Netherlands Food and Consumer
Product Safety Authority
Ministry of Agriculture,
Nature and Food Quality

Quick scan for *Austropuccinia psidii*

National Plant Protection Organization, the Netherlands

Quick scan number: MYC 2024-002

Quick scan date: 29 August 2024

No.	Question	Quick scan answer for ***Austropuccinia psidii***
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? *Add picture of organism/damage if available and publication allowed*.	*Austropuccinia psidii* (G. Winter) Beenken Kingdom Fungi Phylum Basidiomycota Class Pucciniamycotina Order Pucciniales Family Sphaerophragmiaceae Genus Austropuccinia Synonyms: *Puccinia psidii* G. Winter; *Bullaria psidii* (G. Winter) Arthur & Mains; *Dicaeoma psidii* (G. Winter) Kuntze Common names: rust of guava; rust of eucalyptus; myrtle rust

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2.	What prompted this quick scan? *Organism detected in produce for import, export, in cultivation, nature, mentioned in publications, e.g. EPPO alert list, etc.*	This quick scan was prompted by a recent notification from Switzerland where they found *A. psidii* on plants for planting imported from the Netherlands (NL). The origin of these plants was traced back to a greenhouse in NL where occurrence of this fungus was confirmed on imported *Syzygium* plants from China.
3.	Wat is the risk assessment area?	The risk assessment area is the territory of the European Union (EU 27)

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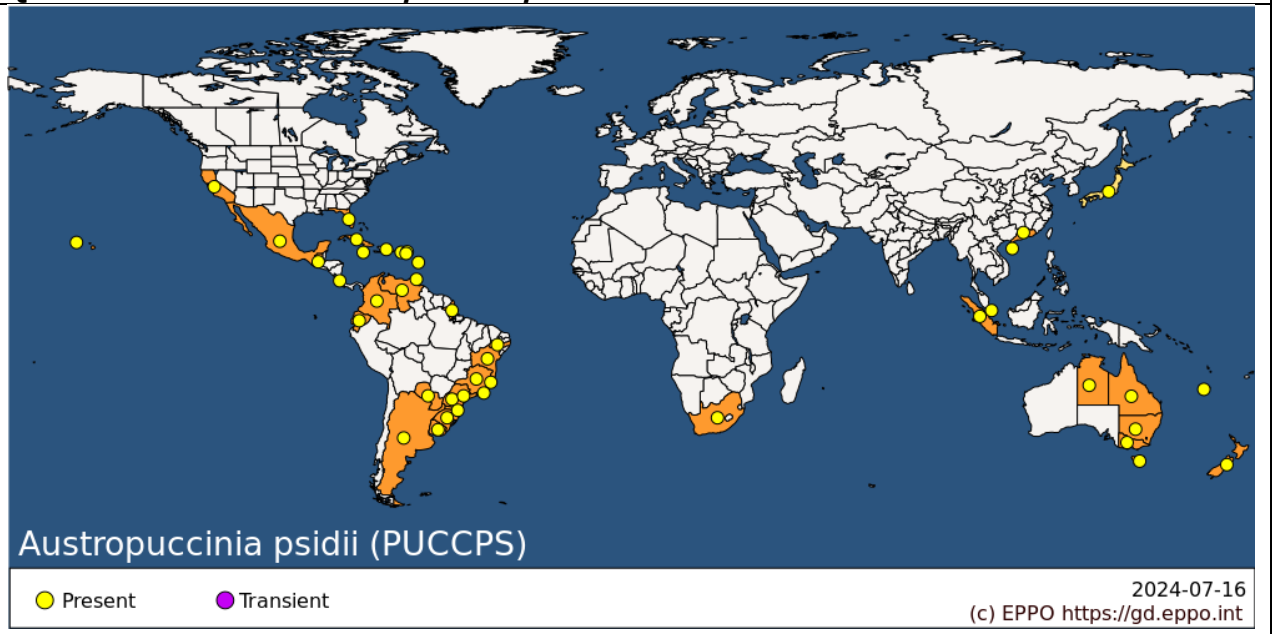
4.	What is the current area of distribution?	 According to EPPO (2024), the EU is free from *A. psidii.* However, there have been incidental finds in the EU; *A. psidii* was for instance found in a greenhouse in NL in 2014 (on plants for planting imported from Costa Rica).
5.	What are the host plants?	*Austropuccinia psidii* infects species within the myrtle family (Myrtaceae, e.g. *Eucalyptus* spp., *Myrtus communis*, *Syzygium*) and has shown to infect more than 500 species in this family (Makinson, 2018; EPPO, 2024). The Myrtaceae comprise about 5,500 species primarily from the Southern Hemisphere (Biffin et al., 2010). In most of the areas where *A. psidii* has invaded up to now, the same strain (or biotype) was responsible (Stewart et al., 2018), but additional strains are known from its native area that may differ in host range (Makinson, 2018; Stewart et al., 2018).
6.	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/no + plant species on which damage has been reported + short description of symptoms.*	<u>Symptoms</u> Yes, *A. psidii* causes lesions on young growing leaves, shoots, buds and fruits; heavy infestations in young trees may kill shoot tips and may eventually lead to plant death (Glen et al., 2007; Makinson, 2018). <u>Impact</u> Impact has been reported under various climatic conditions and varies with the host species. Some species are more susceptible to *A. psidii*, but this may vary depending on the *A. psidii*-strain (see below).

