Mini data sheet on *Thekopsora minima*

Thekopsora minima was added to the EPPO A2 List in 2017. A full datasheet will be prepared, in the meantime you can view here the data which was previously available from the EPPO Alert List (added to the EPPO Alert List in 2016 – deleted in 2017).

Thekopsora minima (blueberry leaf rust)

Why: *Thekopsora minima* is an heteroecious rust which lives on needles of *Tsuga* spp. (aecial stage) and leaves of ericaceous plants (telial stage). On blueberries (*Vaccinium* spp.), it can cause a serious rust disease leading to extensive defoliation. In the EPPO region, the presence of *T. minima* was detected for the first time in Germany in 2015 and an express-PRA has concluded that this pathogen might present a high risk for Germany and other parts of the EPPO region. The NPPO of Germany has therefore suggested that *T. minima* should be added to the EPPO Alert List.

Where: initially recorded in the eastern part of North America and Japan, *T. minima*. has been introduced on *Vaccinium corymbosum* in other parts of the world (e.g. South Africa, Mexico, Australia, Colombia) during the last decades. In the EPPO region, it was found in Germany in 2015 and in Belgium in 2016. Considering some taxonomic confusion in the past and morphological similarities with other rust fungus attacking *Vaccinium* spp., the world geographical distribution of *T. minima* is rather uncertain. In the German PRA, it is argued that some records attributed to *Pucciniastrum vaccinii* in Argentina, Hawaii (US), and Spain may need to be reconsidered as they might be misidentifications of *T. minima*.
EPPO region: Belgium (first found in 2016; transient), Germany (first found in 2015; transient), Netherlands (first reported in 2017), Portugal (first reported in 2017).
North America: Canada (New Brunswick, Nova Scotia, Ontario, Prince Edward Island, Québec), Mexico, USA (Connecticut, Delaware, Georgia, Maine, Massachusetts, Michigan, New Hampshire, New York, Oregon, Vermont, Virginia, West Virginia, Wisconsin).
South America: Colombia.
Asia: China (Sichuan), Japan (Hokkaido, Kyushu, Shikoku).
Oceania: Australia (New South Wales, Queensland, Tasmania).

On which plants: the main host plants are *Vaccinium* spp. (*V. angustifolium, V. corymbosum*, *V. erythrocarpum*). The susceptibility of *Vaccinium* species that are growing in the wild in the EPPO region (e.g., *V. myrtillus*, *V. vitis-idaea*) is not known. The host range also includes Ericaceae species from the following genera: *Azalea, Gaylussacia, Hugeria, Leucothoe, Lyonia, Menziesia, Pernettya, Pieris,* and *Rhododendron*. The alternate host is hemlock (*Tsuga canadensis, T. diversifolia*).

Damage: symptoms appear on the upper surface of blueberry leaves as small, yellow spots that later become necrotic as they enlarge and coalesce, eventually covering large areas of individual leaves. On the undersides of leaves, small flecks surrounded by water-soaked halos appear, turning into yellow-orange pustules. Later in the season, similar pustules can develop on fruits. In case of severe infection, premature leaf drop and plant defoliation is observed. Loss of leaves reduces plant vigour which may lead to a decline in fruit yield and flower production during the following season. The presence of pustules on fruit also leads to crop losses.
The life cycle of the rust has been described as follows. Teliospores of *T. minima* hibernate on blueberry leaves on the ground and after germination in late spring they infest their alternating host, *Tsuga* spp., via basidiospores. The produced aeciospores infest *Vaccinium* and other Ericaceae host plants. The urediniospores which are then produced ensure disease spread within the crop during the whole growing season. However, in closely related rusts

attacking blueberries in Europe, it has been shown that these rusts could hibernate as mycelium in the plant buds and directly produce urediniospores in spring, which means that the alternate host is no longer needed. It is not known whether this could happen for *T. minima* in the EPPO region but in such a case, this would add to the risk.

Dissemination: blueberry rust spores are spread to nearby plants by wind and rain. Over longer distances, trade of infected plants can ensure disease spread. It is also suspected that humans can transport fungal spores on equipment, packaging and clothing.

Pathway: Plants for planting, fruits? of host plants from countries where *T. minima* occurs.

Possible risks: cultivation of *Vaccinium corymbosum* in the EPPO region has started in the 1930s, and takes place in several countries (e.g. Poland, Germany, the Netherlands, Sweden, Baltic countries, Russia, Romania, France). Other Ericaceae hosts, in particular azaleas and rhododendrons, are also widely grown in the EPPO region, mainly for ornamental purposes. *Tsuga canadensis* (alternate host) can also be found in the EPPO region, however the necessity of the alternate host to complete the life cycle remains to be studied under European conditions. Although further studies are needed, the climatic conditions prevailing in the EPPO region appear to be favourable to the establishment of *T. minima.* In countries where *T. minima* has been introduced (e.g. Australia and Mexico), the disease is considered to be economically damaging. In Mexico, it is stated that *T. minima* has become one of the most significant diseases of blueberry in Jalisco and Michoacan states. In Australia, following the successful eradication of *T. mimina* in Tasmania, phytosanitary measures are in place to protect the island from another introduction. Recently published reports from the USA suggest that damage from blueberry leaf rust has been increasing in the last few years. Although some control methods are available (fungicide treatments, use of tolerant varieties, appropriate irrigation, removal of volunteer hosts), these constitute additional constraints to the growers. Considering the high risk that *T. minima* could present for cultivated *Vaccinium* in the EPPO region, and the potential damage that it might cause to wild *Vaccinium* (e.g. *V. myrtillus*), it seems desirable to prevent any further spread within the EPPO region.

Sources

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