





Summary of the EPPO (European and Mediterranean Plant Protection Organisation) PRA on *Thekopsora minima* (Fungi: Pucciniastraceae) and its implications for Great Britain in preparation for new GB legislation.

 <p><small>Thekopsora minima (THEKMI) - https://gd.eppo.int</small></p>	 <p><small>Thekopsora minima (THEKMI) - https://gd.eppo.int</small></p>
<p>Necrotic patches on a blueberry leaf caused by <i>Thekopsora minima</i>. Credit: Wolfgang Maier, JKI (DE) https://gd.eppo.int/taxon/THEKMI/photos</p>	<p>Emerging spores of <i>Thekopsora minima</i>. Credit: Wolfgang Maier, JKI (DE) https://gd.eppo.int/taxon/THEKMI/photos</p>

Background

Thekopsora minima (Arthur) P. Syd. & Syd. 1915 is the fungal agent responsible for the blueberry rust disease. It relies upon two hosts to complete its lifecycle; firstly, on ericaceous plants such as blueberry (from the *Vaccinium* genus), huckleberry (*Gaylussacia*) and *Rhododendron* species. Secondly, it relies upon certain species of conifer (*Tsuga* species). The fungal pathogen was initially found in Eastern North America and Japan but has spread further across North America in addition to being introduced in parts of every continent except Antarctica. This pest was added to the EPPO (European and Mediterranean Plant Protection Organisation) Alert list in 2016 and moved to the EPPO A2 list in 2017.

The EPPO PRA (Pest Risk Analysis) for *T. minima* (September 2017) concludes that this pest poses a **moderate** risk (with **moderate** uncertainty) to the EPPO region. Imports of

Vaccinium plants for planting were considered the most likely pathway for entry. It also estimates that establishment of this pest is **very likely** outdoors and in protected conditions in the EPPO region (with **low** uncertainty).

A link to the full EPPO PRA can be found at the following webpage:

<https://gd.eppo.int/taxon/THEKMI/documents>

A summary of the main findings of the EPPO PRA and their significance to Great Britain are given below.

Crop/sector considered most at risk in GB

Despite its wider host range, the risk of entry of *T. minima* is mostly linked to trade of *Vaccinium* plants for planting. In other countries where this pest has been introduced, *T. minima* is a serious pest on blueberries and can cause a decline in fruit yield and/or death of the plant, resulting in significant economic damage in some countries. For example, this pest causes a loss of tens of millions of dollars in Australia each year.

If *T. minima* established in Great Britain, it is expected to have a serious impact on the commercial production of cultivated North American blueberry species following crop losses and increased costs for industry on pest control.

Summary and conclusions of the EPPO PRA

Risk of entry

Overall, the EPPO PRA concludes that there is a **high** likelihood of this pest's entry (with **low** uncertainty). The host plants for planting (except seeds, tissue culture, pollen) were reviewed as a pathway for entry of this pest in the EPPO region. With the mitigations that were in place in the EPPO region, the likelihood of entry was assessed as being **high** for *Vaccinium* plants for planting and **low** for *Tsuga* plants for planting (both evaluations with **low** uncertainty). A **low** likelihood of entry was also assessed for other host plants for planting (with **moderate** uncertainty).

This pest is already present in the EPPO region; namely in Portugal, Germany, Belgium, Spain, and the Netherlands. Control measures have been taken for all European findings of the fungus, except for in the Netherlands where this pest was found to be established in the wild. Eradication was not considered possible once this fungus was airborne. The likelihood of natural spread from its limited presence in the Netherlands was considered **moderate** with a **moderate** rating for uncertainty. The likelihood of natural spread from non-EPPO countries was considered **very low** (with **low** uncertainty).

Significance to GB: Significant quantities of *Vaccinium* plants for planting are imported to the UK for berry production or traded for ornamental purposes. Demand has been increasing in recent years with specialist GB breeders, propagators and growers¹. A major exporter in this trade is the USA, where *T. minima* is a serious pest.

Within the new EU Exit regulations², that came into force on the 1st January 2021, all plants for planting, and all but a very short list of plant parts and fruits (none of which have been identified as a pathway) require a phytosanitary certificate to be imported into Great Britain, and as such may be subject to inspection. In addition, the movement of *Tsuga* plants into Great Britain are currently prohibited from non-European countries. However, these mitigations do not significantly reduce the risk of host commodities infested by this pest entering Great Britain. Specific measures will be proposed that address the risk.

Risk of establishment and spread

The EPPO PRA suggests that this pest can tolerate a broad range of climates, from subtropical Australia to areas in North America with temperatures below 0°C in winter. It reports that this pest requires a temperature range of 15-25°C during the growing season and a leaf wetness period of 48 hours, yet this pest can survive at low levels under less favourable conditions. The presence of other hosts would aid the establishment and spread of this pest, especially evergreen *Vaccinium* species that would allow *T. minima* to overwinter.