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	Please indicate also when the organism is otherwise harmful (e.g. predator, human/veterinary pathogen vector, etc.).	In Australia, impact ranges from minor leaf spot to severe shoot and stem blight and tree death after repeated infections; locally, *A. psidii* has caused extinction of some plant species (Pegg et al., 2014; Pegg et al., 2017). In New Zealand (oceanic climate), *A. psidii* was recorded for the first time in 2017. Its effect on host species is not fully known yet. (Sutherland et al., 2020) conducted a survey in native forests on the North Island. High rust severity was observed on *Lophomyrtus* spp. on one site causing dieback of shoots and premature drop of fruits. At this site, all seedlings were infected. The authors concluded that it is likely that heavily infected trees will die, natural regeneration is unlikely and that localised extinction is probable. Other Myrtaceae at the site were also infected but the severity was less. In Brazil, *A. psidii* is an economically important pathogen of *Eucalyptus* plantations (Alvares et al., 2017; Almeida et al., 2021). The disease caused by the pathogen is especially severe on seedlings and young trees. Heavy infection causes stunting and multi-branching reducing marketability of the plants (Tommerup et al., 2003). Heavily infected shoots and even entire plants can die. Reductions in wood volume of 23-35% in eucalypt plantations have been reported due to the disease (Almeida et al., 2021). The use of resistant clones is the primary strategy to control the rust, but recently a new race (race 5) was discovered that appears to overcome resistance in genotypes that were resistant against the previously known races (races 1-4) (Almeida et al., 2021). In China, trees of *Rhodomyrtus tomentosa* have been observed to be severely infected by *A. psidii* (Liu et al., 2024). Severely infected plants showed deformation, defoliation, dieback and stunted growth. <u>Strains and host susceptibility</u> Several strains are distinguished which may have different host ranges or vary in aggressiveness on the same host species (Makinson, 2018; Stewart et al., 2018). The C1/C4 'pandemic' strain is the most common strain worldwide and is known to be present in Central America, the Caribbean, USA-Florida, USA-Hawaii, Australia, China-Hainan, New Caledonia, Indonesia and Colombia (Stewart et al., 2018). This strain has a broad host range and can for example infect many *Eucalyptus* species. However, *A. psidii* has thus far not caused decline of *Eucalyptus* species in Australia (it has caused decline of other Myrtaceae species). In Australia, only the pandemic strain is present. However, two eucalypt-associated strains (C2, C3) are known from South America where the fungus has caused major economic impact in *Eucalyptus* species (Makinson, 2018).
7.	Assess the probability of establishment in the Netherlands (NL) (i.e. the suitability of the environment for establishment). a. In greenhouses b. Outdoors c. Otherwise (e.g. storage facilities, human environment)	<u>Outdoors</u> Outdoor establishment may locally occur (high uncertainty). Host plants are only locally present because of their generally low winter hardiness. Outdoor populations may locally persist for some time as long as the infected host plant(s) is/are not removed. The evergreen species *Eucalyptus gunnii* is for example locally present (in private gardens). Thus far, *A. psidii* seems only present in areas with milder winters than NL. The fungus is present in Christchurch (New Zealand) which has a relatively cool climate like NL but winters are milder. Most of NL has plant hardiness zone 8 (8a and 8b) while

