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Pest categorisation of *Setoptus parviflorae*

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Abstract

The EFSA Plant Health Panel performed a pest categorisation of *Setoptus parviflorae* (Acari: Eriophyoidea: Phytoptidae) for the European Union (EU). This mite is not listed in Annex II of Commission Implementing Regulation (EU) 2019/2072. It is known to occur in the Nanjing Botanical Garden (China) on *Pinus parviflora*. This is its only known host plant and location. The mite occurs on the needles and in the needle sheaths. Details about its life cycle are mostly unknown. Plants for planting, including dwarfed plants, of *P. parviflora* are the main potential pathway for entry into the EU. However, plants of the genus *Pinus* other than fruit and seeds are mostly prohibited from entering the EU (Commission Implementing Regulation (EU) 2019/2072). The host, *P. parviflora*, can be found in temperate-zone gardens and arboreta, and is a popular tree for bonsai in the EU. Although the Köppen–Geiger climate type Cfa (humid subtropical), which occurs in Nanjing, can be found in the EU, the growing conditions of *P. parviflora* at the Nanjing Botanical Garden were not reported. This adds uncertainty about where in the EU this mite could establish, most probably on ornamental *P. parviflora*. There is no evidence of impact of *S. parviflorae*. Measures to prevent entry and spread are available. *S. parviflorae* does not satisfy all the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union quarantine pest, as there is no evidence of impact.

Keywords: eriophyoid mite, pest risk, plant health, plant pest, quarantine, *Pinus*

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Table of contents

1. Introduction

1.1. Background and Terms of Reference as provided by the requestor

1.1.1. Background

The new Plant Health Regulation (EU) 2016/2031, on the protective measures against pests of plants, is applying from 14 December 2019. Conditions are laid down in this legislation in order for pests to qualify for listing as Union quarantine pests, protected zone quarantine pests or Union regulated non-quarantine pests. The lists of the EU regulated pests together with the associated import or internal movement requirements of commodities are included in Commission Implementing Regulation (EU) 2019/2072. Additionally, as stipulated in the Commission Implementing Regulation 2018/2019, certain commodities are provisionally prohibited to enter in the EU (high risk plants, HRP). EFSA is performing the risk assessment of the dossiers submitted by exporting to the EU countries of the HRP commodities, as stipulated in Commission Implementing Regulation 2018/2018. Furthermore, EFSA has evaluated a number of requests from exporting to the EU countries for derogations from specific EU import requirements.

In line with the principles of the new plant health law, the European Commission with the Member States are discussing monthly the reports of the interceptions and the outbreaks of pests notified by the Member States. Notifications of an imminent danger from pests that may fulfil the conditions for inclusion in the list of the Union quarantine pest are included. Furthermore, EFSA has been performing horizon scanning of media and literature.

As a follow-up of the above-mentioned activities (reporting of interceptions and outbreaks, HRP, derogation requests and horizon scanning), a number of pests of concern have been identified. EFSA is requested to provide scientific opinions for these pests, in view of their potential inclusion by the risk manager in the lists of Commission Implementing Regulation (EU) 2019/2072 and the inclusion of specific import requirements for relevant host commodities, when deemed necessary by the risk manager.

1.1.2. Terms of Reference

EFSA is requested, pursuant to Article 29(1) of Regulation (EC) No 178/2002, to provide scientific opinions in the field of plant health.

EFSA is requested to deliver 53 pest categorisations for the pests listed in Annex 1A, 1B, 1D and 1E (for more details see mandate M-2021-00027 on the Open.EFSA portal). Additionally, EFSA is requested to perform pest categorisations for the pests so far not regulated in the EU, identified as pests potentially associated with a commodity in the commodity risk assessments of the HRP dossiers (Annex 1C; for more details see mandate M-2021-00027 on the Open.EFSA portal). Such pest categorisations are needed in the case where there are not available risk assessments for the EU.

