

Additions to the rust flora (Uredinales) of the Azores

by

HALVOR B. GJAERUM¹ and R. W. G. DENNIS²

ABSTRACT

One rust species, *Milesina kriegeriana*, is reported as new to the flora of Macaronesia, while 15 species are new to the Azores. Thirteen phanerogam species are new hosts for rusts in Macaronesia, while six are new hosts for rusts in the Azores.

Finally the distribution of the Azorian rusts in Macaronesia is discussed.

RESUMEN

Adiciones a la flora de Uredinales del Archipiélago de Azores

Milesina kriegeriana se cita por primera vez para la flora macaronésica; 15 royas son nuevas para Azores. 13 plantas superiores se dan como nuevos huéspedes de royas en la región Macaronésica, mientras que para Azores se dan seis nuevos huéspedes de micromicetes.

Por último, se discute la distribución de las royas azóricas en el área macaronésica.

The first report of rust fungi from the Azores was given by TRELEASE (1897). He listed 14 rust species on 17 different hosts, mainly from Terceira and Sao Miguel, but also from five of the other Azorian islands. In her two publications MATHILDE BENSUADE (1926, 1926 - 27) added eight new species from Sao Miguel to the list. TUTIN and WARBURG (1932) listed five species from Pico, two of which were new to the archipelago. ARWIDSSON (1940), who visited Sao Miguel and Pico, recorded six species new to the rust flora of the Azores.

The material treated here was collected by R. W. G. DENNIS in the

spring 1975, and is kept in the herbarium of the Royal Botanic Gardens, Kew.

If nothing else is stated, references to the distribution in Madeira and the Canary Islands of the rusts recorded below are taken from VIENNOT - BOURGIN (1939) and JÖRSTAD (1958).

Coleosporium tussilaginis (Pers.) Berk. Outl. Brit. Fungology p. 333 1860.

Syn. *C. senecionis* Fr. ex Kichx. Fl. Flandres 2 : 53, 1876.

On *Senecio mikanioides* Otto ex Walp.

Sao Miguel: Ponta Delgada; II.

Terceira: Angra do Heroismo, Monte Brasil, near Sto. Antonio's Chapel; II.

Faial: Horta; II.

On *Senecio vulgaris* L.

Terceira: Vila Nova; II + III.

This widespread aggregate rust species has previously been reported from Terceira on *S. mikanioides* (TRELEASE, 1897), while *S. vulgaris* is a new host for the rust in the Azores. In Macaronesia the rust is known on both hosts in the Canary Islands, but only on the latter in Madeira.

Frommea obtusa (Str.) Arth. Bull. Torrey bot. Club 44: 503. 1917.

On *Duchesnea indica* (Andr.) Focke.

Sao Miguel: near Ponta Delgada; II.

Terceira: Mata de Junta Geral; II.

Faial: Horta; II.

On *Potentilla erecta* (L.) Rausch.

Terceira: Foot of Pico Alto; II.

ARWIDSSON (1940) reported *Phragmidium potentillae* (Pers.) Karst. on *Potentilla procumbens* Sibth. from Pico, but JÖRSTAD (1958) indicated a wrong determination. By courtesy of the curator I got the opportunity to examine the specimen (Herb. S) which proved to be *F. obtusa*, as indicated by JÖRSTAD.

Both plants mentioned above are new hosts to this rust in the Azores, and the *P. erecta* in Macaronesia as well, while it was reported on *D. indica* by GJAERUM (1970) from Madeira.

Melampsora euphorbiae (Schub.) Cast. Obs. Pl. Acotyl. 2:18, 1843.

Syn. *M. helioscopiae* Wint. Rabh. Krypt. Fl. Ed. 2,1(1) : 240, 1882.

M. ricini Pass. ex Noronha, Agron. Lusit. 14 : 242, 1952.

On *Euphorbia peplus* L.

Sao Miguel: Ponta Delgada; II.

Faial: Horta; II + III.

This aggregate species was first reported by TRELEASE (1897) on the same host from Sao Miguel (as *M. helioscopiae*). Later MATHILDE BENSUADE (1926-27) reported it (as *Melampsorella ricini* (Biv.-Bern.) de Toni) on *Ricinus communis* L. from Sao Miguel. TUTIN & WARBURG (1932) reported it on *E. azorica* Hochst. from Pico.

