



Quick scan National Plant Protection Organization, the Netherlands

Quick scan number: QS.MYC.2020.002

Quick scan date: 30-04-2020

No.	Question	Quick scan answer for <i>Peronospora aquilegiicola</i>
1.	What is the scientific name (if possible up to species level + author, also include (sub)family and order) and English/common name of the organism? <i>Add picture of organism/damage if available and publication allowed.</i>	<i>Peronospora aquilegiicola</i> Thines, Denton & Choi, 2019 (Peronosporaceae, Peronosporales, Oomycetes)
2.	What prompted this quick scan? <i>Organism detected in produce for import, export, in cultivation, nature, mentioned in publications, e.g. EPPO alert list, etc.</i>	Publication on an emerging <i>Peronospora</i> disease on <i>Aquilegia</i> spp. (1)
3.	What is the current area of distribution?	The organism is supposed to be confined to the United Kingdom (UK) and South Korea, where it infects <i>Semiaquilegia adoxoides</i> . There is a doubtful record from China (3). There are no records from continental Europe yet (Marco Thines, one of the co-authors of the article under (1), pers. comm. April 2019). It may have been introduced to the UK from East Asia (2).
4.	What are the hostplants?	<i>Aquilegia alpina</i> , <i>A. buergeriana</i> , <i>A. flabellata</i> , <i>A. viridiflora</i> , <i>A. vulgaris</i> and <i>Semiaquilegia adoxoides</i> (Ranunculaceae) (1,3).
5.	Does the organism cause any kind of plant damage in the current area of distribution and/or does the consignment demonstrate damage suspected to have been caused by this organism?	Yes, an initial symptom of leaf infection is vein-delimited yellowing or chlorosis, often, multiple lesions are present, resulting in a mosaic appearance of the leaves. Eventually, leaves become necrotic and die. Systemic infections lead to a more uniform yellowing and chlorosis of the leaves, stunted growth and malformation of leaves and flowers. <i>Aquilegia</i>

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	<p>Yes/no + plant species on which damage has been reported + short description of symptoms. Please indicate also when the organism is otherwise harmful (e.g. predator, human/veterinary pathogen vector, etc.).</p>	<p>downy mildew has proven to be an aggressive disease, causing death of plants over one, sometimes two seasons (1,3).</p>
6.	<p>Assess the probability of establishment in the Netherlands (NL) (i.e. the suitability of the environment for establishment).</p> <p>a. In greenhouses b. Outdoors c. Otherwise (e.g. storage facilities, human environment)</p>	<p>Conditions in the Netherlands are likely suitable for establishment of <i>Peronospora</i> on <i>Aquilegia</i>, given the fact that the disease is established in the UK. <i>Aquilegia</i> is a popular garden plant and native in the UK and continental Europe.</p>
7.	<p>Assess the probability of establishment in the EU (i.e. the suitability of the environment for establishment).</p>	<p><i>Aquilegia</i> spp. are popular garden plants and native to Europe. The probability of establishment in the EU is rated as high.</p>
8.	<p>What are the possible pathways that can contribute to spread of the organism after introduction? How rapid is the organism expected to spread (by natural dispersal and human activity)?</p>	<p>The pathogen may be dispersed by several mechanisms:</p> <ul style="list-style-type: none"> - wind-dispersal of conidia, - seed transmission (seed transmission has been shown for several <i>Peronospora</i> spp. and may also occur for this species), - trade of infected seeds, rhizomes and entire plants. <p>In 2016, the disease was considered already widespread in England and Wales. It is unknown when the disease was introduced to the UK but natural spread was rated as 'quickly' (medium confidence) and spread by trade as 'very quickly' (high confidence) in the UK-PRA as the disease had been observed at nurseries (2).</p>
9.	<p>Provide an assessment of the type and amount of direct and indirect damage (e.g. lower quality, lower production, export restrictions, threat to biodiversity, etc.) likely to occur if the organism would become established in NL and the EU, respectively?</p>	<p>Downy mildew on <i>Aquilegia</i> is an aggressive disease, able to kill plants within one or two years. This may lead to disappearance of <i>Aquilegia</i> plants in gardens and may also affect biodiversity in nature reserves.</p>
10.	<p>Has the organism been detected on/in a product other than plants for planting (e.g. cut flowers, fruit, vegetables)? If "no", go to question 12</p>	<p>no</p>
11.	<p>If the organism has been found on/in a product other than plants for planting (e.g. cut flowers, fruit, vegetables), what is the probability of introduction (entry + establishment)? Only to be answered in case of an interception or a find.</p>	<p>-</p>
12.	<p>Additional remarks</p>	<p>The UK published a Rapid Pest Risk Analysis in 2016 and concluded that the species is already widespread in the UK with limited control options available. The UK does not take official measures against the pathogen and it was also concluded that breeding of resistant cultivars is likely to be the best control option for <i>Aquilegia</i> downy mildew (2). The pathogen can be introduced by import of plants for planting (including seeds) or by passengers that bring in plants (illegally).</p>

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13.	References	<p>1. Denton et al., 2015. Characterisation and risk assessment of the emerging <i>Peronospora</i> disease on <i>Aquilegia</i> Journal Mycological Progress. Volume 14. Issue 9. Page 69.</p> <p>2. Tuffen M., 2016. Rapid Pest Risk Analysis (PRA) for: <i>Peronospora</i> sp. on <i>Aquilegia</i>. Department for Environment Food & Rural Affairs, York, UK. Available on: . https://secure.fera.defra.gov.uk/phiw/riskRegister/planthealth/pest-risk-analysis-consultations.cfm (last access 10 May 2019).</p> <p>3. Thines M, Denton GJ, Beal EJ, Kilty A, Denton JO, Shin HD & Choi YJ, 2019a. <i>Peronospora aquilegiicola</i> sp. nov., the downy mildew affecting columbines in the UK is an invasive species from East Asia. – European Journal of Plant Pathology https://doi.org/10.1007/s10658-019-01787-y.</p>
14.	Conclusions	<p>This Quicksan was prompted by a publication on an emerging <i>Peronospora</i> disease on <i>Aquilegia</i> spp. in the UK. The organism is widespread in the UK and may have been introduced from East Asia. There are no records of the pathogen from continental Europe. The pathogen can be very damaging and kill the plant within a few years and it has potentially a major impact on this species in nurseries, gardens, parcs and natural environments. The species may be introduced with regular import of plants for planting (including seeds) or by passengers (collectors etc.) bringing in plants (illegally). It is considered a high risk for <i>Aquilegia</i> spp. in Europe.</p>
15.	Follow-up measures	<p>This new disease will be communicated with stakeholders.</p>