When the pests of Annex 1A are qualifying as potential Union quarantine pests, EFSA should proceed to phase 2 risk assessment. The opinions should address entry pathways, spread, establishment, impact and include a risk reduction options analysis.

Additionally, EFSA is requested to develop further the quantitative methodology currently followed for risk assessment, in order to have the possibility to deliver an express risk assessment methodology. Such methodological development should take into account the EFSA Plant Health Panel Guidance on quantitative pest risk assessment and the experience obtained during its implementation for the Union candidate priority pests and for the likelihood of pest freedom at entry for the commodity risk assessment of High Risk Plants.

1.2. Interpretation of the Terms of Reference

Setoptus parviflorae is one of a number of pests listed in Annex 1C to the Terms of Reference (ToR) to be subject to pest categorisation to determine whether it fulfils the criteria of a potential Union quarantine pest for the area of the EU excluding Ceuta, Melilla and the outermost regions of Member States referred to in Article 355(1) of the Treaty on the Functioning of the European Union (TFEU), other than Madeira and the Azores, and so inform EU decision making as to its appropriateness for potential inclusion in the lists of pests of Commission Implementing Regulation (EU) 2019/2072. If a pest fulfils the criteria to be potentially listed as a Union quarantine pest, risk reduction options will be identified.

1.3. Additional information

This pest categorisation was initiated following the commodity risk assessment of bonsai (*Pinus parviflora* grafted on *Pinus thunbergii*) plants from China performed by EFSA (EFSA PLH Panel, 2022), in which *S. parviflorae* was identified as a relevant non-regulated EU pest which could potentially enter the EU on *bonsai*.

2. Data and methodologies

2.1. Data

2.1.1. Literature search

A literature search on *S. parviflorae* was conducted at the beginning of the categorisation in the ISI Web of Science bibliographic database, using the scientific name of the pest as search term. Papers relevant for the pest categorisation were reviewed, and further references and information were obtained from experts, as well as from citations within the references and grey literature.

2.1.2. Database search

Pest information, on host(s) and distribution, was retrieved from the European and Mediterranean Plant Protection Organization (EPPO) Global Database (EPPO, online), the CABI databases and scientific literature databases as referred above in Section 2.1.1.

Data about the import of commodity types that could potentially provide a pathway for the pest to enter the EU and about the area of hosts grown in the EU were obtained from EUROSTAT (Statistical Office of the European Communities).

The Europhyt and TRACES databases were consulted for pest-specific notifications on interceptions and outbreaks. Europhyt is a web-based network run by the Directorate General for Health and Food Safety (DG SANTÉ) of the European Commission as a subproject of PHYSAN (Phyto-Sanitary Controls) specifically concerned with plant health information. TRACES is the European Commission's multilingual online platform for sanitary and phytosanitary certification required for the importation of animals, animal products, food and feed of non-animal origin and plants into the European Union, and the intra-EU trade and EU exports of animals and certain animal products. Up until May 2020, the Europhyt database managed notifications of interceptions of plants or plant products that do not comply with EU legislation, as well as notifications of plant pests detected in the territory of the Member States and the phytosanitary measures taken to eradicate or avoid their spread. The recording of interceptions switched from Europhyt to TRACES in May 2020.

GenBank was searched to determine whether it contained any nucleotide sequences for *S. parviflorae* which could be used as reference material for molecular diagnosis. GenBank® (www.ncbi.nlm.nih.gov/genbank/) is a comprehensive publicly available database that as of August 2019 (release version 227) contained over 6.25 trillion base pairs from over 1.6 billion nucleotide sequences for 450,000 formally described species (Sayers et al., 2020).

2.2. Methodologies

The Panel performed the pest categorisation for *S. parviflorae*, following guiding principles and steps presented in the EFSA guidance on quantitative pest risk assessment (EFSA PLH Panel, 2018), the EFSA guidance on the use of the weight of evidence approach in scientific assessments (EFSA Scientific Committee, 2017) and the International Standards for Phytosanitary Measures No. 11 (FAO, 2013).

