Ellis, *J. Mycol.* 7: 275, 1893
 on *Paspalum floridanum* (new record) — found only in quarantine.
- Tilletia sphaerococca* (Wallr.) A.A.Fisch. Waldh., *Bull. Soc. Imp. Naturalistes Moscou* 40: 255, 1867
 = *Tilletia decipiens* (Pers.) Körn., *Hedwigia* 16: 30, 1877
 on *Agrostis capillaris* (Cunningham 1924 — as *Tilletia decipiens*; Pennycook 1989).
- Tilletia walkeri* Castlebury & Carris, *Mycologia* 91: 122, 1999
 on *Lolium perenne* (Castlebury & Carris 1999).
- Tolyposporium neillii* (G.Cunn.) Vánky & McKenzie, comb. nov.
 = *Sorosporium neillii* G.Cunn., *Trans. New Zealand Inst.* 55: 428, 1924
 on *Isolepis nodosa* (Cunningham 1924).
- Tranzscheliella williamsii* (Griffiths) Dingley & Versluys, *New Zealand J. Bot.* 15: 477, 1977
 on *Austrostipa stipoides* (Dingley & Versluys 1977).
- Urocystis agropyri* (Preuss) A.A.Fisch. Waldh., *Bull. Soc. Imp. Naturalistes Moscou* 40: 258, 1867
 on *Elytrigia repens* (Brook 1957).
- Urocystis agrostidis* (Lavrov) Zundel, *Ustilag. World*: 307, 1953
 on *Agrostis gigantea* (Latch 1966 — as *Urocystis agropyri*).
- Urocystis alopecuri* A.B.Frank, *Krankheiten Pflanzen*: 440, 1880
 on *Alopecurus pratensis* (Latch 1966 — as *Urocystis agropyri*).
- Urocystis bolivari* Bubák & Gonz.Frag. in Bubák, *Bol. Soc. Esp. Hist. Nat.* 22: 205, 1922
 on *Lolium perenne* (Latch 1966 — as *Urocystis agropyri*).
- Urocystis junci* Lagerh., *Bot. Not.* 1888: 201, 1888
 on *Juncus australis* (Dingley & Versluys 1977).
- Urocystis magica* Pass. in Thüm., *Mycoth. Univ.*: No. 223, 1875
 = *Urocystis cepulae* Frost in Farl., *Rep. Secr. Mass. Board Agric.* 24: 175, 1877
 on *Allium cepa* (Gibbs 1938 — as *Urocystis cepulae*).
- Urocystis novae-zelandiae* (G.Cunn.) G.Cunn., *Trans. Roy. Soc. New Zealand* 75: 344, 1945
 = *Tubercinia novae-zelandiae* G.Cunn., *Trans. New Zealand Inst.* 59: 504, 1928
 on *Anemone tenuicaulis* (Cunningham 1928 — as *Tubercinia novae-zelandiae*; Cunningham 1945c).
- Urocystis ranunculi* (Lib.) Moesz, *A Kárpát-Medence Üszöggombái*: 213, 1950
 on *Ranunculus insignis* (Cunningham 1924 — as *Urocystis anemones* (Pers.) G.Winter; Cunningham 1926a — as *Tubercinia anemones* (Pers.) Liro).
- Urocystis roivainenii* (Liro) Zundel, *Ustilag. World*: 332, 1953
 on *Anthoxanthum odoratum* (McKenzie & Latch 1984 — as *Urocystis agropyri*).
- Urocystis tothii* Vánky, *Bot. Not.* 129: 416, 1976
 on *Juncus articulatus* (new record).

Urocystis ulei Magnus, *Hedwigia* 17: 89, 1878

on \times *Schedololium holmbergii* (Latch 1966 — as *U. agropyri* on \times *Festulolium* sp.); *Schedonorus phoenix* (Cunningham 1945b, 1945c — as *Urocystis agropyri* on *Festuca arundinacea*); *S. pratensis* (Brook 1957 — as *U. agropyri* on *F. pratensis*).

