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Data Sheets on Quarantine Pests

Botryosphaeria laricina

IDENTITY

Name: *Botryosphaeria laricina* (K. Sawada) Y. Zhong
Synonyms: *Physalospora laricina* K. Sawada
Guignardia laricina (K. Sawada) W. Yamamoto & K. Ito
Anamorph: Probably a *Fusicoccum* sp.
Taxonomic position: Fungi: Ascomycetes: Dothideales
Common names: Shoot blight of larch, twig dieback of larch (English)
Triebsterben der Lärche (German)
Bayer computer code: GUIGLA
EPPO A1 list: No. 12
EU Annex designation: I/A1 - as *Guignardia laricina*

HOSTS

The principal hosts are *Larix* spp. The most susceptible ones are *L. decidua*, *L. laricina* and *L. occidentalis*. Intermediate resistance has been observed on *L. eurolepis* and *L. leptolepis*. Resistance has been shown on *L. gmelinii* and *L. olgensis* var. *koreana*. The only other host in nature is *Pseudotsuga menziesii*. Many other conifers can be infected by artificial inoculation. For additional information, see Imazeki & Ito (1963), Oguchi (1970), Sato *et al.* (1971).

L. decidua is widely distributed in Europe at various altitudes (e.g. in the Alps and also in the Polish plains). *L. leptolepis* is also planted in the EPPO region. *Pseudotsuga menziesii* is an important forest tree.

GEOGRAPHICAL DISTRIBUTION

EPPO region: Russia (Far East only).
Asia: Japan (Northern part from Hokkaido south to the Tohoku district, and the central part of Honshu), China (Heilongjiang, Jilin, Liaoning, Shandong), Korea Democratic People's Republic, Korea Republic, Russia (Far East). *B. laricina* most probably occurs in the entire range of *Larix* in eastern Asia. For additional information, see Sato *et al.* (1971).
Distribution map: See CMI (1981, No. 545).

BIOLOGY

The anamorph, probably a *Fusicoccum*, appears in abundance on the underside of needles and on young sprouts between July and November, and spores are dispersed by insects or rain. During this time, the pycnidiospores are released and give rise to secondary infections in late summer. Spore discharge occurs between 10 and 35°C (25°C optimum) and at 98% RH. A few spores in their pycnidia can overwinter until the following April.

The teleomorph appears on branches after October. The black pseudothecia, which occur in groups or singly, take 2 years to develop. Ascospores released between May and

October (peak July-August) are the source of primary infections. Optimum temperature for infection is 20°C with free water. Ascospores can infect throughout the season, but do so principally at the beginning of August; wounds do not appear necessary for penetration. Disease symptoms appear about 2 weeks after infection. Some spores may overwinter in the pseudothecia. Cool winters and short summers do not favour the disease.

For additional information, see Uozomi (1961), Yokota (1966), Sato *et al.* (1971).

DETECTION AND IDENTIFICATION

Symptoms

The disease is conspicuous as a discoloration, wilting and death of the succulent current season's growth. Old twigs remain unaffected. Early attack, visible between June and September, causes hanging of the top of shoots, accompanied by a yellowing and browning of leaves which may fall. The leaves at the tops of shoots turn brown and often remain on the tree during winter. Dark, sunken lesions, abundant in sporulating bodies, and exuding resin appear on the stems of affected seedlings and on shoots, and usually girdle these parts. The resin hardens into whitish drops. Late infections, occurring in September to early October, do not show the characteristic hanging, owing to the lignified nature of the twigs. On needles, symptoms appear as brown spots with chlorotic haloes, which subsequently coalesce. Repeated infections result in stunted, bushy trees with many dead shoots.

For additional information, see Imazeki & Ito (1963), Ito (1963), Sato *et al.* (1971).

Morphology

Pseudothecia black, globose to subglobose, ostiolate and erumpent; 300-400 x 265-440 µm. Ascospores aseptate, oblong, hyaline, smooth, and round at the apex; 24-41 x 8-17 µm. Pycnidia similar to pseudothecia in general shape and superficial appearance, but thinner walled; 123-325 x 176-265 µm. Conidia oblong, straight or somewhat curved, hyaline, 22-37 x 6-10 µm.

Detection and inspection methods

The fungal fruiting bodies may be observed directly or isolated and cultured on a medium containing 3 g yeast extract, 10 g soluble starch, 0.25 g $MgSO_4$ $7H_2O$, 15 g agar in 1 litre distilled water, maintained at 20°C (Ito, 1963).

MEANS OF MOVEMENT AND DISPERSAL

Under natural conditions, *B. laricina* spreads by dispersal of ascospores and pycnidiospores. In international trade, spread is possible on diseased host trees. Pollen or seed is unlikely to harbour the pathogen.

PEST SIGNIFICANCE

Economic impact

B. laricina now causes the most serious disease of *Larix* forests and nurseries in Japan. It had long been known locally, but started to cause large-scale damage in *Larix* plantations after 1959 - at which time, *Larix* areas were increasing rapidly. In 1963, more than 80 000 ha of plantations were diseased, with 100% of the trees affected. Although young diseased trees do not usually die, their subsequent growth is retarded or stopped.

Control

In Japan, two antibiotic fungicides (actidione and polyoxin) have been used against this disease: in nurseries, a 3 mg/litre. solution of actidione or 100 p.p.m. of polyoxin are applied every 2 weeks during July-September. Dipping of *Larix* seedlings into polyoxin

solution in spring is also used in highly infested nurseries. Removal and burning of the infected trees and reforestation by other species are also carried out in heavily diseased stands. Selection of resistant clones is in progress (Kobayashi, 1980).

Phytosanitary risk

B. laricina is listed as an A1 pest by EPPO (OEPP/EPPO, 1978) and by IAPSC. In the EPPO region it could be potentially dangerous to *Larix* and *P. menziesii*, wherever present.

PHYTOSANITARY MEASURES

EPPO recommends (OEPP/EPPO, 1990) that all countries should prohibit importation of plants for planting and cut branches of *Larix* from Asia.

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