

Mini data sheet on *Diplocarpon mali*

Added in 2013 - Deleted in 2017

Reasons for deletion:

Diplocarpon mali has been included in EPPO Alert List for more than 3 years and during this period no particular international action was requested by the EPPO member countries. In 2017, the Working Party on Phytosanitary Regulations agreed that it could be deleted, considering that sufficient alert has been given.

***Diplocarpon mali* (anamorph: *Marssonina coronaria*) - Marssonina blotch of apple**

Why: Premature leaf fall of apple trees caused by *Diplocarpon mali* has recently been recorded in several European countries. With the exception of one old record from Romania based on collection specimens (Parmelee, 1974), this disease had not been observed in apple orchards in the EPPO region until recently. In 2001 and 2002, *Marssonina coronaria* (the anamorph of *D. mali*) was observed for the first time in Italy, in Forno Canavese (Torino province, Piemonte region) in an old family orchard (*Malus domestica* cv. 'Furnas'). Ten years later, the disease was observed in August 2011, in several organic apple orchards in the province of Bolzano (Trentino-Alto Adige region). In Germany, it is considered that disease symptoms first appeared in 2010 in Baden-Württemberg. The presence of the fungus was officially reported in 2013, in several areas of Baden-Württemberg and Hesse. In Switzerland, the disease was first observed in 2011 near the Lake of Constance (Bodensee), mainly in organic orchards. In 2012, it was recorded in several areas of the German-speaking part of Switzerland. In Austria, the disease was first noticed in August 2011 at 4 locations in Steiermark (districts of Graz-Umgebung, Hartberg-Fürstenfeld, Weiz) in both organic and intensively managed apple orchards (cvs. Topaz, Jonagold, Gala, Luna). As *D. mali* seems to be an emergent disease in the EPPO region, the EPPO Secretariat considered that it could usefully be added to the Alert List.

Where:

EPPO region: Austria, Czech Republic, Germany, Italy, Romania, Switzerland.

Asia: China (Anhui, Gansu, Hebei, Heilongjiang, Henan, Hubei, Jiangsu, Jilin, Liaoning, Neimenggu, Shaanxi, Shandong, Sichuan, Xinjiang, Yunnan), India (Himachal Pradesh, Jammu & Kashmir, Uttar Pradesh), Japan (Honshu, Kyushu), Korea (Republic of), Taiwan.

North America: Canada (New Brunswick, Nova Scotia, Ontario, Prince Edward Island), USA (Wisconsin).

South and Central America: Brazil (Rio Grande do Sul), Panama.

On which plants: The main host plant is apple (*Malus domestica*). Other *Malus* species (e.g. *M. baccata*) and *Chaenomeles* are also reported as hosts in the literature. Among apple trees, some cultivars appear to be more susceptible than others, such as: 'Topaz', 'Gala', 'Jonagold', 'Golden Delicious', 'Luna' (in Europe) and 'Fuji' (in Asia). In particular, it is noticed that cultivars that are resistant or less susceptible to apple scab (*Venturia inaequalis*) are usually susceptible to *D. mali*.

Damage: The main damage caused by *D. mali* is a premature defoliation of apple trees (with fruit still hanging on the tree). The disease usually starts after long periods of rain in summer with grey-black, diffuse spots on the upper sides of mature leaves. Spots may then coalesce and develop into larger chlorotic and necrotic areas surrounded by red-violet edges. Small, black, round to oval fruiting bodies (acervuli) develop on the upper side of the leaves. When lesions are numerous, leaves become yellow and prematurely fall off the tree. Defoliation can start approximately 2 weeks after the appearance of the first symptoms (e.g. sometimes

as early as mid-August, in Baden-Württemberg). Severe defoliation reduces the quantity and quality of apples, and sometimes affects flower initiation in autumn, leading to reductions in fruit set in the following season. Studies conducted in the Republic of Korea on *M. domestica* cv. 'Fuji' (grafted on M9 rootstock) showed that defoliation (more than 10% before the end of September) reduced fruit weight, as well as fruit red colour and starch content. Symptoms on fruit (small dark spots with acervuli) are rarely observed but may occur in highly infected orchards.

The fungus overwinters in fallen leaves. Ascospores released from overwintered apothecia (on fallen leaves) are considered to be the inoculum for primary infections, and conidia produced in acervuli are thought to be responsible for secondary infections during the apple growing season. Infections require a relatively long duration of leaf wetness and temperatures of 20 to 25°C.

Dissemination: In the field, fungal spores are dispersed by rain and wind. Over long distances, trade of infected plants for planting can be a pathway. Movements of infected fruit are probably of low risk, considering the fact that apples are rarely infected and that the probability of transferring the fungus from fruit (usually intended for consumption) to orchards is low.

Pathway: Plants for planting from countries where *D. mali* occurs.

Possible risks: *M. domestica* is widely grown in the EPPO region and the production of apple is of major economic importance. In the literature, *D. mali* is usually reported as a minor disease and no particular economic damage is reported. However, it is currently considered as a serious problem in apple orchards in the Republic of Korea, and in some parts of China (e.g. Shandong, Sichuan). Control measures against *D. mali* include the elimination of fallen leaves, pruning to facilitate air circulation within the foliage, and the use of fungicides. However, it is noted that *D. mali* has a relatively low sensitivity to copper fungicides (which are permitted in organic orchards), and that resistant strains to thiophanate-methyl have been detected in the late 1990s in Japan. It is generally considered that the most effective control method would be the use of resistant cultivars, and studies are being carried out in Korea to identify potential candidates. The reasons for the emergence of *D. mali* in several European countries are unclear, and the geographical distribution of this fungus probably needs to be further studied. It is assumed that the particularly wet summers of 2010 and 2011 favoured the disease. In addition, it is noted that *D. mali* was mainly found in organic apple orchards, or orchards with reduced fungicide treatment regimes. Although it is still unclear whether phytosanitary measures would be effective to prevent the entry or spread of *D. mali*, it seems appropriate to monitor this emerging disease within the EPPO region.

Sources

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