

EPPO Datasheet: *Mycodiella laricis-leptolepidis*

Last updated: 2023-10-26

IDENTITY

Preferred name: *Mycodiella laricis-leptolepidis*

Authority: (Ito, Sato & Ota) Crous

Taxonomic position: Fungi: Ascomycota: Pezizomycotina:
Dothideomycetes: Dothideomycetidae: Mycosphaerellales:
Mycosphaerellaceae

Other scientific names: *Mycosphaerella larici-leptolepis* Ito, Sato & Ota, *Mycosphaerella laricis-leptolepidis* Ito, Sato & Ota, *Phoma yano-kubotae* Kitajima

Common names: needle cast of Japanese larch

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EPPO Categorization: A1 list

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EU Categorization: A1 Quarantine pest (Annex II A)

EPPO Code: MYCOLL



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Notes on taxonomy and nomenclature

The anamorph of *Mycodiella laricis-leptolepidis* was according to Ito *et al.* (1957) first described by Kitajima in 1931 as *Phoma yano-kobutae*. *Phyllosticta laricis*, as described by Sawada (1950), is thought to be the same fungus as *Phoma yano-kobutae* (Ito *et al.*, 1957), however, the description by Kitajima from 1931 could not be found, thus a thorough comparison could not be made.

HOSTS

The principal hosts are *Larix decidua*, *L. gmelinii* var. *japonica*, *L. gmelinii* var. *olgensis* and *L. kaempferi* (synonym: *L. leptolepis*); the last species is less susceptible. Artificial inoculation to other conifers has been unsuccessful (EFSA *et al.*, 2018; Imazeki & Ito, 1963; Ito *et al.*, 1957).

Larix decidua is widely distributed in Europe at various elevations (e.g. in the Alps and also in the Polish plains; Matras & Pâques, 2008). *Larix kaempferi* is also planted in the EPPO region (Wu *et al.*, 2020).

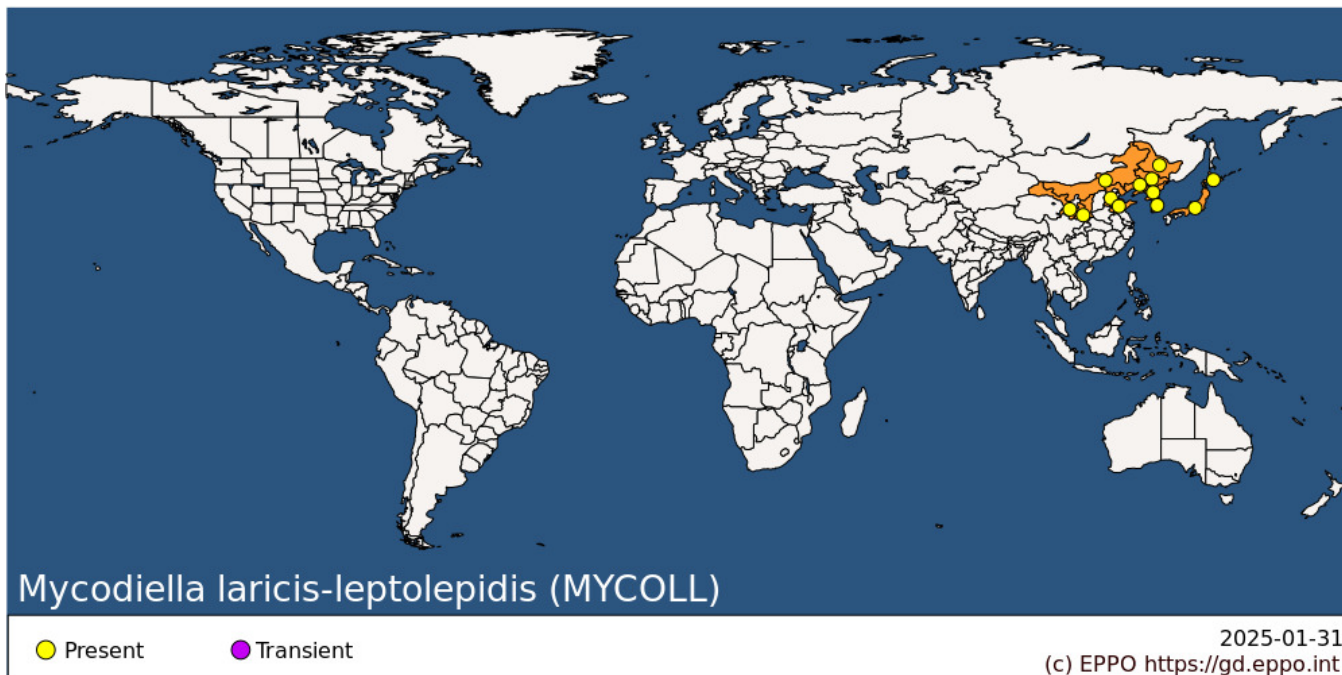
Host list: *Larix decidua*, *Larix gmelinii* var. *japonica*, *Larix gmelinii* var. *olgensis*, *Larix gmelinii*, *Larix kaempferi*

GEOGRAPHICAL DISTRIBUTION

First descriptions of this fungal tree disease were from Japan, and *M. laricis-leptolepidis* is also considered native to Japan (Kobayashi, 1980). However, there is no evidence to support this claim, and it is unclear if *M. laricis-leptolepidis* really originates from Japan or if it was introduced from another country. Several tree species from other Asian countries as well as further afield were introduced to Japan for forestry in the late 19th and early 20th century (Imazeki, 1963).