Ustilago agropyri McAlpine, *Agric. Gaz. New South Wales* 7: 154, 1896

= *Ustilago readeri* Syd. ex McAlpine, *Smuts Australia*: 159, 1910

on [*Anthoxanthum odoratum* (Cunningham 1924 — as *Ustilago readeri*; Cunningham 1945c; McKenzie 1990 — host misidentified = *Rytidosperma* sp.)]; *Rytidosperma biannulare* (McKenzie & Latch 1984); *R. caespitosum* (Laundon 1973); *R. clavatum* (Laundon 1973); *R. penicillatum* (Cunningham 1924 — as *U. readeri*; Cunningham 1945c); *R. racemosum* (McKenzie & Latch 1984); *Rytidosperma* sp. (Cunningham 1924 — as *U. readeri* on *Anthoxanthum odoratum*; Cunningham 1945c — on *A. odoratum*; McKenzie 1990 — on *Rytidosperma* sp.).

Ustilago avenae (Pers.: Pers.) Rostr., *Overs. Kongel. Danske Vidensk. Selsk. Forh. Medlemmers Arbeider* 1890: 13, 1890

= *Ustilago perennans* Rostr., *Overs. Kongel. Danske Vidensk. Selsk. Forh. Medlemmers Arbeider* 1890: 15, 1890

on *Arrhenatherum elatius* (Cunningham 1924; Sydow 1924 — as *Ustilago perennans*); *Avena fatua* (Cunningham 1928); *A. sativa* (Kirk 1906).

Ustilago bromivora (Tul. & C.Tul.) A.A.Fisch. Waldh., *Bull. Soc. Imp. Naturalistes Moscou* 40: 252, 1867

on *Bromus firmior* (Latch 1965 — as *U. bullata*); *B. hordeaceus* (Cunningham 1924 — as *U. bullata* on *B. mollis*); *B. marginatus* (Rumball et al. 1987 — as *U. bullata*); *B. secalinus* (Latch 1965 — as *U. bullata*); *B. tectorum* (Latch 1965 — as *U. bullata*); *B. valdivianus* (Latch 1965 — as *U. bullata* on *B. coloratus*); *B. willdenowii* (Hill 1915; Cunningham 1945c — as *U. bullata*).

Ustilago bullata Berk. in Hook.f., *Fl. Nov.-Zel.* 2: 196, 1855

= *Ustilago asprellae* G.Cunn., *Trans. New Zealand Inst.* 61: 417, 1930

on *Elymus rectisetus* (Berkeley 1855); *Stenostachys gracilis* (Cunningham 1930).

Ustilago comburens F.Ludw., *Z. Pflanzenkrankh.* 3: 139, 1893

on *Rytidosperma buchananii* (Cunningham 1924); *R. penicillatum* (Cunningham 1945b, 1945c); *R. pumilum* (McKenzie & Latch 1984); *Rytidosperma* sp. (Dingley 1969).

Ustilago cynodontis (Henn.) Henn., *Bull. Herb. Boissier* 1: 114, 1893

on *Cynodon dactylon* (Brook 1957).

Ustilago filiformis (Schrank) Rostr., *Festschr. Bot. Foren. Kjøbenhavn* 1890: 136, 1890

= *Ustilago longissima* (Sowerby) Meyen, *Pflanzen-Pathologie*: 124, 1841

on *Glyceria declinata* (Vánky 1990); *G. fluitans* (Brook 1957 — as *Ustilago longissima*).

Ustilago hordei (Pers.: Pers.) Lagerh., *Mitt. Bad. Bot. Vereins* 59: 70, 1889 (non Brefeld 1888)

= *Ustilago jensenii* Rostr., *Overs. Kongel. Danske Vidensk. Selsk. Forh. Medlemmers Arbeider* 1890: 12, 1890

= *Ustilago levis* (Kellerm. & Swingle) Magnus, *Ber. Naturwiss.-Med. Vereins Innsbruck* 21: 33, 1894

= *Ustilago kolleri* Wille, *Bot. Not.* 1893: 10, 1893

on *Avena sativa* (Cunningham 1924 — as *Ustilago levis*; Cunningham 1945c — as *U. kolleri*; Dingley 1969); *Hordeum vulgare* (Kirk 1904; Kirk 1906 — as *U. jensenii*).