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		Christchurch has plants hardiness zone 9a (Biosecurity New Zealand, 2023; Anonymous, 2024). However, the coastal areas in the south-west and north-west of NL also have plant hardiness zone 9a. Thus, at least in those parts of NL, winter conditions are not expected to limit establishment. It remains, however, unknown whether *A. psidii* can survive colder winters. It is not known whether the mycelium can survive subzero temperatures or whether the fungus can survive cold periods via its uredinial or telial stage (Beresford et al., 2020). Teliospores are thick walled resting spores and may especially enable rust fungi to survive winter periods in colder climates. However, the role of teliospores and basidiospores in the life cycle of *A. psidii* is unclear (teliospores form basidia on which basidiospores are formed). In Australia, basidiospores of *A. psidii* seems not able to infect host plants and the fungus seems to spread only by its urediniospores (Makinson, 2018). However, McTaggart et al. (2018) have shown that basidiospores of the South African strain can infect *Syzygium jambos* under experimental conditions. For these reasons, the ability of *A. psidii* to overwinter in the major part of NL and other areas with similar or colder winter conditions remains uncertain. However, in these areas low densities of host plants will already limit establishment because of their generally low winter hardiness (in fact the (near) absence of host plants in areas with cold winters may limit establishment rather than direct effects of low temperature on the survival of *A. psidii*). <u>Greenhouses</u> In greenhouses, several Myrtaceae are grown as pot plant or container plant. *Austropuccinia psidii* may locally be present in greenhouses. The fungus is likely to disappear when all host plants are removed. Re-infestation from the outdoor environment seems unlikely because of the low density of host plants (see above). Establishment in greenhouses seems, therefore, unlikely unless there is a permanent presence of host plants or when new host plants are introduced shortly after the movement of the infested plants.
8.	Assess the probability of establishment in the EU (i.e. the suitability of the environment for establishment).	<u>Climate</u> Humid conditions and moderate temperatures are favourable for development of the fungus according to Roux et al. (2015). Under experimental conditions, latent period (LP) was shortest between 22 and 28°C with a minimum LP of 5-7 days depending on the host; minimum and maximum temperatures for latent development were 8-10°C and 32°C (Beresford et al., 2020). The climate in eastern and southeastern coastal areas of Australia have been assessed to be more suitable than other areas in Australia (Berthon et al., 2018). These coastal areas have either a tropical climate, a warm oceanic/humid subtropical climate, or an oceanic climate (Köppen-Geiger climate classification Af/Am/AW, Cfa and Cfb, respectively). Major impacts on the native plants have been reported from south eastern Queensland that has a humid subtropical climate (Cfa). Tasmania has an oceanic climate (Cfb) and was first assessed to be unsuitable for establishment of *A. psidii* by Booth & Jovanovic (2012). However, the fungus was detected here in 2015 for the first time and it is now considered "marginally naturalised and limited to hosts in cultivated situations" (Makinson, 2018). (Berthon et al., 2018) assessed the climate in Tasmania, especially its western part, as suitable for *A. psidii*.