The rust is new to Faial.

Melampsora populnea (Pers.) Karst. Bidr. Känned. Finl. Nat. Folk 39: 53, 1879.

Syn. *M. aecidioides* Schroet. in Cohn, Krypt. Fl. Schles. III, 1 : 362, 1887.

On *Populus alba* L.

Terceira: Angra do Heroismo, path beyond Ermita Santo Antonio, Monte Brasil; II.

Trelease (op. cit.) published this rust (as *M. aecidioides*) on the same host from Terceira. It is also known from the Canaries. The rust consists of several morphologically similar races, often recognized as species. In the Canary Islands JÖRSTAD (1958) supposed that the rust occurring there on *P. alba* belonged to the «race» *M. pulcherrima* Maire.

Milesina blechni (Syd.) Syd. Ann. Mycol. 8 : 491. 1910.

On *Blechnum spicant* (L.) Roth.

Terceira: Terreira da Macela, S of Biscoitos; II.

This rust which is new to the rust flora of Azores, was previously reported from Madeira. It is widespread in Europe.

Milesina kriegeriana (P. Magn.) P. Magn. Ber. Deutsch. Bot. Ges. 27: 325, 1909.

On *Dryopteris dilatata* (Hoffm.) A. Gray ssp. *azorica* (Christ) P. Silva & Q. P. Silva (syn. *D. azorica* (Christ) Alston).

Terceira: Mata de Junta General; II.

Fern rusts seem to be rare in Macaronesia. Previously only *Hyalopsora adianti - capilli - veneris* Syd. was reported from the Azores (ARWIDSSON 1940) while *Milesina blechni* (Syd.) Syd. was known from Madeira only. Recently BELTRÁN TEJERA (1976) has reported *H. adianti - capilli - veneris* from Canary Islands.

M. kriegiana which is a new member of the Macaronesian rust flora, is widespread in Europe and Asia, while the present host is endemic in the Azores.

Miyagia pseudosphaeria (Mont.) Jöst. Nytt Mag. Bot. 8 : 78, 1962.
Syn. *Puccinia pseudosphaeria* Mont. in Berker-Webb & Bent. Hist. Nat. Iles Canar. III, 2 : 89, 1840.

On *Sonchus tenerrimus* L.

Sao Miguel: Ponta Delgada; II.

Terceira: Vila Nova; II; Praia da Vitoria; II.

Faial: Horta; II.

This species which is new to the Azorian rust flora, occurs on a large number of *Sonchus* spp. in the Canaries (JÖRSTAD 1958, 1962, 1966; GJÆRUM 1974), and has also been reported from Madeira (e. g. by MAGNUS 1901). MONTAGNE (1840) based his description on material collected at Tenerife.

S. tenerrimus is a new host for this rust species in Macaronesia, but it has been reported infected in the Mediterranean region.

Phragmidium tuberculatum J. Müll. Ber. Deutsch. Bot. Ges. 3 : 391, 1885.

On *Rosa* sp. (cult.)

Terceira: Angra do Heroísmo, Public garden; II.

Ph. tuberculatum is a new rust species to the Azorian flora, but it has been reported from several localities in the Canary Islands.

On cultivated roses BENSUAUDE (1926 - 27) reported *Ph. mucronatum* (Pers.) Schlecht. (syn. *Ph. disciflorum* James) from Sao Miguel.

Phragmidium violaceum (C. F. Schultz) Wint. Hedwigia 19 : 54, 1880.

On *Rubus ulmifolius* Schott.

Sao Miguel: behind Ponta Delgada; II.

TRELEASE (1897) reported this rust on *R. rusticanus* Merc. (= *R. ulmifolius*) from Corvo, Flores, and Terceira. Later TUTIN & WARBURG (1932) reported it from Pico without stating any host. It is new to Sao Miguel.

This widespread rust has also been reported from Madeira (TORREND 1909, VIENNOT - BOURGIN 1939) and from several of the Canarian Islands.

Puccinia antirrhini Diet. & Holw. apud Diet. in Hedwigia 36 : 298, 1897.

On *Antirrhinum majus* L. (cult.).

Terceira: Angra do Heroísmo, Public garden; II.

The snapdragon rust, which is widespread especially on *A. majus*, is new to the rust flora of the Azores. It has been reported from the Canary Islands and Madeira. VIENNOT - BOURGIN (1939) reported the occurrence of teliospores which seem to be rare.