Ustilago hypodytes (Schldl.) Fr., *Syst. Mycol.* 3: 518, 1832

= *Ustilago spegazzinii* Hirschh., *Notas Mus. La Plata, Bot.* 4: 415, 1939

on *Austrostipa nodosa* (Laundon 1973 — as *U. spegazzinii*); *Elymus rectisetus* (Brook 1957; Pennycook 1989 — as *Ustilago spegazzinii*); *Elytrigia repens* (Cunningham 1926b; Pennycook 1989 — as *U. spegazzinii*); *Poa cita* (Brook 1957; Pennycook 1989 — as *U. spegazzinii*).

Ustilago nuda (J.L.Jensen) Kellerm. & Swingle, *Kansas Agric. Exp. Sta. Annual Rep.* 2: 277, 1890

on *Hordeum vulgare* (Kirk 1905; Cunningham 1924 — as *Ustilago tritici*).

Ustilago serpens (P.Karst.) B.Lindeb., *Symb. Bot. Upsal.* 16(2): 133, 1959

= *Ustilago macrospora* Desm., *Pl. Crypt. France, Ed. 2, Ser. 1*: 1727, 1850

on *Elytrigia repens* (McKenzie & Latch 1984 — as *Ustilago macrospora*).

Ustilago spinificis F.Ludw., *Z. Pflanzenkrankh.* 3: 138, 1893

≡ *Cintractia spinificis* (F.Ludw.) McAlpine, *Smuts Australia*: 174, 1910

- on *Spinifex sericeus* (Cunningham 1924 — as *Cintractia spinificis*; Vánky 1986).
- Ustilago striiformis*** (Westend.) Niessl, *Hedwigia* 15: 1, 1876
 on *Agrostis capillaris* (Dingley 1969); *A. stolonifera* (Latch 1966); *Aira praecox* (McKenzie & Johnston 1999); *Alopecurus pratensis* (Latch 1966); *Arrhenatherum elatius* (McKenzie & Latch 1984); *Austrofestuca littoralis* (Latch 1966); *Dactylis glomerata* (Cunningham 1924); *Elytrigia repens* (Latch 1966); *Holcus lanatus* (Cunningham 1924); *H. mollis* (new record); *Lolium multiflorum* (Latch 1966); *L. multiflorum* × *perenne* (Latch 1966); *Lolium* (*multiflorum* × *perenne*) × *perenne* (Latch 1966); *L. perenne* (Latch 1966); *Phleum pratense* (McKenzie & Latch 1984); *Poa annua* (Dingley 1969); *P. cita* (Brook 1957); *P. pratensis* (Latch 1966); *P. trivialis* (Latch 1966).
- Ustilago trichophora*** (Link) Körn., *Hedwigia* 16: 36, 1877
 on *Echinochloa crusgalli* (Fullerton 1977).
- Ustilago tritici*** (Pers.: Pers.) Rostr., *Overs. Kongel. Danske Vidensk. Selsk. Forh. Medlemmers Arbeider* 1890: 15, 1890
 on *Triticum aestivum* (Kirk 1906; Dingley 1969 — as *Ustilago nuda*).
- “*Ustilago urceolorum* Tul. & C.Tul., *Ann. Sci. Nat., Bot., Sér. 3*, 7: 86, 1847
 on *Carex ternaria* (Cooke 1879) — doubtful record, see Introduction.”
- Ustilago vaillantii*** Tul. & C.Tul., *Ann. Sci. Nat., Bot., Sér. 3*, 7: 90, 1847
 on *Chionodoxa sardensis* (Harvey & Braithwaite 1982); *Muscari botryoides* (new record).