The EPPO PRA concluded that the likelihood of *T. minima* establishing outdoors on host plants in the EPPO region was **very high** (with a **low** rating for uncertainty). Reports of this pest occurring in glasshouses in some countries has given it a **very high** rating for likelihood of establishment in protected conditions (with **low** uncertainty). The natural spread of *T. minima* spores is thought to be limited; within a few hundred metres by wind. As a result, the magnitude of this spread was rated **low to moderate** (with **low** uncertainty). Human-assisted spread, via the trade or movement of infected plant material, equipment or people, was considered much more significant with a rating for the magnitude of spread as **high** with a **low** rating of uncertainty.

Significance to GB: Areas most at risk from this pest are those where evergreen *Vaccinium* species are grown, areas with wet conditions during the growing season, and areas of widespread host cultivation, though it is considered likely in this PRA that *T. minima* will be able to maintain itself in the absence of *Tsuga* species. The environmental conditions listed above are not dissimilar to the GB climate. In addition, host species of *T.*

¹ <https://www.britishsummerfruits.co.uk/members>

² S.I. 2020/1482 (<https://www.legislation.gov.uk/ukxi/2020/1482/made>) and S.I. 2020/1527 (<https://www.legislation.gov.uk/ukxi/2020/1527/made>)

minima are present in the wild of Great Britain, in urban areas (e.g. gardens) and in cultivated areas such as fields, nurseries, and garden centres. To conclude, the rating given for the whole EPPO region on the establishment and spread of this pest should also apply to Great Britain.

Economic, environmental and social impact

The damage from this rust appears to be higher in warmer countries with suitable humidity, and in other areas this pest would mostly be an issue for nurseries. The EPPO PRA concludes that the overall potential impact to the EPPO region would be **moderate** (with a **moderate** uncertainty), similar to the impact on countries inflicted with the pest - other than Australia. The magnitude of impact in Australia is rated **high** (with a **low** uncertainty) due to the combination of a subtropical climate, extended growing season and use of evergreen blueberry cultivars that allow the fungus to over-winter.

Some of the suggested impacts associated with the introduction of this pest in the EPPO region include impacts on commercial production of North American *Vaccinium* species, including on organic production. Cosmetic damage on ornamental hosts, such as *Vaccinium* and *Rhododendron* plants, in gardens may also occur. Finally, there could be a very high environmental and social impact if *T. minima* attacks wild European *Vaccinium* species; potential hosts of this pest. This could occur if this pest hybridised with the closely related native *Naohidemycetes vaccinii* rust and led to a new virulent type (though there is uncertainty whether this could happen).

Significance to GB: The blueberry-growing industry in Great Britain is rapidly expanding, with blueberry production increasing by 61% from 2018 to 2020, led by a growth in consumer demand (British Summer Fruits, personal comm.). The value of the GB blueberry-growing economy is currently valued at £32 million ex-farm³ (British Summer Fruits, personal comm) with over £400m worth of British blueberries sold in the UK from May 2018 to August 2019 (British Summer Fruits). There could be a significant economic impact on growers if this pest established in Great Britain.

In addition, native *Vaccinium* species such as *Vaccinium vitis-idaea* and *Vaccinium myrtillus* are present in the wild of Great Britain. These native species are already under pressure from pathogens such as *Phytophthora ramorum* and *Phytophthora kernoviae*. The introduction of *T. minima* could cause serious environmental damage to these native GB species.

³ Ex-farm price refers to the total price paid for the products not including the cost of haulage to the purchasers' premises.

Risk management recommendations

The following is a summarised version of the EPPO Panel on Phytosanitary Measures (PPM) recommendations for the high-risk pathway; *Vaccinium* plants for planting. See Section 16.1 of the EPPO PRA for the recommended measures in more detail and Section 8 for the assessed pathways of pest entry.

The PPM recommended that *Vaccinium* plants for planting (except seeds, tissue cultures, pollen) should;

- come from a PFA (Pest Free Area)

- Or

- grow under complete physical isolation

- Or

- be subject to a systems approach (inspection at place of production, fungicide treatments during production, dormant and free from leaves at import, consignment free from plant debris, inspection of the consignment)

- Also packed in conditions preventing infestation during transport.

Significance to GB: Within the new EU Exit regulations², that came into force on the 1st January 2021, all plants for planting, and all but a very short list of plant parts and fruits (none of which have been identified as a pathway) require a phytosanitary certificate, and as such may be subject to inspection. Using the EPPO PRA recommendations, new GB regulations will be drafted with the aim of further mitigating the risk of introducing this pest.