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

Quick scan for *Euwallacea similis*

National Plant Protection Organization, the Netherlands

Quick scan number: QS2021ENT007

Quick scan date: 27 January 2022

No.	Question	Quick scan answer for *Euwallacea similis*
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.*	*Euwallacea similis* (Ferrari 1867) (Scolytinae)   Rachel Osborn, Southeast Asian Ambrosia Beetle ID, USDA APHIS PPQ, Bugwood.org **Notes on taxonomic status:** The current treatment of the nomenclature of *Euwallacea similis* is defined and follows that of Wood 1969. Several synonyms of *E. similis* exist, among others *Xyleborus similis*, *Wallacellus similis* and *X. parvulus*. However, in his review of the biology of *Xyleborus* spp., Browne (1961) treats *X. similis* and *X. parvulus* as

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		separate species. When referring to Browne (1961), information is therefore pooled from *X. parvulus* and *X. similis* as *E. similis*. Moreover the information throughout this quick scan has been gathered from all species reported as synonyms of *E. similis* by Atkinson (2021).
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.*	In March and in April 2021, the species was found (a single individual in both cases) in a commercial greenhouse growing (sub)tropical plants. Both individuals were collected during inspections carried out as part of an eradication program against *Euwallacea fornicatus* s.l. (EPPO 2021a). One individual was found in a generic Scolytinae trap (cross-vane traps with ethanol as bait), whereas the other was found walking on a plant. *E. similis*, being a non-European Scolytinae, is currently regulated as quarantaine-organism in the EU but as far as we known, no risk assessment is available for the EU.
3.	What is the current area of distribution?	*E. similis* is presumably native to Asia and the Pacific from Pakistan to the Solomon Islands. It has been introduced into Africa, the USA (Florida, Mississippi and Texas) and various islands in Oceania (Beucke, 2018; Browne, 1961; EPPO, 2021b; Haack & Rabaglia, 2013; Rabaglia et al., 2006; Setiawan et al., 2018; Smith et al., 2019; Wood, 2007). There is uncertainty about its presence in South and Central America. It may be present in Costa Rica as Wood (2007) mentions intercepted specimen from a virgin forest: "*Intercepted specimens were examined from Mexico, Costa Rica (in virgin forest), Panama, Brazil (Deyr., Chapuis Collection), Venezuela (Coche, Deyr., Chapuis Collection)*". In other countries in Central and South America, the species may only have been intercepted (Wood 2007). More specifically the species has been reported to be present on the following continents and countries: Africa: Cameroon, Kenya, Madagascar, Mauritania, Mauritius, Seychelles, Tanzania. Asia: Burma, China, Taiwan, Cocos Islands, India, Indonesia, Malaysia, Nepal, Philippines, Sri Lanka, Thailand, Java, Borneo, Vietnam, Japan, Jordan. Oceania: Australia, Fiji, Micronesia, Papua New Guinea, North America: Costa Rica (uncertain: see text), United States of America (continental USA and Hawaii). In the USA, the species has first been found in Houston (Texas) in 2002, where it appears to be established (Rabaglia et al. 2006; Haack and Rabaglia 2013). Additionally, Atkinson (2021) mentions records in Florida and Mississippi.
4.	What are the hostplants?	Browne (1961) mentions host records in 28 plant families from the Malayan Archipelago, Australia and Pacific regions, but does not list individual species within each family. Table 1. contains a list of species assembled from different studies (Atkinson, 2021, Anonymous 2021a, Browne 1961, Rabaglia et al. 2006, Beaver 1987, Beaver et al. 2014., Bernard et al. 2018., Setiawan et al. 2018., Lynn et al. 2021). **Table 1.** Recorded host plants of *Euwallacea similis*.*

Family	Species
Anacardiaceae	*Anacardium excelsum, Anacardium occidentale, Mangifera indica*
Annonaceae	*Unidentified sp.*

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		Apocynaceae *Alstonia spathulata* **Araliaceae** *Arthrophyllum diversifolium* **Araucariaceae** *Agathis* **Arecaceae** *Cocos* **Burseraceae** *Boswellia serratar* **Combretaceae** *Terminalia bellirica* **Dipterocarpaceae** *Dipterocarpus baudii , Dryobalanops aromatica , Shorea leprosula, Shorea robusta* **Elaeocarpaceae** *Elaeocarpus petiolatus, Eleaocarpus sp.* **Euphorbiaceae** *Hevea brasiliensis, Manihot glaziovii* **Fabaceae** *Acacia crassicarpa, Albizzia falcata, Erythrina subumbrans, Falcataria moluccana, Intsia palembanica, Pterocarpus indicus* **Guttiferae** *Calophyllum sp., Garcinia sp.* **Lamiaceae** *Tectona grandis, Vitex pubescens* **Leguminosae** *unknown* **Malvaceae** *Theobroma cacao, Durio zibethinus* **Moraceae** *Ficus, Ficus religiosa* **Myrtaceae** *Syzygium cumini, Eugenia sp.* **Pinaceae** *Pinus caribaea hondurensis* **Rhamnaceae** *Alphitonia, Alphitonia brasiliensis* **Rhizophoraceae** *Bruguiera parviflora, Pellacalyx saccardiana, Rhizophora mucronata* **Rubiaceae** *Coffea arabica* **Sapindaceae** *Pometia pinnata* **Sterculiaceae** *Sterculia macrophylla* **Styracaceae** *Styrax benzoin* **Theaceae** *Camellia sinensis* **Urticaceae** *Artocarpus polyphema, Artocarpus sp., Artocarpus integer, Artocarpus scortechinii* * - Some of the above records come from studies where authors concluded on host plant status based on trapping carried out in pure stands of a plant species. These records may rather imply but do not prove that these species are host plants.