HOST LIST FOR NEW ZEALAND SMUT FUNGI

- Ageratina*** [Asteraceae] *A. riparia* (Regel) R.M.King & H.Rob. — *Entyloma ageratinae*.
- Agrostis*** [Poaceae] *A. capillaris* L. — *Jamesdicksonia dactylidis*, *Tilletia sphaerococca*, *Ustilago striiformis*; *A. gigantea* Roth — *Urocystis agrostidis*; *A. stolonifera* L. — *Jamesdicksonia dactylidis*, *Ustilago striiformis*.
- Aira*** [Poaceae] *A. praecox* L. — *Ustilago striiformis*.
- Allium*** [Alliaceae] *A. cepa* L. — *Urocystis magica*.
- Alopecurus*** [Poaceae] *A. geniculatus* L. — *Jamesdicksonia dactylidis*; *A. pratensis* L. — *Jamesdicksonia dactylidis*, *Urocystis alopecuri*, *Ustilago striiformis*.
- Anemone*** [Ranunculaceae] *A. tenuicaulis* (Cheeseman) Parkin & Sledge — *Urocystis novae-zelandiae*.
- Anthoxanthum*** [Poaceae] *A. aristatum* Boiss. — *Tilletia anthoxanthi*; *A. odoratum* L. — *Jamesdicksonia dactylidis*, *Tilletia anthoxanthi*, *Urocystis roivainenii*.
- Arrhenatherum*** [Poaceae] *A. elatius* (L.) J.Presl & C.Presl — *Jamesdicksonia dactylidis*, *Ustilago avenae*, *Ustilago striiformis*.
- Austrofestuca*** [Poaceae] *A. littoralis* (Labill.) E.B.Alexeev — *Ustilago striiformis*.
- Austrostipa*** [Poaceae] *A. nodosa* (S.T.Blake) S.W.L.Jacobs & J.Everett — *Ustilago hypodytes*; *A. stipoides* (Hook.f.) S.W.L.Jacobs & J.Everett — *Tranzscheliella williamsii*.
- Avena*** [Poaceae] *A. fatua* L. — *Ustilago avenae*; *A. sativa* L. — *Ustilago avenae*, *Ustilago hordei*.
- Baumea*** [Cyperaceae] *B. huttonii* (Kirk) S.T.Blake — *Moreaua littoralis*; *B. juncea* (R.Br.) Palla — *Moreaua littoralis*.
- Borago*** [Boraginaceae] *B. officinalis* L. — *Entyloma serotinum*.
- Briza*** [Poaceae] *B. minor* L. — *Entyloma brizae*.
- Bromus*** [Poaceae] *B. firmior* (Nees) Stapf — *Ustilago bromivora*; *B. hordeaceus* L. — *Ustilago bromivora*; *B. marginatus* Nees ex Steud. — *Ustilago bromivora*; *B. secalinus* L. — *Ustilago bromivora*; *B. tectorum* L. — *Ustilago bromivora*; *B. valdivianus* Phil. — *Ustilago bromivora*; *B. willdenowii* Kunth — *Jamesdicksonia dactylidis*, *Ustilago bromivora*.
- Calendula*** [Asteraceae] *C. officinalis* L. — *Entyloma calendulae*.
- Carex*** [Cyperaceae] *C. coriacea* Hamlin — *Anthracoidea heterospora*; *C. dipsacea* Berggr. — *Farysia nigra*, *Farysia thuemenii*; *C. dissita* Sol. ex Boott — *Farysia caricis-filicinae*, *Farysia thuemenii*; *C. echinata* Murray — *Entorrhiza caricicola*; *C. fascicularis* Sol. ex Boott — *Farysia thuemenii*; *C.*