Puccinia brachypodii Otth var. *brachypodii*. Mitth. Naturf. Ges. Bern p. 82, 1861.

On *Brachypodium silvaticum* (Huds.) PB.

Sao Miguel: behind Ponta Delgada; II.

The species is a new member of the Azorian rust flora. It has been reported from several localities in the Canaries, also there on *Trachynia distachya* (L.) Link (syn. *Brachypodium distachyum* (L.) P B.).

Puccinia brachypodii Otth var. *arrhenatheri* (Kleb.) Cumm. & H. C. Greene. Mycologia 58 : 709, 1966.

On *Hordeum*? *bulbosum* L.

Sao Miguel: Ponta Delgada, II.

This taxon is a new member of the Azorian rust flora and of the flora of Macaronesia as well. Elsewhere its main distribution is in temperate and cooler areas (CUMMINS 1971).

Puccinia brachypodii Otth var. *poae-nemoralis* (Otth) Cumm. & Greene Mycologia 58 : 705, 1966.

Syn. *P. poae-nemoralis* Otth. Mitt. Naturf. Ges. Bern 1870 : 113, 1871.

P. poae-sudeticae (Westend.) Jörst. Nytt Mag. Naturv. 70 : 325, 1932.

On *Poa annua* L.

Terceira: Angra do Heroísmo; II.

On *Poa* sp.

Terceira: Angra do Heroísmo, Monte Brasil; II.

This cosmopolitan rust variety has not previously been reported from the Azores. The only record of this rust in Macaronesia is that of JÖRSTAD (1958) who reported it from several localities in the Canaries on *Poa* spp. and *Vulpia* spp.

Puccinia buxi DC. Fl. Fr. 6: 60, 1815.

On *Buxus sempervirens* L.

Terceira: Angra do Heroismo, Biscoitos road, a Household hedge; III. TRELEASE (1897) and later BENSUADE (1926, 1926-27) have reported this rust species from Sao Miguel. It is also known in Madeira (TORREND 1909, VIENNOT - BOURGIN 1939), but not in the Canary Islands.

Puccinia cancellata Sacc. & Roum. Rev. Mycol. 9: 26, 1881.

On *Juncus acutus* L.

Terceira: Angra do Heroismo, seaward end of the Sto. Antonio's Chapel path, E side of Monte Brasil; II.

This rust is new to the Azores. URRIES (1957) reported it (as *P. rimosa* (Link) Wint.) from Gran Canaria in the Canaries. The confusion caused by use of the name *P. rimosa* auct. = *P. cyrnaea* Maire has been discussed by JÖRSTAD (1962 a).

Puccinia caricina DC. Fl. Fr. 5: 60, 1815.

On *Carex punctata* Gaud.

Faial: near km 10 on the Caldera road; II.

On *Carex* sp.

Faial: near km 10 on the Caldera road; II.

This rust, which is new to the Azores, has previously been reported from Tenerife in the Canary Islands. *C. punctata* seems to be a new host for this rust.

Puccinia coronata Cda. Icon. Fung. 1: 6, 1873.

On *Avena sativa* L.

Terceira: Angra do Heroismo, Biscoitos road; II (+ III).

Faial: Above Flamengos; II + III.

On *Festuca* sp.

Terceira: Angra do Heroismo; II.

On *Holcus lanatus* L.

Sao Miguel: behind Ponta Delgada; II.

Terceira: W of Vila Nova; II.

On *Lolium multiflorum* Lam.

Sao Miguel: Ponta Delgada; II.

On *Vulpia* sp.

Terceira: Monte Brasil; II.

The crown rust, world wide and known especially on oats, but also on many grasses, has previously been reported by TUTIN & WARBURG (1932) in its aecial stage on *Frangula azorica* Tutin (syn. *R. latifolius* L'Her.) from Pico. It has also been collected on many grass species in the Canaries (URRIES 1957, JÖRSTAD 1958) and also in Madeira (BORNMÜLLER 1903, VIENNOT - BOURGIN 1939).

In the material treated, telia occur on *Avena* only. As only the uredia occur the identification of the rust on the other hosts might be questioned. However, after comparison with material e. g. from the Canary Islands (Herb. O), we find it most reasonable to refer them to *P. coronata*.