The criteria to be considered when categorising a pest as a potential Union quarantine pest (QP) is given in Regulation (EU) 2016/2031 Article 3 and Annex I, Section 1 of the Regulation. Table 1 presents the Regulation (EU) 2016/2031 pest categorisation criteria on which the Panel bases its conclusions. In judging whether a criterion is met the Panel uses its best professional judgement (EFSA Scientific Committee, 2017) by integrating a range of evidence from a variety of sources (as presented above in Section 2.1) to reach an informed conclusion as to whether or not a criterion is satisfied.

The Panel's conclusions are formulated respecting its remit and particularly with regard to the principle of separation between risk assessment and risk management (EFSA founding regulation (EU)

No 178/2002); therefore, instead of determining whether the pest is likely to have an unacceptable impact, deemed to be a risk management decision, the Panel will present a summary of the observed impacts in the areas where the pest occurs, and make a judgement about potential likely impacts in the EU. Whilst the Panel may quote impacts reported from areas where the pest occurs in monetary terms, the Panel will seek to express potential EU impacts in terms of yield and quality losses and not in monetary terms, in agreement with the EFSA guidance on quantitative pest risk assessment (EFSA PLH Panel, 2018). Article 3(d) of Regulation (EU) 2016/2031 refers to unacceptable social impact as a criterion for quarantine pest status. Assessing social impact is outside the remit of the Panel.

Table 1: Pest categorisation criteria under evaluation, as derived from Regulation (EU) 2016/2031 on protective measures against pests of plants (the number of the relevant sections of the pest categorisation is shown in brackets in the first column)

Criterion of pest categorisation	Criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest (article 3)
Identity of the pest (Section 3.1)	Is the identity of the pest clearly defined, or has it been shown to produce consistent symptoms and to be transmissible?
Absence/presence of the pest in the EU territory (Section 3.2)	Is the pest present in the EU territory? If present, is the pest in a limited part of the EU or is it scarce, irregular, isolated or present infrequently? If so, the pest is considered to be not widely distributed.
Pest potential for entry, establishment and spread in the EU territory (Section 3.4)	Is the pest able to enter into, become established in, and spread within, the EU territory? If yes, briefly list the pathways for entry and spread.
Potential for consequences in the EU territory (Section 3.5)	Would the pests' introduction have an economic or environmental impact on the EU territory?
Available measures (Section 3.6)	Are there measures available to prevent pest entry, establishment, spread or impacts?
Conclusion of pest categorisation (Section 4)	A statement as to whether (1) all criteria assessed by EFSA above for consideration as a potential quarantine pest were met and (2) if not, which one(s) were not met.

3. Pest categorisation

3.1. Identity and biology of the pest

3.1.1. Identity and taxonomy

Is the identity of the pest clearly defined, or has it been shown to produce consistent symptoms and/or to be transmissible?

Yes, *Setoptus parviflorae* Kuang is a clearly defined species of eriophyoid mite.

Setoptus parviflorae Kuang (1998) is an eriophyoid mite (Acari: Eriophyioidea: Phytoptidae) described from specimens found in 1994 in the Nanjing Zhongshan Botanical Garden, in the province of Jiangsu (China), as a vagrant (i.e. non-gall forming free-living) on the Japanese white pine, *P. parviflora* (Kuang, 1998). More recently, a new species within the same genus, *S. semiornatum* Pye (2011), was described and reported in the UK on artificially dwarfed plants of *P. parviflora* imported from Japan (Pye, 2011). According to Pye (2011), these two species can be clearly distinguished based on the ornamentation of the prodorsal shield, which is unornamented and smooth in *S. parviflorae* and subspherical with granules restricted to the posterior region in *S. semiornatum*. However, the EFSA PLH Panel (2022) considered that these two species could be the same. Based on Pye (2011), in this categorisation *S. parviflorae* and *S. semiornatum* will be considered as separate species. However, as pointed out by Chetverikov et al. (2019), the *Setoptus* species described from China should be 'redescribed because the original descriptions are very poor, with inadequate drawings and morphometrics. Often type material is lost or not available for study by deterioration'. Consequently, it would be wise to undertake this redescription, as highlighted in the summary table at the end of this categorisation.