- gaudichaudiana* Kunth — *Anthracoidea heterospora*, *Entorrhiza caricicola*; *C. geminata* Schkuhr — *Anthracoidea heterospora*, *Farysia caricis-filicinae*, *Farysia thuemenii*; *C. lessoniana* Steud. — *Anthracoidea heterospora*, *Farysia thuemenii*; *C. longibrachiata* Boeck. — *Farysia thuemenii*; *C. maurica* Hamlin — *Farysia caricis-filicinae*, *Farysia thuemenii*; *C. resectans* Cheeseman — *Entorrhiza caricicola*; *C. riparia* Curtis — *Farysia thuemenii* *C. sinclairii* Boott — *Anthracoidea heterospora*, *Entorrhiza caricicola*; *C. subdola* Boott — *Anthracoidea heterospora*; *C. virgata* Sol. ex Boott — *Farysia zeylanica*; *C. wakatipu* Petrie — *Anthracoidea wakatipu*.
- Carpha* [Cyperaceae] *C. alpina* R.Br. — *Anthracoidea carphae*.
- Chionodoxa* [Liliaceae] *C. sardensis* Hort. Barr & Sugden — *Ustilago vaillantii*.
- Cynodon* [Poaceae] *C. dactylon* (L.) Pers. — *Ustilago cynodontis*.
- Cyperus* [Cyperaceae] *C. ustulatus* A.Rich. f. *grandispiculosus* Kük. ex Carse — *Bauerago gardneri*.
- Dactylis* [Poaceae] *D. glomerata* L. — *Jamesdicksonia dactylidis*, *Ustilago striiformis*.
- Dahlia* [Asteraceae] *Dahlia coccinea* × *D. pinnata* — *Entyloma dahliae*.
- Deyeuxia* [Poaceae] *D. quadriseta* (Labill.) Benth. — *Tilletia inolens*.
- Dianthus* [Caryophyllaceae] *D. caryophyllus* L. — *Microbotryum dianthorum*.
- Echinacea* [Asteraceae] *E. angustifolia* D.C. — *Entyloma echinaceae*.
- Echinochloa* [Poaceae] *E. crusgalli* (L.) P.Beauv. — *Moesziomyces bullatus*, *Ustilago trichophora*.
- Eleocharis* [Cyperaceae] *E. gracilis* R.Br. — *Entorrhiza caricicola*.
- Elymus* [Poaceae] *E. rectisetus* (Nees) Á.Löve & Connor — *Ustilago bullata*, *Ustilago hypodytes*.
- Elytrigia* [Poaceae] *E. repens* (L.) Nevski — *Urocystis agropyri*, *Ustilago hypodytes*, *Ustilago serpens*, *Ustilago striiformis*.
- Eschscholzia* [Papaveraceae] *E. californica* Cham. — *Entyloma eschscholziae*.
- Gahnia* [Cyperaceae] *G. pauciflora* Kirk — *Farysporium endotrichum*; *G. procera* J.R.Forst. & G.Forst. — *Farysporium endotrichum*; *G. setifolia* (A.Rich.) Hook.f. — *Farysporium endotrichum*; *G. xanthocarpa* (Hook.f.) Hook.f. — *Farysporium endotrichum*; *Gahnia* sp. — *Farysporium endotrichum*.
- Gaillardia* [Asteraceae] *Gaillardia* sp. — *Entyloma gaillardianum*.