Festuca sp. and *Vulpia* sp. are both new host genera for this rust in Macaronesia.

P. coronata comprises several varieties. According to CUMMINS (1971) the rust on oats belong to var. *avenae* Frases & Ledingham, while the rust on the other hosts belongs to var. *coronata*.

Puccinia difformis Kze. & Schm. Myk. Hefte 1 : 71, 1817.

On *Galium aparine* L.

Sao Miguel: Ponta Delgada; I.

Faial: Horta; I.

This rust species, which is new to the Azorian rust flora, is fairly common in the Canaries. In the specimen from Sao Miguel, aecia are very scanty. The same specimen is also attacked by *Pucciniastrum guttatum* (see p. 111).

Puccinia graminis Pers. ssp. *graminicola* Urban. Ceska Mycol. 21 : 14, 1967.

Syn. *Puccinia anthoxanthi* Fckl. Jahrb. Nass. Ver. Nat. 27 : 15, 1873.

On *Anthoxanthum odoratum* L.

Terceira: Angra do Heroismo, Biscoitos Road; II.

The black stem rust has previously been reported from the Azores on *Triticum aestivum* L. (U. S. Dept. of Agric., List of plant pests intercepted 1936: 10, 1937).

It has also been reported from the Canary Islands (SPEGAZZINI 1915, JÖRSTAD 1958), and from Madeira.

Anthoxanthum odoratum is a new host for the rust in Macaronesia.

Puccinia hieracii (Röhl.) Mart. var. *hypochoeridis* (Oud.) Jörst. Kgl. N. Vidensk. Selsk. Skr. 1935, 38 : 27, 1936.

On *Hypochoeris radicata* L.

Terceira: Foot of Pico Alto; (II +) III.

Faial: in a wall near Flamengos; II (+ III).

The rust is new to the flora of Azores, but it has previously been reported from Canary Islands (BORNMÜLLER 1903, JÖRSTAD 1958) and from Madeira. *H. radicata* is a new host for this rust in Macaronesia.

Puccinia hordei Otth. Mitth. Naturf. Ges Bern 1870: 114, 1871.

On *Hordeum* cf. *leporinum* Link (syn. *H. murinum* L. ssp. *leporinum* (Link) Arc.)

Sao Miguel: Ponta Delgada, II + III.

The widespread brown rust of barley which is known from several of the Canarian Islands, has previously been reported by TRELEASE (1897) on *Holcus lanatus* (as *Puccinia rubigovera* DC.) from Flores. *Hordeum* cf. *leporinum* is a new host for this rust in Macaronesia.

Puccinia malvacearum Bert. ex Mont. in C. Gay, Hist. Fis. Polit. Chile 8 : 43, 1852.

On *Lavatera cretica* L.

Sao Miguel : Ponta Delgada; III.

Terceira: Angra do Heroismo; III.

Faial: Horta; III.

TRELEASE (1897) reported this rust on the same host from both Faial and Terceira, and later TUTIN & WARBURG (1932) reported the rust from PICO without stating the host. It is also known in Madeira (TORREND 1912, VIENNOT - BOURGIN 1939) and in the Canaries on other hosts.

The rust is new to the flora of Sao Miguel.

Puccinia menthae Pers. Syn. Meth. Fung. p. 227, 1801.

On *Mentha suaveolens* Ehrh. (syn. *M. rotundifolia* auct. non (L.) Huds.).

Terceira: Foot of Pico Alto; II.

The only record known to us of this rust from the Azores is given in the List of intercepted plant pests 1955 : 55, 1956. It has been reported on several host genera in the Canaries and Madeira. The host is new for this rust in Macaronesia.

Puccinia oxalidis Diet. & Ellis apud Dietel in Hedwigia 34: 291, 1895.

On *Oxalis corymbosa* DC.

Sao Miguel: Ponta Delgada, in Pineapple house, Estufas Anonazes Augusto Arruda, Fajenda Baixo; II + III.

On *Oxalis* sp.

Faial: Horta; II.

