

Data Sheets on Quarantine Pests

*Mycosphaerella laricis-leptolepidis***IDENTITY**

Name: *Mycosphaerella laricis-leptolepidis* K. Ito, K. Sato & M. Ota (published as *M. larici-leptolepis*)

Anamorph: *Phoma yano-kubotae* Kitajima
Phyllosticta laricis Sawada

Taxonomic position: Fungi: Ascomycetes: Dothideales

Common names: Needle cast of Japanese larch (English)

Bayer computer code: MYCOLL

EPPO A1 list: No. 16

EU Annex designation: I/A1 - as *Mycosphaerella larici-leptolepis*

HOSTS

The principal hosts are *Larix decidua*, *L. gmelinii* var. *japonica*, *L. gmelinii* var. *olgensis* and *L. leptolepis*; the last species is less susceptible. Artificial inoculation to other conifers has been unsuccessful.

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.

GEOGRAPHICAL DISTRIBUTION

EPPO region: Absent.

Asia: China (Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Shandong, Shaanxi), Korea Democratic People's Republic, Korea Republic, Japan (especially northern and central Honshu, Hokkaido).

EU: Absent.

BIOLOGY

The primary source of inoculum is ascospores. Black pseudothecia develop singly or in groups on fallen needles in contact with the soil during the autumn and winter. Mature ascospores are released only at 100% RH, from late May to mid-June onwards; exceptionally, from mid-May to late August. Spore discharge continues for 70 days at 5-10°C but lasts about 13 days at 25°C. The ascospores are carried in air currents and infect the current season's needles. Peak infection occurs in late May to mid-June, with no infection in September. There is an incubation period of 1-2 months.

Black spermogonia are produced on needles throughout the summer, from July onwards, while the needles are still attached to the tree. The small spermatia are not suited to wind dissemination and do not germinate readily - they play no part in transmission of the disease.

In general, the disease is more severe on acid soils (e.g. volcanic soils), with lower amounts of potassium or exchangeable calcium, or those having a higher coefficient of

phosphate absorption and, also, on those soils in which the layer of the A₀ horizon which consists mainly of *Larix* needles, exceeds 2.5 cm.

For additional information, see Ito *et al.* (1957), Peace (1962), Anon. (1965), Pyun & La (1970).

DETECTION AND IDENTIFICATION

Symptoms

In early July, scattered brown spots (5-7 or up to 20 per needle), surrounded by a faint chlorotic halo, appear on needles of the crown. The needles of the upper branches are often less infected than those of the lower ones. Lesions gradually coalesce, attaining a width of 1 mm or more and cause the needles to go brown and the tree to have a scorched appearance. This coloration is particularly marked in summer and autumn. Before the needles are cast, black pustules, spermogonia, appear on the upper surface of the dead area. Needle cast results in trees with all or portions of their crowns thin and the remaining needles are confined to tufts at the end of the branches. Needles from susceptible trees have less chlorophyll, less N, P, K, and more Ca and Si than resistant ones. Nitrogen content falls in the autumn in resistant needles but increases in susceptible, infected needles. Repeated defoliation results in a decrease in growth increment and death of shoots and twigs. In general, trees in plantations are most severely affected but seedlings and saplings may also be attacked. Trees in mixed hardwood stands are usually less affected.

For additional information, see Ito *et al.* (1957), Peace (1962), Anon. (1965), Pyun & La (1970).

Morphology

Spermogonia thick-walled, 83-165 x 75-143 µm. Spermata hyaline, rod-shaped, 3-5 x 0.5-1 µm. Pseudothecia occur singly or in groups, partially erumpent, globose, 88-156 x 84-142 µm. Asci clavate, 49-99 x 7-12 µm. There are no paraphyses. Ascospores hyaline, unequally two-celled, constricted at the septum, 11-18 x 3-5 µm.

MEANS OF MOVEMENT AND DISPERSAL

PEST SIGNIFICANCE

Economic impact

Since the early 1950s, this fungus has increased in prevalence and, although disease severity varies widely between forests, it is the most important defoliator of *Larix* in Japan. Usually, 10- to 20-year-old forests are severely infected. Up to 80% reduction in wood volume occurs in heavily infected trees. In Japan, *M. laricis-leptolepidis* can also attack introduced *L. decidua* (Imazeki & Ito, 1963).

Control

In Japan, chemicals are not usually applied in plantations but mancozeb in six 2-weekly applications has given some control. Three to four sprays with copper fungicides during June-July has proved effective in preventing disease development. In addition, control can be aimed at the infection source by removing or burning diseased fallen needles in spring.

Resistant clones are also used (Kobayashi, 1980).

Phytosanitary risk

M. larici-leptolepidis is listed as an A1 pest by EPPO (OEPP/EPPO, 1978). In the EPPO region it could be potentially dangerous to *Larix*, wherever present.

PHYTOSANITARY MEASURES

EPPO recommends (OEPP/EPPO, 1991) that all countries should prohibit importation of plants for planting and cut branches of *Larix* from Japan.

BIBLIOGRAPHY

- Anon. (1965) Working Group on Needle Cast of Larch. Researches on the needle cast of larch. I-X. *Bulletin of the Government Forest Experiment Station, Meguro* **178**, 1-179.
- Imazeki R.; Ito K. (1963) Internationally dangerous forest tree diseases - needle cast of larch. *US Department of Agriculture Miscellaneous Publication* No. 939, pp. 47-49.
- Ito, K.; Sato, K.; Ota, N. (1957) Studies on the needle cast of Japanese larch. I. Life history of the causal fungus, *Mycosphaerella larici-leptolepis*. *Bulletin of the Government Forest Experiment Station, Meguro* **96**, 69-88.
- Kobayashi, T. (1980) Important forest diseases and their control measures. *Plant Protection in Japan, Agriculture Asia* Special Issue No. 11, p. 298.
- OEPP/EPPO (1978) Data sheets on quarantine organisms No. 16. *Mycosphaerella larici-leptolepis*. *Bulletin OEPP/EPPO Bulletin* **8** (2).
- OEPP/EPPO (1991) Specific quarantine requirements. *EPPO Technical Documents* No. 1008.
- Peace, T.R. (1962) *Pathology of trees and shrubs*. Oxford University Press, Oxford, UK.
- Pyun, B.H.; La, Y.J. (1970) Studies on the epidemiology and control of larch needle cast disease caused by *Mycosphaerella larici-leptolepis*. *Research Report, Forest Institute of Korea* **17**, 29-34.