The EPPO code[1] (Griessinger and Roy, 2015; EPPO, 2019) for this species is: SETPPA (EPPO, online).

3.1.2. Biology of the pest

S. parviflorae is an eriophyoid mite. Mites from this superfamily are not closely related to other groups of mites and have characteristic morphology and biology. They are minute vermiform animals with only two pairs of legs in all active stages (larva, nymph and adult), which look quite similar to each other. In addition to the sessile egg stage, they have two additional quiescent stages one between the larva and the nymph, the nymphochrysalis and one between the nymph and the adult, the imagochrysalis. Eriphyoid mites are usually quite specific for the host plant on which they feed, or they are often restricted to one plant genus or, at most, one family. These mites cannot survive for long periods away from a host plant, and thus, most of the plant species on which they feed are perennials (Jeppson et al., 1975; Hull, 2014; EFSA PLH Panel, 2022). The eggs of *S. parviflorae* are laid among pine needles and are difficult to see (EFSA PLH Panel, 2022). The immature forms of many eriophyoid mites, including those of the genus *Setoptus*, have not been described. Both adult males and females were observed in the Zhongshan Botanical Garden in Nanjing (China) and have been described (see Section 3.1.5). Most of the time, mites of the genus *Setoptus* are hidden in needle basal sheaths and can remain active during winter inside the sheaths. Whether this species can enter diapause to overwinter is not known (EFSA PLH Panel, 2022). Two species of *Setoptus* (different from S. *parviflorae*) were found to complete the lifecycle in 5 weeks at 10°C and 10 days at 22°C (Manson and Oldfield, 1996).

3.1.3. Host range/species affected

Most eriophyoid mite species, are closely linked to one or a small number of hosts (Ozman-Sullivan & Sullivan, 2023). In the case of species belonging to the genus *Setoptus*, they are highly specific on plants of the genera *Pinus* or *Tsuga*. For *S. parviflorae*, the only known host is the Japanese white pine, *P. parviflora* (Kuang, 1998; Pye, 2011; NVWA, 2020). Should *S. parviflorae* be native to China, additional host(s) within the genus *Pinus* L. native to China should exist. Alternatively, *S. parviflorae* could be native to Japan and/or Korea, from where it was imported to China with its host.

3.1.4. Intraspecific diversity

No intraspecific diversity has been described for *S. parviflorae*.

3.1.5. Detection and identification of the pest

Are detection and identification methods available for the pest?

Infestations do not cause visible symptoms. A morphological description of the species is available to allow taxonomic identification under microscopic examination.

Symptoms

No symptoms of mite presence on *P. parviflora* have been described.

Detection

Although no detection methods have been described for this species, congenerics occur in the basal sheaths of needles. Needles and sheaths could be the plant parts to sample and examine using a light microscope (EFSA PLH Panel, 2022).

Identification

According to Kuang (1998), adults are spindle-shaped, females are 0.20–0.21 mm long and 0.08 mm wide, while males are lightly smaller (0.19 × 0.08 mm). This species is similar to *S. strobacus* (Keifer), which is known to occur in Serbia (Petanovic and Vidovic, 2009), but can be

[1] An EPPO code, formerly known as a Bayer code, is a unique identifier linked to the name of a plant or plant pest important in agriculture and plant protection. Codes are based on genus and species names. However, if a scientific name is changed the EPPO code remains the same. This provides a harmonised system to facilitate the management of plant and pest names in computerised databases, as well as data exchange between IT systems (Griessinger and Roy, 2015; EPPO, 2019).

distinguished by the prodorsal shield, which is smooth and unornamented, and the feathered claws. No molecular methods for the identification of this mite are available.