The disease also occurs in the provinces Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Neimenggu, Shaanxi and Shandong of China and in the Democratic People's Republic of Korea and the Republic of Korea. Details on distribution and pathogenicity of *M. laricis-leptolepidis* in these countries is limited or difficult to obtain.

No records of the disease are known from the European Union (Anon., 2019), the United Kingdom (Fera, 2019), or any other part of the EPPO region.



Asia: China (Gansu, Hebei, Heilongjiang, Jilin, Liaoning, Neimenggu, Shaanxi, Shandong), Japan (Hokkaido, Honshu), Korea Dem. People's Republic, Korea, Republic

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% relative humidity, from late May to mid-June onwards; exceptionally, from mid-May to late August (Pyun and La, 1970). 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 (Ito *et al.*, 1957).

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 (Ito *et al.*, 1957).

In general, the disease is more severe on acid soils (e.g. volcanic soils), with lower amounts of potassium or exchangeable calcium (Kobayashi, 1980), 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 (EFSA, 2018).

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 (usually 5-7 but occasionally up to 20 per needle), surrounded by a faint chlorotic halo, appear on needles of the crown (Ito *et al.*, 1957). In most cases the needles of the upper branches are less infected than those of the lower ones (Ito *et al.*, 1957; Pyun and La, 1970). 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 (Ito *et al.*, 1957). Before the needles are cast, black pustules, spermogonia, appear on the upper surface of the dead area. Needle cast results in trees with thinning of all or portions of their crowns with the remaining needles 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 needles from resistant trees but increases in infected needles in susceptible trees. 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 (Kobayashi, 1980).

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

Morphology

Spermogonia thick-walled and brown, 83-165 x 75-143 µm. Spermata hyaline, rod-shaped, 3-5 x 0.5-1 µm. Pseudothecia occur individually or in groups, partially erumpent, globose, slightly papillate, 88-156 x 84-142 µm. Asci clavate-cylindrical, 49-99 x 7-12 µm, containing eight ascospores. There are no paraphyses. Ascospores hyaline, unequally two-celled, constricted at the septum, 11-18 x 3-5 µm (Ito *et al.*, 1957).

Detection and inspection methods

The description by Ito *et al.* (1957) can be used for morphological identification. *Mycodiella laricis-leptolepidis* can also be distinguished from other species in the Mycosphaerellaceae based on DNA sequences. A protocol and reference sequences are available on the [EPPO-Q-bank website](#).

PATHWAYS FOR MOVEMENT

In natural conditions, dissemination is mainly ensured by windborne ascospores. In international trade, *M. laricis-leptolepidis* can be transported on infected plants for planting and cut branches of *Larix* spp.

PEST SIGNIFICANCE

Economic impact

Since the early 1950s, this fungus has increased in prevalence and, although disease severity varies widely between forests, it was reported as the most important defoliator of *Larix* in Japan (Imazeki & Ito, 1963). In Japan, 10- to 20-year-old forest plantations are most severely infected. Compared to healthy trees, heavily infected trees have a growth increment reduction of up to 80% (Kobayashi, 1980). *Mycodiella laricis-leptolepidis* does not kill the trees, however, the pathogen is still seen as a major risk to larch production sites in Japan (Wada *et al.*, 2022).

Control

There is no recent information available on control measures against *M. laricis-leptolepidis*. There have been efforts to produce resistant seedlings, and these have been used in plantations (Kobayashi, 1980). Mancozeb in six 2-weekly applications has given some control in South Korea and it was the most effective of the five fungicides tested (Pyun and La, 1970). In Japan, three to four sprays with copper fungicides during June-July proved effective in preventing disease development and the application of calcium cyanamide on the ground proved effective in killing the pathogen in the fallen needles (Kobayashi, 1980).

Phytosanitary risk

In the EPPO region, *M. laricis-leptolepidis* could be potentially damaging to *Larix*, wherever present.

PHYTOSANITARY MEASURES

It could be recommended that countries prohibit importation of plants for planting and cut branches of *Larix* from countries where *M. laricis-leptolepidis* occurs.

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CABI and EFSA resources used when preparing this datasheet

CABI Datasheet on *Mycodiella laricis-leptolepidis*.

<https://www.cabidigitallibrary.org/doi/10.1079/cabicompndium.35291>

EFSA Pest survey card on *Mycodiella laricis-leptolepidis*. <https://doi.org/10.2903/j.efsa.2018.5246>

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Datasheet history

This datasheet was first published in the EPPO Bulletin in 1978 and revised in the two editions of 'Quarantine Pests for Europe' in 1992 and 1997, as well as in 2023. It is now maintained in an electronic format in the EPPO Global Database. The sections on 'Identity', 'Hosts', and 'Geographical distribution' are automatically updated from the database. For other sections, the date of last revision is indicated on the right.

CABI/EPPO (1992/1997) *Quarantine Pests for Europe (1st and 2nd edition)*. CABI, Wallingford (GB).

EPPO (1978) Data sheets on quarantine organisms No. 16. *Mycosphaerella larici-leptolepis*. *EPPO Bulletin* **8**(2), 3-6. <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2338.1978.tb02760.x>



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