The rust which was described from Mexico, has been reported from several localities in the southern states of U. S. A. and Central America south to Argentina and Peru. It is also reported from Ontario in eastern Canada (PARMELEE 1960). In Africa it is reported from Spanish Morocco (UNAMUNO 1942). Recently HIRATSUKA (1973) reported it from Japan. The only European records are those of LE ROUX & DICKSON (1957) who reported it from S. Europe without any exact reference to localities, and BROOKS (1974) who reported it from Kent, England, and also from Jersey and Guernsey. LONG & HARSCH (1918) demonstrated that the rust produces aecia on *Mahonia repens* (Lindley) G. Don. (syn. *Berberis repens* Lindley).

In Macaronesia BELTRÁN TEJERA (1976) has reported *P. oxalidis* from Tenerife in the Canary Islands. It is a new member of the Azorian rust flora.

Puccinia pelargonii-zonalis Doidge. Bothalia 2 : 203, 1926.

On *Pelargonium hortorum* Bailey (syn. *P. zonale* Hort.).

Sao Miguel: Ponta Delgada; II.

Terceira: Vila Nova; II.

The *Geranium* rust, originally described from South Africa, has since 1962 spread rapidly in western Europe.

It is widespread in the Canaries (Gjaerum, unpubl.), and it has been reported from Madeira by ALANKO (1973), but it is a new member of the rust flora of the Azores.

The sori are parasitized by *Darluka filum* (Biv. — Bern. ex Fr.) Cast.

In more humid climates the fungus causes considerable damage to the host plants.

Pucciniastrum guttatum (Schroet.) Hyl., Jörstad & Nannf. Opera botanica 1 : 81, 1953.

On *Galium aparine* L.

Sao Miguel: Ponta Delgada; II.

The rust is new to the flora of the Azores.

It has previously been reported from Madeira on *G. parisiense* L. In Europa it is widespread on a great number of *Galium* spp. and also on

Sherardia arvensis L. and *Asperula* spp., and it is also reported on *Galium* spp. in North America and East Asia. On *G. aparine*, however, it has been reported only from a few localities, viz. in Norway (JÖRSTAD 1962), Sweden (HYLANDER, JÖRSTAD & NANNFELDT 1953), Poland (MAJEWSKI 1967). It occurs on this host in the Hebrides (DENNIS 1976).

Uromyces anthyllidis Schroet. Hedwigia 14 : 162, 1875.

Syn. *U. guerkeanus* P. Henn. Bull. Herb. Boiss. 1. 107, 1893.

U. renovatus P. & H. Syd. Monogr. Ured. 2 : 113, 1909.

On *Lotus creticus* L.

Terceira: Praia de Vitoria; II.

On *Lupinus albus* L.

Terceira: between Vila Nova and Quatro Ribeiras; II.

On *Lupinus luteus* L.

Faial: above Flamengos; II.

The uredospores varies slightly in size and in thickness of the wall, mostly from 2 - 3 μ , on *L. luteus* up to 4 μ , while the number of germ-pores is the same in the three collections, varying from 5 - 7.

TRELEASE (1897) reported *Uromyces striatus* Schroet. on *Lotus subbiflorus* Lag. (syn. *L. hispidus* Desf.) from Corvo. JÖRSTAD (1958) placed this with some doubt under *U. anthyllidis* which he reported on several host genera in the Canaries. *U. anthyllidis* is also known from Madeira (P. & H. SYDOW 1910, TORREND 1912, VIENNOT - BOURGIN 1939).

Lotus creticus and *Lupinus luteus* are new hosts for this rust in Macaronesia while *L. albus* is a new host in the Azores.

Some of the sori on *Lotus creticus* were parasitized by *Darluca filum* (Biv. - Bern. ex Fr.) Cast.

Uromyces bidenticola Arth. Mycologia 9 : 71, 1917.

On *Bidens pilosa* L.

Sao Miguel: near Ponta Delgada; II.

This widespread rust is new to the Azorian flora. It has been recorded several times under different names from the Canary Islands and Madeira (cf. JÖRSTAD 1958). Outside the Americas telia have been reported only from TAIWAN (Ito 1950).

Uromyces geranii (DC.) Fr. Summa Veg. Scand. p. 514, 1859.

On *Geranium molle* L.

Sao Miguel: near Ponta Delgada; II

This rust was reported by TRELEASE (1897) on *G. rotundifolium* L. from Sao Miguel. *G. molle* which is a new host for the rust in Macaronesia, has occasionally been recorded as a host for the same rust in Europa.

Uromyces rumicis (Schum.) Wint. Hedwigia 19 : 37, 1880.

On *Rumex pulcher* L.