3.2. Pest distribution

3.2.1. Pest distribution outside the EU

S. parviflorae is known to occur in the Nanjing Botanical Garden (32°03′26″ N 118°49′51″ E), in the Chinese province of Jiangsu (Kuang, 1998) (Figure 1) and has not been reported anywhere else.

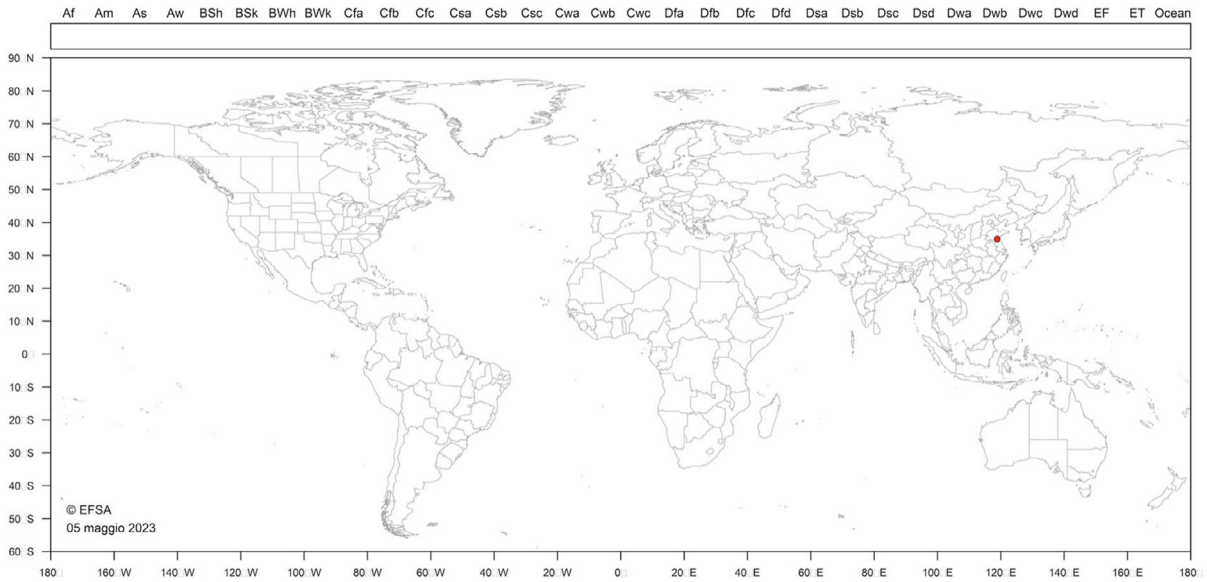

Figure 1: Global distribution of *Setoptus parviflorae* (Source: Kuang, 1998.). The dot represents the only location where this mite has been reported, which corresponds to Nanjing (China)

3.2.2. Pest distribution in the EU

Is the pest present in the EU territory? If present, is the pest in a limited part of the EU or is it scarce, irregular, isolated or present infrequently? If so, the pest is considered to be not widely distributed.

No, *S. parviflorae* is not known to occur in any part of the EU.

3.3. Regulatory status

3.3.1. Commission Implementing Regulation 2019/2072

S. parviflorae is not listed in Annex II of Commission Implementing Regulation (EU) 2019/2072, an implementing act of Regulation (EU) 2016/2031, or in any emergency plant health legislation.

3.3.2. Hosts or species affected that are prohibited from entering the Union from third countries (Table 2)

Table 2: List of plants, plant products and other objects that are *Setoptus parviflorae* hosts whose introduction into the Union from certain third countries is prohibited (Source: Commission Implementing Regulation (EU) 2019/2072, Annex VI)