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		Austropuccinia psidii is also present in New Zealand. The fungus has been found across the North Island and in the northern part of the South Island but also more central (e.g. in Christchurch) in coastal areas of the South island (Biosecurity New Zealand, 2023). All these areas have an oceanic climate (Cfb). The climate in the warmer areas of New Zealand has been assessed to be more favourable for the *A. psidii* than the cooler areas (McCarthy et al., 2021; Beresford & Wright, 2022). The average myrtle rust climatic risk over 6 years (2016-2022) in the region Canterbury located in the central-eastern South Island was assessed to be 'moderate' only during about one month per year while in Northland the risk was assessed to be moderate to very high during about 7 months per year (Beresford & Wright, 2022). In South Africa, the eastern coastal areas have been assessed to be most suitable for development of the fungus (Roux et al., 2015). These areas have a humid subtropical climate (Cfa). Alvares et al. (2017) assessed areas in Brazil with a tropical climate to be more favourable for *A. psidii* than areas with a subtropical climate, because the climate in the tropical areas was favourable for infection throughout the year, while the climate is less favourable during fall and winter in the other areas. However, (Silva et al., 2013) observed lower rust occurrence in sites with a tropical savanna climate (Aw) than in sites with a Monsoon-influenced humid subtropical climate or humid subtropical climate (Cwa or Cfa climate). *Austropuccinia psidii* has been reported from plantings and a nursery in San Diego (Zambino & Nolan, 2011; University of Hawaii, 2024). No information was found whether the fungus has established in San Diego or its surroundings. (Zambino & Nolan, 2011) state: "*The rust has not been reported in California on any plants outside of nursery settings or on Eucalyptus in any setting. The current strains of P. psidii [synonym of A. psidii] in California appear likely to remain a recurrent problem for ornamental plant and foliage crops in the myrtle family grown in some nursery settings*". San Diego has a hot-summer Mediterranean climate (Csa) which is probably unfavourable for establishment of *A. psidii* (too dry). In the EU, areas with an oceanic climate or humid subtropical climate are especially present in western Europe, northern parts of Spain and Italy, and coastal regions along the Adriatic and Black Sea. <u>Host plants</u> The only native Myrtaceae species in the EU is *Myrtus communis* (Paap et al., 2023). This species is present in the Mediterranean area, where it is an important component in the understory of oak woodland and late successional shrublands. It is also cultivated as an ornamental. Other Myrtaceae have been planted as ornamental or forest trees, especially *Eucalyptus globulus*. *Eucalyptus globulus* is native to Tasmania (Australia) and has been planted in southern Europe where it covers 1.3 million hectares of forested area (Cerasoli et al., 2016). Most of it (>80%) is pesent in Portugal and Spain. Furthermore, Myrtaceae may locally be present in private gardens and parcs especially in the southern EU.

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		Conclusion (EU) *Austropuccinia psidii* can likely establish in areas in the EU where host plants are (more than incidentally) present and which have an oceanic or humid subtropical climate. There is uncertainty about the ability of the fungus to survive in areas with a plant hardiness zone 8 or lower but in these areas host plant are usually absent outdoors or only incidentally present (See the answer to Question No. 6). In areas with an unfavourable (dry) climate, *Austropuccinia psidii* might be able to establish locally.
9.	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)?	Natural spread *Austropuccinia psidii* spores are wind-borne and can spread over long distances (Clark, 2011). It has probably been introduced into New Zealand from Australia by wind (Makinson, 2018). Human assisted spread *Austropuccinia psidii* can be spread by trade of living plant materials of host plants (Clark, 2011; Makinson, 2018). It may have been introduced into California and Hawaii by trade of flowers and decorative myrtaceous foliage (Makinson, 2018). Conclusion After introduction (entry + establishment), *A. psidii* can spread rapidly by wind and trade of infected plant materials.
10.	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?	NL *Austropuccinia psidii* may locally and incidentally have some impact (e.g. on host plants grown in greenhouses). EU *Austropuccinia psidii* (especially the eucalypt-associated strains C2 and C3, see Q6) may impact *Eucalyptus* stands, especially in the northern parts of the Iberian insula with an oceanic climate. The fungus may also affect shrubs of the native *M. communis* in areas where the climate is favourable for development of the fungus (oceanic climate or humid subtropical climate). Paap et al. (2023) found that both the pandemic strain (C1/C4) and the strain present in South Africa caused typical symptoms in *M. communis* under experimental conditions. More locally, other ornamental Myrtaceae plants and trees may be affected. Lower impacts are, however, expected than those reported from the eastern coast of Australia because Myrtaceae are much less common in the EU and the climate appears to be less suitable for development of the fungus in large parts of the EU. A more detailed climatic study in combination with host plant distributions in the EU may better assess the potential endangered area and impacts that may be expected in the EU. Such detailed studies are not part of a Quick scan.
11.	Has the organism been detected on/in a product other than plants for planting (e.g. cut flowers, fruit, vegetables)?	No