5.	was	Hulcr & Stelinski (2017) have defined three distinct modes of ambrosia beetle damage: (i) "*association with a virulent tree pathogen"*, (ii) "*mass accumulation on stressed trees*", and (iii) "*structural damage*" (including staining) of freshly sawn timber. Below, these different modes of damage are discussed for *E. similis*. <u>Mode (i): Association with a virulent pathogen</u> *E. similis* may transmit plant pathogenic fungi. Browne (1961) refers to Sharples (1918) who documented that *Xyleborus parvulus (= E. similis*) was a suspected vector of *Ustulina* (*=Kretzschmaria*) *zonata*, a pathogen causing "collar – rot" of the rubber tree (*Hevea brasiliensis*) in Malaya (currently Malaysia). Sharples (1918) explains that *X. parvulus* was first mentioned attacking a large number of trees of *H. brasiliensis* within a single district in 1909. Borer damage always concentrated on damaged trees, that were either pollarded or were in a thinned out area. Although subsequent experiments showed a clear correlation between pathogen vectoring and disease development, the exclusive role of *X. parvulus* as a vector remained unclear. Browne (1961) also points out that the species is never a primary borer and apparently shows no particular attraction to *Hevea* being less abundant than some other "Scolytids and Platypodids" that attack the tree. Browne (1961) proceeds and concludes that the importance of *X. parvulus* as a vector is probably at most a minor and sporadic one. Balasundaran & Sankaran (1991) observed dieback and mortality among teak (*Tectona grandis*) trees in Southern India caused by *Fusarium solani.* The trees were infested by *E. similis* from which the pathogen was isolated. The number of trees involved was, however, small (16 after 2 years) (CABI, 2019). Recently, four fungal mutualists associated with *E. similis* have been identified, specifically *Fusarium rekanum*, *F. akasia*, *F. awan* and *F. mekan* (Lynn et al. 2021). At least some of these *Fusarium* species appeared not to be associated to a single ambrosia beetle species. Both *E. similis* and *E. perbrevis* (the tea shot hole borer from the *E. fornicatus* complex) attack *Acacia crassicarpa*, and two of the fungal mutualists (*F. rekanum* and *F. akasia*) were associated with both *Euwallacea* species (Lynn et al. 2021). Other isolates were found to be associated with either one of the two *Euwallacea* species (Lynn et al. 2021). A subsequent study showed that although the two isolates of *F. rekanum* resulted in lesions in the heartwood, these were relatively small suggesting weak pathogenicity of these isolates in *A. crassicarpa* (Lynn et al. 2020). In conclusion, there are insufficient data to conclude that *E. similis* causes economic impact by vectoring a virulent pathogen. <u>Mode (ii): Mass accumulation on stressed trees</u> *E. similis* has been reported as a secondary pest that attacks trees that are weakened or stressed. Under the synonym *X. parvulus,* Browne (1961) mentions that this species is never a primary borer, is not particularly attracted to *Hevea* (rubber tree) and is not one of the most frequent bark beetles attacking this tree species. In addition, Lynn et al. (2021) mention that they only found *E. similis* in trees that were also infested by *E. perbrevis*, supporting the notion that (on this host plant) *E. similis* is a secondary invader that attacks weakened and already infested trees.