- Glyceria* [Poaceae] *G. declinata* Bréb. — *Ustilago filiformis*; *G. fuitans* (L.) R.Br. — *Ustilago filiformis*.
- Holcus* [Poaceae] *H. lanatus* L. — *Jamesdicksonia dactylidis*, *Tilletia holci*, *Ustilago striiformis*; *H. mollis* L. — *Tilletia holci*, *Ustilago striiformis*.
- Hordeum* [Poaceae] *H. vulgare* L. — *Ustilago hordei*, *Ustilago nuda*.
- Hydrocotyle* [Hydrocotylaceae] *H. heteromeria* A.Rich. — *Entyloma novae-zelandiae*; *H. novae-zelandiae* DC. — *Entyloma novae-zelandiae*.
- Isolepis* [Cyperaceae] *I. basilaris* Hook.f. — *Entorrhiza fineranii*, *Entorrhiza scirpicola*; *I. cernua* (Vahl) Roem. & Schult. — *Entorrhiza fineranii*, *Entorrhiza scirpicola*; *I. inundata* R.Br. — *Entorrhiza fineranii*; *I. nodosa* (Rottb.) R.Br. — *Schizonella isolepidis*, *Tolyposporium neillii*; *I. reticularis* Colenso — *Entorrhiza fineranii*; *I. setacea* (L.) R.Br. — *Entorrhiza scirpicola*.
- Juncus* [Juncaceae] *J. articulatus* L. — *Entorrhiza casparyana*, *Urocystis tothii*; *J. australis* Hook.f. — *Urocystis junci*; *J. bufonius* L. — *Entorrhiza aschersoniana*, *Entorrhiza casparyana*; *J. aff. caespiticius* E.Mey. — *Heterotolyposporium piluliforme*; *J. effusus* L. — *Entorrhiza casparyana*; *J. gregiflorus* L.A.S.Johnson — *Bauerago abstrusa*, *Entorrhiza casparyana*, *E. casparyanella*; *J. planifolius* R.Br. — *Heterotolyposporium piluliforme*; *J. pusillus* Buchenau — *Entorrhiza caricicola*; *Juncus* spp. — *Bauerago abstrusa*, *Entorrhiza caricicola*, *Entorrhiza casparyana*.
- Lepidosperma* [Cyperaceae] *L. filiforme* Labill. — *Moreaua rodwayi*; *L. laterale* R.Br. — *Moreaua rodwayi*.
- Leptocarpus* [Restionaceae] *L. similis* Edgar — *Restiosporium dissimile*.
- Lolium* [Poaceae] *L. multiflorum* Lam. — *Ustilago striiformis*; *L. multiflorum* Lam. × *perenne* L. — *Ustilago striiformis*; *L. (multiflorum × perenne) × perenne* — *Ustilago striiformis*; *L. perenne* L. — *Tilletia lolii*, *Tilletia walkeri*, *Urocystis bolivari*, *Ustilago striiformis*.
- Muscari* [Hyacinthaceae] *M. botryoides* (L.) Mill. — *Ustilago vaillantii*.
- Myosotis* [Boraginaceae] *M. arvensis* (L.) Hill — *Entyloma fergussonii*; *M. laxa* Lehm. ssp. *caespitosa* (Schultz) Hyl. ex Nordh. — *Entyloma fergussonii*.