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<tr><td></td><td>If “no”, go to question 12</td><td></td></tr>
<tr><td>12.</td><td>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.</td><td>Not relevant</td></tr>
<tr><td>13.</td><td>Additional remarks</td><td>

In a German Express-PRA that was initiated by the finding of Puccinia psidii (syn. A. psidii) in Germany the risk of the fungus for was assessed ‘high’ for the EU and ‘low’ for Germany (Schrader & Steinmöller, 2012). The species is not in the German list of ‘Pests regulated and requiring measures according to Article 29 of Regulation (EU) 2016/2031’ (JKI, 2024).
Austropuccinia psidii was placed among ‘the world’s ten most feared fungi’ by (Hyde et al., 2018) because of its massive impact on native plants in western Australia.
Austropuccini psidii (as Puccinia psidii) has been on the EPPO alert list from 1998 to 2003. It was removed from the EPPO alert list because the risk was assessed to be low for the EPPO-region due to the climatic requirements of the species (EPPO, 2002;2003). Since then it has spread to new areas including areas with more temperate climates. Therefore, the conclusions of the EPPO-PRA may need reconsideration. In addition, the probability of entry has probably increased due to introduction of the fungus in new countries including China (first finding in 2009) (Zhuang & Wei, 2011)) from which many plants for planting of Syzygium are imported (Table 1).

Table 1. Import of plants for planting of Syzygium into the Netherlands from countries where Austropuccina psidii is known to be present from 2021 to 2023 (source: NVWA)
<table>
<tr><th>Country of origin</th><th>2021</th><th>2022</th><th>2023</th><th>Total</th></tr>
<tr><td>China</td><td>168,037</td><td>137,652</td><td>131,825</td><td>437,514</td></tr>
<tr><td>Indonesia</td><td>198</td><td>453</td><td>250</td><td>901</td></tr>
<tr><td>Total</td><td>168,235</td><td>138,105</td><td>132,075</td><td>438,415</td></tr>
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<tr><td>14.</td><td>Summary and conclusions</td><td>

This Quickscan was prompted by the finding of Austropuccina psidii on plants for planting of Syzygium from China.
Austropuccinia psidii infects many species within the Myrtaceae family.
Austropuccinia psidii is not known to be present in the EU.
The fungus can likely establish in parts of the EU that have an oceanic or humid subtropical climate and where host plants are (more than incidentally) present. There is uncertainty about the ability of the fungus to survive in areas with a plant hardiness zone 8 or lower but in these areas host plant are usually absent outdoors or only incidentally present because of their generally low winter hardiness.
Impact may especially occur in Eucalyptus plantations (growth reduction and shoot dieback especially in young trees) in areas with an oceanic climate or humid subtropical climate. The impact may depend on the A. psidii strain. Several strains are distinguished which may have

