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Data Sheets on Quarantine Pests

Cronartium comptoniae

IDENTITY

Name: *Cronartium comptoniae* J.C. Arthur
Anamorph: *Peridermium comptoniae* Orton & Adams
Taxonomic position: Fungi: Basidiomycetes: Uredinales
Common names: Sweetfern blister rust (English)
Bayer computer code: CRONCP
EPPO A1 list: No. 250
EU Annex designation: I/A1 - as *Cronartium* spp. (non-European)

HOSTS

The aecial hosts of *C. comptoniae* in North America are two- and three-needled *Pinus* spp., of which the most important in practice are jack pine (*P. banksiana*), across Canada, lodgepole pine (*P. contorta*) in western Canada and northwestern USA, and pitch pine (*P. rigida*) in northeastern USA. The European Scots pine (*P. sylvestris*), widely planted in North America, is susceptible. Other *Pinus* spp. are attacked to a limited extent in different parts of North America: Table Mountain pine (*P. pungens*), red pine (*P. resinosa*) and Virginia pine (*P. virginiana*) in eastern USA, loblolly pine (*P. taeda*) and shortleaf pine (*P. echinata*) in southeastern USA. The western species Coulter pine (*P. coulteri*), Jeffrey pine (*P. jeffreyi*), western yellow pine (*P. ponderosa*) and Monterey pine (*P. radiata*) do not coincide with *C. comptoniae* in their native range, but have been found susceptible when planted elsewhere in North America. The European species maritime pine (*P. pinaster*) and Austrian pine (*P. nigra*), and the Japanese *P. densiflora*, have been found to be susceptible in North America. In view of the fact that *P. contorta* and *P. radiata* are planted in northern and western Europe and that the previously mentioned European species are also susceptible, *C. comptoniae* would certainly find aecial hosts on which to establish in the EPPO region.

The telial hosts are members of the Myricaceae: *Comptonia peregrina* (sweetfern), *Myrica gale* (bog myrtle) and other *Myrica* spp. The genus *Comptonia* does not occur in Europe, but *M. gale* is widespread on poor soils in northwest Europe. For more information, see Spaulding (1956, 1961), Boyce (1961), USDA (1963), Davidson & Prentice (1967), Peterson (1967), Hepting (1971), Ziller (1974), Sinclair *et al.* (1987).

GEOGRAPHICAL DISTRIBUTION

EPPO region: Absent.
North America: Canada (practically throughout - Alberta, British Columbia, Manitoba, New Brunswick, Nova Scotia, Northwest Territory, Ontario, Quebec, Saskatchewan), USA (northern and eastern states - Alaska, California (unconfirmed), Connecticut, Delaware, Georgia, Maine, Maryland, Massachusetts, Michigan, Minnesota, Montana (unconfirmed),

New Hampshire, New Jersey, New York, North Carolina, Ohio, Oregon, Pennsylvania, Rhode Island, Vermont, Virginia, Washington, Wisconsin).
Distribution map: See IMI (1992, No. 476).
EU: Absent.

BIOLOGY

The biology of all the heteroecious North American *Cronartium* spp. is broadly the same, and the following general account can be applied to *C. comptoniae*. Pycnia and aecia are produced on the *Pinus* hosts in the spring and early summer, one to several years after infection. In *C. comptoniae*, unlike the other species, aecia usually appear in the year after the formation of pycnia and not in the same year. Aeciospores can be carried over long distances in the wind and infect the alternate (telial) host; they cannot reinfect *Pinus*. Within 1-3 weeks after infection, uredinia appear on the alternate hosts, and telia develop about 15 days later (earlier in *C. comptoniae* than in other species). *Pinus* hosts become infected via the first-year needles by the wind-borne basidiospores which arise from germination of teliospores; the telial host cannot be reinfected by basidiospores. Basidiospore infection, which occurs in summer and autumn, is usually limited to an area within 1.5 km of the alternate host, owing to the spores being delicate and short-lived. Infection of *Pinus* by basidiospores completes the life cycle. For more information, see also Boyce (1961), USDA (1963), Davidson & Prentice (1967), Peterson & Jewell (1968), Peterson (1973), Ziller (1974), Sinclair *et al.* (1987). The widely distributed and much studied *C. ribicola* has similar biology.

DETECTION AND IDENTIFICATION

Symptoms

C. comptoniae has its major impact on seedlings, and most trees beyond 4-10 years old survive infection, with only insignificant reduction in vigour. Infected seedlings, which may show a swelling of the stem, become stunted and deformed, and often produce adventitious shoots resembling witches' brooms. Perennial cankers, about four times longer than broad, may be found on stems and branch swellings, but seldom more than 2 m above the ground line. For more information, see also Mielke (1957), Boyce (1961), USDA (1963), Hepting (1971), Ziller (1974), Sinclair *et al.* (1987).