List of plants, plant products and other objects whose introduction into the Union from certain third countries is prohibited			
	Description	**CN code**	**Third country, group of third countries or specific area of third country**
1.	Plants of [...] *Pinus* L. [...], other than fruit and seeds	ex 0602 20 20 ex 0602 20 80 ex 0602 90 41 ex 0602 90 45 ex 0602 90 46 ex 0602 90 47 ex 0602 90 50 ex 0602 90 70 ex 0602 90 99 ex 0604 20 20 ex 0604 20 40	►**M4** Third countries other than Albania, Andorra, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Canary Islands, Faeroe Islands, Georgia, Iceland, Liechtenstein, Moldova, Monaco, Montenegro, North Macedonia, Norway, Russia (only the following parts: Central Federal District (Tsentralny federalny okrug), Northwestern Federal District (Severo- Zapadny federalny okrug), Southern Federal District (Yuzhny federalny okrug), North Caucasian Federal District (Severo-Kavkazsky federalny okrug) and Volga Federal District (Privolzhsky federalny okrug)), San Marino, Serbia, Switzerland, Türkiye, Ukraine and the United Kingdom(1)◄

(1): In accordance with the Agreement on the withdrawal of the United Kingdom of Great Britain and Northern Ireland from the European Union and the European Atomic Energy Community, and in particular Article 5(4) of the Protocol on Ireland/ Northern Ireland in conjunction with Annex 2 to that Protocol, for the purposes of this Annex, references to the United Kingdom do not include Northern Ireland.

3.4. Entry, establishfment and spread in the EU

3.4.1. Entry

Is the pest able to enter into the EU territory? If yes, identify and list the pathways.

Yes, due to their small size, eriophyoid mites are easily moved around with plant material with needles.

Comment on plants for planting as a pathway.

Because of the intimate relationship between eriophyoid mites and their host plants, plants for planting are the main entry pathway of *S. parviflorae*.

Eriophyoids have a high potential as adventive mite species because their small size makes them difficult to detect and easy to be distributed via world trade of plants for planting (Navia et al., 2010). Table 3 lists potential entry pathways.

Table 3: Potential pathways for *Setoptus parviflorae* into the EU

Pathways (e.g. host/intended use/source)	**Life stage**	**Relevant mitigations [e.g. prohibitions (Annex VI), special requirements (Annex VII) or phytosanitary certificates (Annex XI) within Implementing Regulation 2019/2072]**
Plants of *Pinus parviflora* other than fruit and seeds	All life stages	Annex VI: (1) Plants of *Pinus* L., other than fruit and seeds are prohibited from countries where *S. parviflorae* is known to occur (i.e. China). Annex VII: (30) Naturally or artificially dwarfed plants for planting other than seeds from countries where *S. parviflorae* is known to occur (i.e. China) are subjected to special requirements.

Pathways (e.g. host/intended use/source)	Life stage	Relevant mitigations [e.g. prohibitions (Annex VI), special requirements (Annex VII) or phytosanitary certificates (Annex XI) within Implementing Regulation 2019/2072]
		Derogations: Commission Implementing Regulation (EU) 2020/1217 on a derogation from Implementing Regulation (EU) 2019/2072 concerning the introduction into the Union of naturally or artificially dwarfed plants for planting of [...] certain species of *Pinus* L., originating in Japan, and repealing Decision 2002/887/EC. Although *S. parviflorae* is not known to occur in Japan, its host (*P. parviflora*) is native to Japan

The EFSA Plant Health Panel adopted a Commodity risk assessment of bonsai plants from China consisting of *P. parviflora* grafted on *Pinus thunbergii* in December 2021 (EFSA PLH Panel, 2022). The panel concluded that with 95% certainty, 9,114 or more bonsai plants per 10,000 would be free from *S. parviflorae*. Therefore, as soon as this trade is allowed, an entry pathway for *S. parviflorae* to the EU would open. Should this mite be native to Japan and Korea (see 3.1.3), the existing derogation for artificially dwarfed plants for planting of [...] certain species of *Pinus* L., originating in Japan (EU) 2020/1217) would provide an additional entry pathway to the EU. Because Eurostat or FAOSTAT do not provide current data on bonsai plants imported in the EU, Table 4 presents the number of *P. parviflora* bonsai plants exported from Japan to the EU in the years 2002–2008, before the current EU Plant Health Regime.