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No.	Question	Quick scan answer for *Austropuccinia psidii*
		different host ranges or vary in aggressiveness on the same host species. Environmental impact may occur in areas with an oceanic climate or humid subtropical climate and where the native species *M. communis* is present. A detailed climatic study in combination with host plant distributions in the EU may better assess the potential endangered area and impacts that may be expected in the EU.
15.	References	Almeida RF, Machado PS, Damacena MB, Santos SA, Guimarães LM, Klopfenstein NB & Alfenas AC, 2021. A new, highly aggressive race of Austropuccinia psidii infects a widely planted, myrtle rust-resistant, eucalypt genotype in Brazil. Forest Pathology, 51 (2), e12679. Alvares C, Sentelhas PC, Mattos E, Miranda A, Moraes W, Silva P, Furtado E & Stape J, 2017. Climatic favourability zones for Eucalyptus rust in Brazil. Forest Pathology, 47 (1), e12301. Anonymous, 2024. Plantmaps.com [Web page]. Available online: https://www.plantmaps.com/index.php [Accessed: 30-07-2024]. Beresford R & Wright P, 2022. Risk-based fungicide management for myrtle rust in nurseries. A Plant & Food Research report prepared for: Ministry for Primary Industries. Milestone No. 94346. Contract No. 40226. Job code: P/391002/01. PFR SPTS No. 22715. Available online: https://www.mpi.govt.nz/dmsdocument/54247-Risk-based-fungicide-management-for-myrtle-rust-in-nurseries Beresford RM, Shuey LS & Pegg GS, 2020. Symptom development and latent period of Austropuccinia psidii (myrtle rust) in relation to host species, temperature, and ontogenic resistance. Plant Pathology, 69 (3), 484-494. Berthon K, Esperon-Rodriguez M, Beaumont L, Carnegie A & Leishman M, 2018. Assessment and prioritisation of plant species at risk from myrtle rust (Austropuccinia psidii) under current and future climates in Australia. Biological Conservation, 218, 154-162. Biffin E, Lucas EJ, Craven LA, Ribeiro da Costa I, Harrington MG & Crisp MD, 2010. Evolution of exceptional species richness among lineages of fleshy-fruited Myrtaceae. Annals of Botany, 106 (1), 79-93. Biosecurity New Zealand, 2023. Where is myrtle rust? [Web page]. Available online: https://www.myrtlerust.org.nz/about-myrtle-rust/where-is-myrtle-rust/ [Accessed: 24-07-2024]. Booth TH & Jovanovic T, 2012. Assessing vulnerable areas for Puccinia psidii (eucalyptus rust) in Australia. Australasian plant pathology, 41, 425-429. Cerasoli S, Caldeira M, Pereira J, Caudullo G & De Rigo D, 2016. Eucalyptus globulus and other eucalypts in Europe: distribution, habitat, usage and threats. European atlas of forest tree species, 90-91. Clark S, 2011. Risk analysis of the Puccinia psidii/ Guava Rust fungal complex (including Uredo rangelii/Myrtle Rust) on nursery stock. EPPO, 2002. Report of a Pest Risk Assessment: Puccinia psidii. Available online: https://pra.eppo.int/pra/51678c45-8afa-43eb-984d-1d0090307216 EPPO, 2003. Mini data sheet on Puccinia Psidii. Available online: https://gd.eppo.int/taxon/PUCCPS/documents