Sao Miguel: near Ponta Delgada; II.

Faial: Horta; II.

This rust species is new to the flora of the Azores. It has a wide distribution in the Canaries on the same host (JÖRSTAD 1958), and on *R. crispus* L. VIENNOT - BOURGIN (1939) reported it from Madeira on *R. pulcher* and on *R. conglomeratus* Murr.

Uromyces viciae-fabae (Pers.) Schroet. Hedwigia 14 : 161, 1875.

On *Vicia faba* L.

Terceira: Angra do Heroismo, field high on the Biscoitos road; II.

On *Vicia sativa* L. ssp. *nigra* (L.) Ehrh.

Terceira: Angra do Heroismo; II.

M. BENSUADE (1926 - 27) reported this rust from Sao Miguel on *V. faba*, and it is also mentioned from the Azores in List of intercepted plant pests 1937 (U.S. Dept. of Agric. 1939). In the Canary Islands the rust occurs on several *Vicia* spp. (URRIES 1957, JÖRSTAD 1958, 1962) and also on *Lens culinaris* Med. VIENNOT - BOURGIN (1939) reported it from Madeira.

V. sativa ssp. *nigra* is a new host for this rust in Macaronesia.

The distribution of the Azorian rusts in Macaronesia

A. IN THE AZORES.

A total of 51 rust taxa including 48 species, one of which has two varieties and one has three, are known from the Azores. These 51 taxa make 74 host/species combinations. On *Rosa* sp. and *Galium aparine* two rust species occur. One taxon, *Puccinia coronata*, attacks six hosts species, while 35 taxa occur on only one host species each.

The numbers of rust taxa known from the different islands (Tab. 1) clearly show that the rust flora in the Azores is both poorly and unevenly known. Most attention has been focused on the easily accessible islands Sao Miguel, Terceira, and Faial, while only scattered collections have been

made from the other six main islands in the archipelago. No rust has yet been reported from Santa Maria.

TABLE 1. NUMBERS ON RUST TAXA ON THE DIFFERENT AZORIAN ISLAND

Santa Maria	0	Sao Jorge	1
Sao Miguel	35	Faial	11
Terceira	23	Flores	4
Graciosa	1	Flores	4
Pico		Corvo	4

One very conspicuous rust species, *Phragmidium violaceum*, has been reported from five islands, while 29 taxa are reported from one island only.

B. ELSEWHERE IN MACARONESIA.

The rust flora of the different groups of islands within Macaronesia is unevenly known. Most extensive investigation have been carried out in the Canary Islands (JÖRSTAD 1958, 1962, 1966) and in Madeira (VIENNOT-BOURGIN 1939), while only two species are reported from Salvage (GJÆRUM 1975) and eight species from Cape Verde (GJÆRUM 1974). Of the 51 taxa known in the Azores, 31 are reported from Madeira, and 33 taxa from the Canaries, while only one Azorian taxon is reported from Cap Verde. None of the two species reported from Salvage occur in the Azores.

One species only, viz. *Melampsora euphorbiae*, is reported from all Macaronesian islands groups except Salvage, while 22 of the Azorian taxa occur both in Madeira and Canary Islands. Eight taxa are known only from Madeira and ten in the Canaries only.

The total distribution of the Azorian rusts in Macaronesia is summarized in Tab. 2.

TABLE 2. THE DISTRIBUTION OF THE RUST TAXA IN THE AZORES AND MACARONESIA

	A	Ma	Mi	T	G	P	J	Fa	Fl	C	M	S	Cl	CV
<i>Cerotelium fici</i>														
<i>Ficus carica</i>				x							x		x	
<i>Coleosporium tussilaginis</i>														
<i>Senecio mikanioides</i>				x	x			x			x		x	
<i>vulgaris</i>					x								x	
<i>Frommea obtusa</i>														
<i>Duchesnea indica</i>				x	x			x			x			