Table 4: Overview of the number of *Pinus parviflora* bonsai plants exported from Japan to the EU in the years 2002–2008 (European Commission, 2008; in EFSA PLH Panel, 2019)

Year:	2002	2003	2004	2005	2006	2007	2008
Number of *P. parviflora* bonsai plants exported from Japan to the EU	18,151	17,731	18,431	16,589	17,093	18,241	21,289

Notifications of interceptions of harmful organisms began to be compiled in Europhyt in May 1994 and in TRACES in May 2020. As at 07.06.2023, there were no records of interception of *S. parviflora* in the Europhyt and TRACES databases.

3.4.2. Establishment

Is the pest able to become established in the EU territory?

Yes, although there is a high degree of uncertainty on where in the EU it could establish. The single location where S. *parviflorae* has been reported has a climate type also occurring in the EU. However, whether the host plant was growing outdoors or indoors, is unknown. Therefore, there is uncertainty about the climatic requirements for establishment of this mite. As *P. parviflora* is a common ornamental plant in gardens and arboreta and as a bonsai in the EU, *S. parviflorae* might be able to establish in those areas where the host is grown.

Climatic mapping is the principal method for identifying areas that could provide suitable conditions for the establishment of a pest taking key abiotic factors into account (Baker, 2002). Availability of hosts is considered in Section 3.4.2.1. Climatic factors are considered in Section 3.4.2.2.

3.4.2.1. EU distribution of main host plants

P. parviflora is a pine species native to Korea (Ullung island) and Japan, characteristic to subalpine areas and hardy to zone 5, which means cold hardiness limits between –28.8°C and – 23.3°C. In Europe, *P. parviflora* is a common ornamental in temperate-zone gardens and arboreta, and a popular tree for bonsai (Bannister and Neuner, 2001; in Earle, 2020).

3.4.2.2. Climatic conditions affecting establishment

Nanjing, the city where *S. parviflorae* was found, has a humid subtropical climate (Köppen–Geiger Cfa climate type; Kottek et al., 2006). However, *S. parviflorae* was not recorded on this tree species in a natural environment but in a botanical garden (Kuang, 1998). In China, *P. parviflora* is an exotic

species (see Section 3.1.3) and Kuang (1998) did not describe whether the mite was found outdoors or under protected cultivation. So, it is unknown which climatic conditions would allow for establishment of this mite species outdoors. In the EU, the Cfa climate type can be found in some areas of Bulgaria, Croatia, France, Greece, Italy, Portugal (Azores), Romania and Spain (Figure 2).

