

Screening of Emerging risks in Norway (ERIN). Judgments are preliminary and should not be considered as part of a final risk assessment:

## *Diplocarpon mali* Y. Harada & Sawamura, (1974)

**1. Taxonomic position:** (Dermateaceae, Helotiales, Leotiomyces, Pezizomycotina, Ascomycota, Fungi) **Popular names** Marssonina blotch of apple (English); There is no Norwegian name for the disease caused by *D. mali*.

**2a. Status in Norway:**

Established <input type="checkbox"/>	Intercepted but not established <input type="checkbox"/>	Not intercepted <input checked="" type="checkbox"/>
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**2b. If this species is already established in Norway and this assessment is limited to a part of Norway where it may expand, define this part area of Norway:**

**3. Area of native distribution in the world and information about introductions, expansions and eradications:**

*D. mali* is of Asian origin, and in China, it is prevalent from the south to the very northern provinces of Jilin and Heilongjiang, bordering Russia. During recent years *D. mali* has been introduced into Central- and North-America.

The first European case of *D. mali* was in the Torino province, Italy during 2001 (Tamietti and Matta 2003). In Germany, the pathogen was detected in the Federal States, Baden-Württemberg and Hesse in 2010 (Hinrichs-Berger und Müller 2012). Austria and Switzerland reported on attacks in 2011.

**4. Sector in Norway expected to be impacted by the species (related to question 10 below):**

Agriculture <input type="checkbox"/>	Forest(ry) <input type="checkbox"/>	Ornamental/park/garden <input type="checkbox"/>	Fruit orchard/garden <input checked="" type="checkbox"/>
Greenhouse/protected <input type="checkbox"/>	Other sector, or not relevant <input type="checkbox"/> Describe:		

**5. Susceptible host(s) and/or type of environment(s) in Norway:**

Cultivated apple trees in orchards and home gardens are at risk. The pathogen is likely to infect domestic fruit varieties and survive the winter climate in the commercial fruit growing districts of Norway. In addition, apple trees growing outside cultivated areas may become infected. Based on the European experience the disease will be more difficult to control in organic fruit production than in conventional fruit production.

**6. Description of damage:**

The conidial stage of the fungus causes massive defoliation of apple trees. Lesions on apples make the fruit non-marketable.

**7a. How is the overall probability of entry in Norway, or in a defined part of Norway?**

0. not relevant <input type="checkbox"/>	1. very low <input type="checkbox"/>	2. low <input type="checkbox"/>	3. medium <input checked="" type="checkbox"/>	4. high <input type="checkbox"/>	5. very high <input type="checkbox"/>
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Level of uncertainty:	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input checked="" type="checkbox"/>
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The potential pathway is import of apple trees for planting. There has been a recent spread of the pathogen in Europe. An express PRA at the Julius Kühn Institute, Germany concludes that apple trees infected in nurseries is the most likely pathway for *D. mali*, while infected apples represents a low risk for dissemination of the pathogen (Schrader and Steinmüller 2013).

The volume of fruit trees imported for planting in Norway is difficult to predict, since this pathway has only recently been opened.

The probability for establishment is high in the climatic zones for commercial apple production in Norway. There is medium uncertainty in this assessment.

The overall probability of establishment in Norway is low with medium uncertainty.

Since there has been no outbreak of *D. mali* in Norway this estimate is based on experiences from continental Europe.

**7b. How is the overall probability of establishment in Norway, or in a defined part of Norway?**

0. not relevant <input type="checkbox"/>	1. very low <input type="checkbox"/>	2. low <input type="checkbox"/>	3. medium <input checked="" type="checkbox"/>	4. high <input type="checkbox"/>	5. very high <input type="checkbox"/>
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Level of uncertainty:	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input checked="" type="checkbox"/>
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Despite the very cold and severe winter in the Chinese province of Heilongjiang, *D. mali* causes severe disease in the apple orchards. Thus, it is likely that the fungus will survive the winters in the apple growing areas of Norway. The pathogen behaves like a hemibiotroph, and use both biotrophic and necrotrophic strategies to establish infection (Zhao et al. 2013). In Asia, the fungus develops its sexual stage in infected leaves on the ground. Ascospores are released in the spring and serve as inoculum for infection of new leaves. Conidia produced on the leaves infect the developing fruits. In Europe, the sexual stage of *D. mali* has not been detected, but the fungus survives in infected leaves in the orchards.

**8. How fast is the pest expected to expand in Norway, or in a defined part of Norway?**

< 0.3 km per year <input type="checkbox"/>	0.3 - 10 km per year <input type="checkbox"/>	10 - 30 km per year <input type="checkbox"/>	> 30 km per year <input checked="" type="checkbox"/>
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Level of uncertainty:	Low <input type="checkbox"/>	Medium <input type="checkbox"/>	High <input checked="" type="checkbox"/>
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Since there has been no outbreak of *D. mali* in Norway, the assessment of the expansion rate in the country is based on published reports from continental Europe. The experience in several countries is that the pathogen is rapidly dissiminated over large distances.