		In conclusion, *E. similis* has not been reported causing economic damage as a primary attacker of stressed trees. <u>Mode (iii): Structural damage</u> Browne (1961) mentions that the species has been collected from unhealthy, dead and cut trees, and from charred stumps, whereas the beetle has not been observed attacking sawn unseasoned timber. According to CABI (2019), *E. similis* is very common in felled timber in the region from India to the Solomon Islands. This region has mainly a tropical climate (Köppen Geiger classification; Beck et al, 2018). Mathew (1982) reported on a survey of beetles in stored timber in Kerala, India. They mention *E. similis* together with 8 other wood borings species as the most important species damaging the wood. The relative importance of *E. similis* varied among wood species. Sittichaya & Beaver (2009) investigated wood boring beetles in the wood of cut rubber trees (sawn wood and piled timber) in areas around the Gulf of Thailand. *E. similis* was found in a few cases (0.8% of the beetles found concerned *E. similis*). The species was not found in piled timber. No reports have been found on structural damage of freshly sawn timber in areas where *E. similis* has been introduced (e.g. the USA). Additional information: the species is not highly size-selective, but most frequently found in stems of about 8 to 25 cm in diameter, exceptionally as thin as 4 cm (Browne 1961). In conclusion, *E. similis* causes structural damage to wood of several wood species in tropical areas in its native area of distribution.
6.	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)	See Question 7 (no detailed assessment made for the Netherlands).
7.	Assess the probability of establishment in the EU (i.e. the suitability of the environment for establishment).	The species is present in areas that are (sub)tropical. According to the Köppen Geiger climate classification these regions include a wide range of (sub)tropical climates, from humid tropical rainforest and monsoon climates, to tropical savanna, to semi - arid hot and cold desert climate (e.g. Texas). Based on this information, climatic conditions in (parts of) southern EU may be suitable for establishment.

8.	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)?	*E. similis* may especially spread with trade of wood and woody plants. It may also hitchhike on plant material as it has been intercepted at Australian points of entry on cut flower and foliage consignments (Anonymous 2021b). Estimates of natural spread distances are lacking. The dispersal of the related species *E. fornicatus s.l.* has been previously quantified and may provide some insight. In mark release recapture experiments in avocado orchards, Owens et al. (2019) found most (80%) of the recaptured *E. fornicatus* s.l. beetles within 30–35 m of the release point. Additional flight – mill tests in the laboratory showed an average total flight distance of 81.0 m in 24 h (with a maximum at 400 m). These estimates of daily dispersal capacity suggest substantial potential for annual spread.
9.	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?	*E. similis* causes structural damage to sawn wood of various tree species in tropical areas in its native area of distribution. In the EU, the species may not significantly contribute to damage of sawn wood caused by wood borers due to the less favourable climate (not tropical). Clear evidence of other economic impacts have not been found. It has been introduced outside its native area without any reports of economic damage. Therefore, *E. similis* may not cause significant economic impacts if it were to become introduced into the EU. The uncertainty of this assessment is, however, high: - the species is polyphagous and it is difficult to predict to which extent it will attack stressed trees and sawn wood in the EU because of other tree species/genotypes that are present/prevalent than in its the current area of distribution. - in addition, *E. similis* is related to *E. fornicatus sensu lato.* This species has in combination with the fungus *Neocosmospora euwallacea* (syn. *Fusarium euwallacea*) emerged in the USA, Israel and South Africa as a damaging pest of avocado and urban trees following its introduction (Mendel et al., 2021). *E. similis* has been found associated with four fungal species belonging to the same Ambrosia Fusarium Clade as *Fusarium* (*Neocosmospora*) *euwallacea* (Lynn et al., 2021). These species are not known as aggressive pathogens in *Acacia crassicarpa,* but may interact differently with other host species of *E. similis*. In general, there is little information on the (pathogenicity) of fungi that can be associated with *E. similis* and other ambrosia beetles.
10.	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*	No
11.	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.*	NA
12.	Additional remarks	• *E. similis* is listed in the U.S. Regulated Plant Pest List (APHIS, 2020).

		• *E. similis* has got 'Pest Rating A' for California: "pests of the agricultural industry or environment which score high and are not known to occur or under official control in the State of California". However, the risk assessment also states: "*There is a lack of evidence that E. similis is having economic or environmental impacts in the United States, where this species is apparently established in Florida, Mississippi, and Texas…There do not appear to be any reports of E. similis having an environmental impact anywhere in the world…There is no evidence Euwallacea similis causes economic or environmental damage anywhere it is known to have been introduced. However, it seems that a cautious approach is best with possible forest pests*" (Beucke, 2018).
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14.	**Conclusions**	This quick scan was prompted by the finding of *Euwallacea similis* in a commercial greenhouse during inspections and monitoring carried out as part of an eradication program against the related quarantine organism *Euwallacea fornicatus sensu lato*. *E. similis* is not known to be present in the EU. The organism can likely establish in parts of the southern EU. On living trees, it is considered a secondary pest that only attacks when the tree is stressed or weakened. *E. similis* is not known as an economic pest in its current area of distribution except from causing damage to stored timber in tropical regions. Therefore, damage caused by the species may be limited if it were to become introduced into the EU. The uncertainty of this assessment is high, mainly due to lack of information about the pathogenicity of the fungal symbionts it may be associated with.
15.	**Follow-up measures**	Infested plants must be destroyed (all non-European Scolytinae are regulated in the EU)