	A	Ma	Mi	T	G	P	J	Fa	Fl	C	M	S	Cl	CY
<i>Potentilla erecta</i>			X											
<i>procumbens</i>				X										
<i>Hyalopsora adianti-capilli-veneris</i>														
<i>Adiantum capillus-veneris</i>			X										X	
<i>Melampsora euphorbiae</i>														X
<i>Euphorbia azorica</i>						X								
<i>peplus</i>			X					X			X		X	
<i>Ricinis communis</i>			X										X	
<i>Melampsora hypericorum</i>														
<i>Hypericum elatum</i>										X	X		X	
<i>humifusum</i>			X			X					X		X	
<i>Melampsora populnea</i>														
<i>Populus alba</i>				X										X
<i>Milesina blechni</i>														
<i>Blechnum spicant</i>				X							X			
<i>Milesina kriegeriana</i>														
<i>Dryopteris dilatata</i> spp. azo- <i>rica</i>				X										
<i>Miyagia pseudosphaeria</i>												X	X	
<i>Sonchus tenerrimus</i>			X	X				X						
<i>Phragmidium mucronatum</i>														
<i>Rosa</i> sp. (cult.)			X											
<i>Phragmidium tuberculatum</i>														
<i>Rosa</i> sp. (cult.)				X										X
<i>Phragmidium violaceum</i>														
<i>Rubus ulmifolius</i>			X	X				X	X				X	
sp.						X				X				
<i>Puccinia allii</i>														
<i>Allium porrum</i>									X		X		X	
<i>Puccinia antirrhini</i>														
<i>Antirrhinum majus</i> (cult.)				X							X		X	
<i>Puccinia brachypodii</i>														
var. <i>brachypodii</i>														
<i>Brachypodium silvaticum</i>			X											X
<i>Puccinia brachypodii</i>														
var. <i>arrhenatheri</i>														
<i>Hordeum ? bulbosum</i>			X											

	A	Ma	Mi	T	G	P	J	Fa	Fl	C	M	S	Cl	CV
<i>Puccinia brachypodii</i> var. <i>poae-nemoralis</i> <i>Poa annua</i>						X								X
<i>Puccinia buxi</i> <i>Buxus sempervirens</i>						X	X						X	
<i>Puccinia cancellata</i> <i>Juncus acutus</i>							X							X
<i>Puccinia caricina</i> <i>Carex punctata</i> sp.									X					X
<i>Puccinia chrysanthemi</i> <i>Chrysanthemum</i> sp. cult.						X							X	
<i>Puccinia coronata</i> <i>Avena sativa</i>													X	
<i>Holcus lanatus</i>						X	X							X
<i>Festuca</i> sp.						X								
<i>Lolium multiflorum</i>						X								X
<i>Vulpia</i> sp.						X								
<i>Frangula azorica</i>								X						
<i>Puccinia crepidis</i> <i>Crepis capillaris</i>							X						X	
<i>Puccinia difformis</i> <i>Galium aparine</i>							X		X					X
<i>Puccinia dioicae</i> <i>Carex vulcani</i>							X							
<i>Puccinia frankeniae</i> <i>Frankenia pulverulenta</i>													X	
<i>Puccinia epilobii</i> <i>Epilobium obscurum</i>														X
<i>Puccinia graminis</i> <i>Anthoxanthum odoratum</i>							X							
<i>Triticum aestivum</i>						X							X	X
<i>Puccinia hieracii</i> var. <i>hieracii</i> <i>Leontodon hirtus</i>							X							
<i>nudicaulis</i>							X						X	X
<i>Taraxacum officinale</i>						X	X	X					X	X
<i>Puccinia hieracii</i> var. <i>hypochoeridis</i> <i>Hypochoeris radicata</i>							X		X				X	X

	A	Ma	Mi	T	G	P	J	Fa	Fl	C	M	S	CI	CV
<i>Uromyces limonii</i>														x
<i>Limonium vulgare</i>			x											
<i>Uromyces rumicis</i>														
<i>Rumex pulcher</i>			x					x			x		x	
<i>Uromyces striatus</i>														
<i>Lotus subbiflorus</i>										x				
<i>Uromyces viciae - fabae</i>														
<i>Vicia faba</i>			x	x								x	x	
<i>sativa</i> var. <i>nigra</i>				x										

A Azores
Ma Santa Maria
Mi Sao Miguel
T Terceira
G Graciosa
P Pico
J Sao Jorge

Fa Fayal
Fl Flores
C Corvo
M Madeira
S Salvage
CI Canary Islands
CV Cape Verde Islands

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- 1) Norwegian Plant Protection Institute
N 1432 Aa - NLH, Norway
- 2) Royal Botanic Gardens,
Kew, Richmond
Surrey TW 9, England

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