After a successful entry, the pathogen *D. mali* may be spread with infected plants for planting. Over short distances, the fungal spores may be disseminated with air-borne spores and with splash dispersal of spores in rain.

The commercial apple cultivation in Norway is concentrated to the best climatic zones in Sogn og Fjordane County, Hordaland County, Rogaland County and several counties in South-East Norway.

**9. How large percent of potential environment type in Norway, or in a defined part of Norway, is expected to be colonized?**

< 5 % <input type="checkbox"/>	5 - 10 % <input type="checkbox"/>	10 - 20 % <input type="checkbox"/>	20 - 40 % <input checked="" type="checkbox"/>	> 40 % <input type="checkbox"/>
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Level of uncertainty:	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>
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The pathogen has the potential to colonize a large part of the apple orchards in Norway. In commercial fruit production, the pathogen can be controlled by eradication of infected trees and fungicide sprays. The pathogen will be difficult to control for growers of organic apples and in home gardens with no fungicide application. There are no known resistant apple varieties.

**10. How great a negative effect is the pest likely to have on economy including costs of control measures for the impacted sector in Norway, or in a defined part of Norway? Rate possible effects:**

0. not relevant <input type="checkbox"/>	1. minimal <input type="checkbox"/>	2. minor <input type="checkbox"/>	3. moderate <input checked="" type="checkbox"/>	4. major <input type="checkbox"/>	5. massive <input type="checkbox"/>
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Level of uncertainty:	Low <input type="checkbox"/>	Medium <input checked="" type="checkbox"/>	High <input type="checkbox"/>
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The growers are likely to suffer significant losses from *D. mali* infections of their orchards. Infected fruits cannot be marketed. Infected trees will suffer severe defoliation, which will reduce yield the subsequent years. The severity of the disease will lead to control measures. Planting of non-infected

trees, hygiene, disposal of fallen infected leaves and fungicide application are control measures, which are negative for the economy in apple production. Since there has been no outbreak of *D. mali* in Norway this estimate is based on experiences from continental Europe.

**11. How important is the environmental impact likely to be in Norway, or in a defined part of Norway? Rate possible effects:**

0. not relevant <input type="checkbox"/>	1. minimal <input type="checkbox"/>	2. minor <input checked="" type="checkbox"/>	3. moderate <input type="checkbox"/>	4. major <input type="checkbox"/>	5. massive <input type="checkbox"/>
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Level of uncertainty:	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>
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There are limited numbers of apple trees growing outside orchards and gardens. Infection of these trees represents a minor negative environmental effect of *D. mali*.

**12. How important is social damage likely to be in in Norway, or in a defined part of Norway? Rate possible effects:**

0. not relevant <input checked="" type="checkbox"/>	1. minimal <input type="checkbox"/>	2. minor <input type="checkbox"/>	3. moderate <input type="checkbox"/>	4. major <input type="checkbox"/>	5. massive <input type="checkbox"/>
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Level of uncertainty:	Low <input checked="" type="checkbox"/>	Medium <input type="checkbox"/>	High <input type="checkbox"/>
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Social damage from *D. mali* outbreak is not relevant.

**13. Priority in Norway versus EPPO and EU:**

The pathogen *D. mali* is not on the EPPO A1 or A2 lists. Since 2013-05, the pathogen *D. mali* is on the EPPO Alert List over pests possibly presenting a risk in EPPO member countries. In the EPPO region, the fungus *D. mali* is known from Austria, Germany, Italy, Romania and Switzerland.

*D. mali* is not regulated in Norway.

**14. Specific questions for Norway:**

There is no specific question for Norway. The susceptible host is available and the climate in the districts for commercial apple cultivation in Norway is not likely to limit the pathogen.

**15. Existing assessments:**

An express PRA has been published by the Julius Kühn Institute, Germany (Schröder und Steinmüller 2013). Since 2013-05, the pathogen *D. mali* is on the EPPO Alert List over pests possibly presenting a risk in EPPO member countries. CABI has published a Data Sheet on *Diplocarpon mali* (CABI 2013).

**16. Requested assessments:**

The Norwegian Food Safety Authority has not requested any assessment of *D. mali*.

**17. Recommended type of assessment:**

A pest risk assessment of *D. mali* should be done for Norway.

## References

CABI Invasive Species Compendium (2013) Datasheet on *Diplocarpon mali*. <http://www.cabi.org/isc/?compid=5&dsid=109745&loadmodule=datasheet&page=481&site=144#>

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Tamietti G, Matta A. 2003. First report of leaf blotch caused by *Marssonina coronaria* on apple in Italy. Plant Disease 87, 1005.

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Zhao H, Han, Q, Wang J, Gao X, Xiao C-L, Liu J, Huang L. 2013. Cytology of infection of apples by *Diplocarpon mali*. European Journal of Plant Pathology 136, 41-49.

Vedlegg 1. PM 5/3(5). Decision-support scheme for quarantine pests (version 2011). EPPO. Kan lastes ned her: <http://archives.eppo.int/EPPOStandards/prs.htm>.

Vedlegg2. Guidance to the questions 7 and 10 in the scheme

Vedlegg 3. Ratings used for describing the level of uncertainty