Morphology

Aecia caulicolous, aecial filaments mostly continuous. Aeciospores short-ellipsoid, orange; wall coarsely verrucose, with a conspicuous smooth spot and warts up to 3 µm high;
16-24 x 24-33 µm (very similar to those of *C. coleosporioides*). Uredinia and telia hypophyllous. Urediniospores oval-obovate, wall colourless, 2.5 µm thick, sparsely and finely echinulate, 16-21 x 23-31 µm. Telial columns filiform; 0.4-1 mm long. Teliospores fusiform-oblong, wall colourless, smooth, uniformly 1-1.5 µm thick; 13-17 x 28-56 µm. See also Mordue & Gibson (1978). Microscopic observation of sporulating structures is necessary to differentiate *Cronartium* rust species. Inoculation of alternate hosts may be necessary to differentiate *C. comptoniae* from *C. coleosporioides*. See also Hedgcock & Siggers (1949), Boyce (1961), USDA (1963), Anderson & French (1965), Peterson & Jewell (1968), Ziller (1974).

MEANS OF MOVEMENT AND DISPERSAL

Cronartium spp. can be carried considerable distances as wind-borne aeciospores and can survive considerable periods in the airborne state (Chang & Blenis, 1989). More

importantly, these rusts can also be carried into new areas on plants for planting of the coniferous aecial hosts, as has occurred in parts of the USA. The long incubation periods of these rusts mean that latent infections easily go undetected unless post-entry quarantine is applied. The alternate hosts of *C. comptoniae* are wild plants which are extremely unlikely to be traded internationally. Similarly, there is no risk in the movement of *Pinus* seeds or pollen.

PEST SIGNIFICANCE

Economic impact

The *Cronartium* rusts cause very important diseases in North America, resulting in malformation, reduced vigour and death of trees and seedlings. However, their abundance does depend primarily on the abundance and localization of the alternate host (Gross *et al.*, 1983). *C. comptoniae* is not a serious pathogen in natural stands or on trees over about 4 years old. In general, on the economically most important hosts *P. banksiana* and *P. contorta*, it is less important than the other two "blister rusts" (*C. coleosporioides* and *C. comandrae*) and is little mentioned in the literature. Only on *P. rigida* in northeastern USA is it recorded as the most important rust (Hepting, 1971). However, considerable infection of *P. banksiana* and *P. contorta* has been reported from Quebec (Canada) and it was considered an important disease of *P. banksiana* in Canada by McCauley & Gross (1984). Experimental plantations of *P. radiata* on Vancouver Island (Canada) suffered severe losses in 1961.

Control

Control can be effected by removing infected material and eradicating the alternate host, although this is rarely economically viable. Nurseries should be located away from possible infection sources, and the use of chemical spraying is feasible. Research into resistant cultivars has led to successful control of some *Cronartium* rusts.

Phytosanitary risk

C. comptoniae is one of the non-European *Cronartium* spp. of the EPPO A1 list (OEPP/EPPO, 1979). The danger presented by these fungi to the EPPO region is classically exemplified by reference to the quarantine pest *C. ribicola* (Phillips, 1988), which has made it almost impossible to grow *P. strobus* commercially in most areas in Europe and North America to which the fungus was introduced from Asia. However, it should be stressed that the potential risk from introduced *Cronartium* spp. is much affected by the status of the alternate hosts concerned. While the *Ribes* hosts of *C. ribicola* are widespread cultivated plants, the telial hosts of *C. comptoniae* are wild plants which do not occur in Europe (*C. peregrina*), or are limited in their distribution (*M. gale*). In favour of the importance of *C. comptoniae* as a quarantine pest for the EPPO region is the fact it has a telial host species that actually occurs in Europe (no other North American blister rust does), that it infects *P. sylvestris*, and that it has on several occasions caused serious infection on *Pinus* spp. from western North America experimentally planted elsewhere in North America. On the other hand, it is generally less important that the other blister rusts, mainly affecting young trees at the nursery stage. Accordingly, *C. comptoniae* can be considered to present only a moderate risk for the EPPO region.

PHYTOSANITARY MEASURES

Since symptoms may not be apparent for many years after infection, the only practical safeguard is to prohibit entry of host plants (especially *Pinus* spp.) from countries where *C. comptoniae* occurs (OEPP/EPPO, 1990). Bark and wood of *Pinus* should have been

appropriately treated (heat-treated, fermented, kiln-dried; EPPO quarantine procedures are in preparation).

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