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		EPPO, 2024. Austropuccinia psidii (PUCCPS) [Web page]. Available online: https://gd.eppo.int/taxon/PUCCPS Glen M, Alfenas A, Zauza E, Wingfield M & Mohammed C, 2007. Puccinia psidii: a threat to the Australian environment and economy—a review. Australasian plant pathology, 36, 1-16. Hyde KD, Al-Hatmi AM, Andersen B, Boekhout T, Buzina W, Dawson TL, Eastwood DC, Jones EG, de Hoog S & Kang Y, 2018. The world's ten most feared fungi. Fungal Diversity, 93, 161-194. JKI, 2024. Pest Risk Analyses [Web page]. Julius Kühn-Institut. Available online: https://pflanzengesundheit.julius-kuehn.de/en/pest-risk-analyses.html [Accessed: 28.08.2024]. Liu F, Liu Q & Li G, 2024. Myrtle rust, a serious threat to horticultural plant Rhodomyrtus tomentosa (Myrtaceae) in southern China. Physiological and molecular plant pathology, 130, 102243. Makinson R, 2018. Myrtle Rust reviewed: the impacts of the invasive pathogen Austropuccinia psidii on the Australian environment. Plant Biosecurity Cooperative Research Centre. McCarthy JK, Wiser SK, Bellingham PJ, Beresford RMx, Campbell RE, Turner R & Richardson SJ, 2021. Using spatial models to identify refugia and guide restoration in response to an invasive plant pathogen. Journal of Applied Ecology, 58 (1). Available online: https://doi.org/http://dx.doi.org/10.1111/1365-2664.13756 McTaggart A, Shuey LS, Granados G, Du Plessis E, Fraser S, Barnes I, Naidoo S, Wingfield M & Roux J, 2018. Evidence that Austropuccinia psidii may complete its sexual life cycle on Myrtaceae. Plant Pathology, 67 (3), 729-734. Paap T, Santini A, Rodas CA, Granados GM, Pecori F & Wingfield MJ, 2023. Myrtus communis in Europe threatened by the pandemic and South African strains of the myrtle rust pathogen Austropuccinia psidii (Sphaerophragmiaceae, Pucciniales). NeoBiota, 84, 41-46. Pegg G, Taylor T, Entwistle P, Guymer G, Giblin F & Carnegie A, 2017. Impact of Austropuccinia psidii (myrtle rust) on Myrtaceae-rich wet sclerophyll forests in south east Queensland. PLoS ONE, 12 (11), e0188058. Pegg GS, Giblin FR, McTaggart AR, Guymer GP, Taylor H, Ireland KB, Shivas RG & Perry S, 2014. Puccinia psidii in Queensland, Australia: disease symptoms, distribution and impact. Plant Pathology, 63 (5), 1005-1021. Available online: https://doi.org/https://doi.org/10.1111/ppa.12173 Roux J, Germishuizen I, Nadel R, Lee DJ, Wingfield M & Pegg GS, 2015. Risk assessment for Puccinia psidii becoming established in South Africa. Plant Pathology, 64 (6), 1326-1335. Schrader G & Steinmöller S, 2012. Express – PRA zu Puccinia psidii. Julius Kühn-Institut. Available online: https://pra.eppo.int/pra/e2b2c990-40fb-456b-9263-8b4c9b8bf13f Silva PH, Miranda AC, Moraes ML, Furtado EL, Stape JL, Alvares CA, Sentelhas PC, Mori ES & Sebbenn AM, 2013. Selecting for rust (Puccinia psidii) resistance in Eucalyptus grandis in São Paulo State, Brazil. Forest Ecology and Management, 303, 91-97. Stewart J, Ross-Davis A, Graça R, Alfenas A, Peever T, Hanna J, Uchida J, Hauff R, Kadooka C & Kim MS, 2018. Genetic diversity of the myrtle rust pathogen (Austropuccinia psidii) in the Americas and Hawaii: global implications for invasive threat assessments. Forest Pathology, 48 (1), e12378.

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		Sutherland R, Soewarto J, Beresford R & Ganley B, 2020. Monitoring Austropuccinia psidii (myrtle rust) on New Zealand Myrtaceae in native forest. New Zealand Journal of Ecology, 44 (2), 3414. Available online: https://doi.org/http://dx.doi.org/10.20417/nzjecol.44.23 Tommerup I, Alfenas A & Old K, 2003. Guava rust in Brazil–a threat to Eucalyptus and other Myrtaceae. New Zealand Journal of Forestry Science, 33 (3), 420-428. University of Hawaii, 2024. Myrtle rust Austropuccinia (formerly Puccinia) psidii [Web page]. Cooperative Extension University of Hawaii at Manoa. [Accessed: 24-07-2024]. Zambino PJ & Nolan PA, 2011. First Report of Rust Caused by Puccinia psidii on Paperbark, Melaleuca quinquenervia, in California. Plant Disease, 95 (10), 1314-1314. Available online: https://doi.org/10.1094/pdis-05-11-0436 Zhuang J & Wei S, 2011. Additional materials for the rust flora of Hainan Province, China. Mycosystema, 30 (6), 853-860.
16.	**Follow-up measures**	None (the fungus has been found in the EU before and has not been listed as a quarantine pest)