- Nymphaea* [Nymphaeaceae] *N. alba* × *N. mexicana* Zucc. — *Rhamphospora nymphaeae*.
Oreobolus [Cyperaceae] *O. pectinatus* Hook.f. — *Cintractia oreoboli*; *O. strictus* Berggr. — *Cintractia oreoboli*.
Panicum [Poaceae] *P. miliaceum* L. — *Sporisorium destruens*.
Papaver [Papaveraceae] *P. rhoeas* L. — *Entyloma fuscum*; *P. somniferum* L. — *Entyloma fuscum*.
Parietaria [Urticaceae] *P. debilis* G.Forst. — *Entyloma parietariae*.
“*Paspalum* [Poaceae] *P. floridanum* Michx. — *Tilletia rugispora* — quarantine record, see Introduction.”
Phleum [Poaceae] *P. pratense* L. — *Ustilago striiformis*.
Physalis [Solanaceae] *P. ixocarpa* Hornem. — *Entyloma australe*; *P. peruviana* L. — *Entyloma australe*.
Poa [Poaceae] *P. annua* L. — *Jamesdicksonia irregulare*, *Ustilago striiformis*; *P. cita* Edgar — *Ustilago hypodytes*, *Ustilago striiformis*; *P. pratensis* L. — *Jamesdicksonia dactylidis*, *Ustilago striiformis*; *P. pusilla* Berggr. — *Tilletia cathartae*; *P. trivialis* L. — *Ustilago striiformis*; *P. xenica* Edgar & Connor — *Tilletia cathartae*.
Polygonum [Polygonaceae] *P. hydropiper* L. — *Microbotryum tenuisporum*, *Sphacelotheca polygoneserrulati*; *P. persicaria* L. — *Sphacelotheca polygoneserrulati*; *P. punctatum* Elliott — *Sphacelotheca polygoneserrulati*; *P. salicifolium* Willd. — *Sphacelotheca polygoneserrulati*.
Polypogon [Poaceae] *P. monspeliensis* (L.) Desf. — *Jamesdicksonia dactylidis*.
Potamogeton [Potamogetonaceae] *P. cheesemanii* A.Benn. — *Doassansiopsis hydrophila*.
Ranunculus [Ranunculaceae] *R. insignis* Hook.f. — *Urocystis ranunculi*; *R. reflexus* Garn.-Jones — *Entyloma microsporum*; *R. repens* L. — *Entyloma microsporum*; *R. sardous* Crantz — *Entyloma microsporum*.
Rytidosperma [Poaceae] *R. biannulare* (Zotov) Connor & Edgar — *Ustilago agropyri*; *R. buechananii* (Hook.f.) Connor & Edgar — *Ustilago comburens*; *R. caespitosum* (Gaudich.) Connor & Edgar — *Ustilago agropyri*; *R. clavatum* (Zotov) Connor & Edgar — *Ustilago agropyri*; *R. penicillatum* (Labill.) Connor & Edgar — *Ustilago agropyri*, *Ustilago comburens*; *R. pumilum* (Kirk) Connor & Edgar — *Ustilago comburens*; *R. racemosum* (R.Br.) Connor & Edgar — *Ustilago agropyri*; *Rytidosperma* sp. — *Ustilago agropyri*, *Ustilago comburens*.
Sagina [Caryophyllaceae] *S. apetala* Ard. — *Microbotryum nivale*.
× *Schedololium* [Poaceae] × *S. holmbergii* (Dörf.) Holub — *Urocystis ulei*.
Schedonorus [Poaceae] *S. phoenix* (Scop.) Holub — *Urocystis ulei*; *S. pratensis* (Huds.) P.Beauv. — *Urocystis ulei*.
Schefflera [Araliaceae] *S. digitata* J.R.Forst. & G.Forst. — *Mundkurella schefflerae*.
Schoenus [Cyperaceae] *S. apogon* Roem. & Schult. var. *apogon* — *Cintractia solida*; *S. brevifolius* R.Br. — *Moreaua schoeni*; *S. carsei* Cheeseman — *Moreaua kochiana*; *S. maschalinus* Roem. & Schult. — *Anthracoidea schoenus*, *Cintractia solida*; *S. nitens* (R.Br.) Hook.f. var. *concinus* (Hook.f.) Cheeseman — *Cintractia solida*; *S. pauciflorus* (Hook.f.) Hook.f. — *Anthracoidea schoenus*, *Cintractia solida*.
Senecio [Asteraceae] *S. minimus* Poir. — *Entyloma saccardianum*.
Spinifex [Poaceae] *S. sericeus* R.Br. — *Ustilago spinificis*.
Stenostachys [Poaceae] *S. gracilis* (Hook.f.) Connor — *Jamesdicksonia dactylidis*, *Ustilago bullata*.
Trisetum [Poaceae] *T. youngii* Hook.f. — *Jamesdicksonia dactylidis*.
Triticum [Poaceae] *T. aestivum* L. — *Tilletia caries*, *Tilletia laevis*, *Ustilago tritici*.
Uncinia [Cyperaceae] *U. banksii* Boott — *Anthracoidea sclerotiformis*; *U. divaricata* Boott — *Anthracoidea sclerotiformis*; *U. egmontiana* Hamlin — *Anthracoidea sclerotiformis*; *U. involuta* Hamlin — *Anthracoidea sclerotiformis*; *U. laxiflora* Petrie — *Anthracoidea sclerotiformis*; *U. leptostachya* E.F.A.Raoul — *Anthracoidea sclerotiformis*; *U. nervosa* Boott — *Anthracoidea sclerotiformis*; *U. rubra* Boott — *Anthracoidea sclerotiformis*; *U. scabra* Boott — *Anthracoidea sclerotiformis*; *U. silvestris* Hamlin — *Anthracoidea sclerotiformis*; *U. uncinata* (L.f.) Kük. — *Anthracoidea sclerotiformis*.
Vulpia [Poaceae] *V. bromoides* (L.) Gray — *Tilletia bromi*.
Zea [Poaceae] *Z. mays* L. — *Sporisorium reilianum*.

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