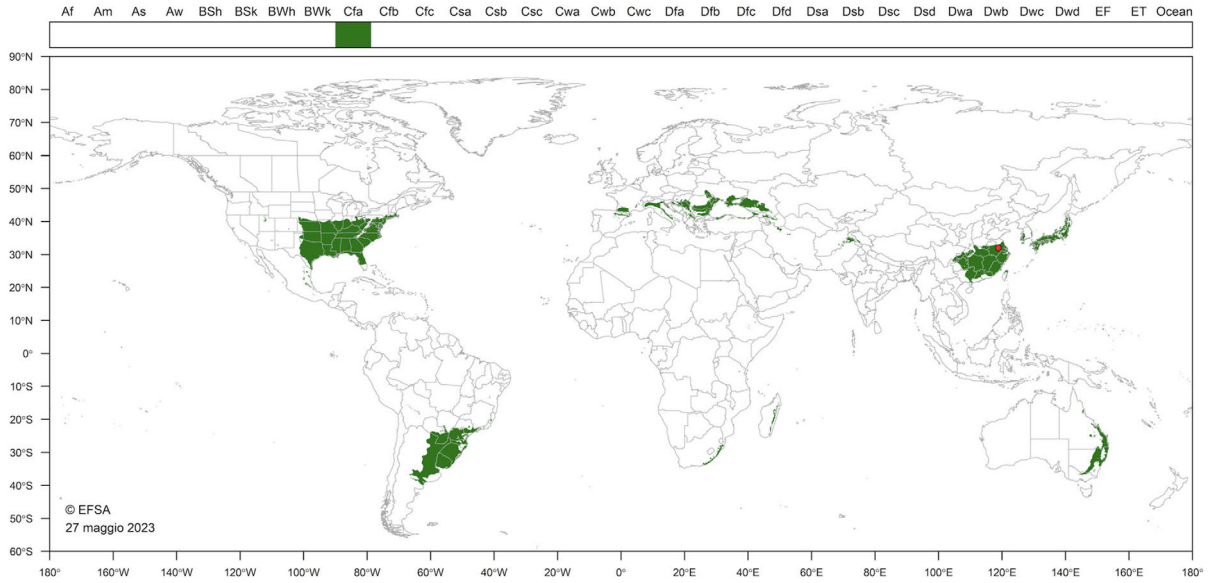

Figure 2: Occurrence of the Köppen–Geiger Cfa-climate type (humid subtropical climate) worldwide

3.4.3. Spread

Describe how the pest would be able to spread within the EU territory following establishment?

S. parviflorae depends mostly on passive dispersal by wind, pollinators or water and especially human-assisted movement of infested plant material for spread.

Comment on plants for planting as a mechanism of spread.

Because of the intimate relationship between eriophyoid mites and their host plants, plants for planting are the main spread pathway of *S. parviflorae*.

According to EFSA PLH Panel (2022), the main possible ways of eriophyoid mite dispersal are by wind, pollinators (phoresy), water (Lindquist et al., 1996) and pruning (NVWA, 2020). Eriophyoid mites could also spread with trade on propagation material, fresh fruits, cut flowers, buds and in some cases seeds (Navia et al., 2010). Although there are examples of eriophyoid species developing inside seeds, which could use these seeds as a pathway (i.e. *Trisetacus kirghsorum* Shectchenko with *Juniperus* sp. seeds; Oganezova and Pogosova, 1994), seeds are not likely to be used as a means of spread for eriophyoid species not developing inside the seeds (Navia et al., 2010), like *S. parviflorae*.

3.5. Impacts

Would the pests' introduction have an economic or environmental impact in the EU territory?

No. There is no evidence of impact in the area where the mite is known to occur (Nanjing, China), nor in the countries where the host (*P. parviflora*) is native (Japan and Korea). On this basis an economic or environmental impact in the EU territory by this mite is unlikely.

There is no evidence of impact in the area where the mite is known to occur (Nanjing, China), or in the countries where the host (*P. parviflora*) is native (Japan and Korea). However, because of the presumed allopatric nature of this mite-host association, the possibility that this mite could breed on other *Pinus* spp. occurring in Europe and cause an impact cannot be completely excluded although is considered unlikely based on the biology of eriophyoid mites.

3.6. Available measures and their limitations

Are there measures available to prevent pest entry, establishment, spread or impacts such that the risk becomes mitigated?

Yes, see Section 3.3.2 on current measures inhibiting entry. Additional measures are also available to inhibit entry and spread.

3.6.1. Identification of potential additional measures

Phytosanitary measures (prohibitions) are currently applied to some host plants for planting (see Section 3.3.2).

Additional potential risk reduction options and supporting measures are shown in Sections 3.6.1.1 and 3.6.1.2.

3.6.1.1. Additional potential risk reduction options

Potential additional control measures are listed in Table 5.

Table 5: Selected control measures (a full list is available in EFSA PLH Panel, 2018) for pest entry/establishment/spread/impact in relation to currently unregulated hosts and pathways. Control measures are measures that have a direct effect on pest abundance

Control measure/Risk reduction option (Blue underline = Zenodo doc, Blue = WIP)	RRO summary	Risk element targeted (entry/ establishment/ spread/impact)
Require pest freedom	Source host plants from a pest free area, pest free place of production or pest free production site.	Entry/Spread
Growing plants in isolation	Plants could be grown in dedicated structures such as glass or plastic greenhouses with eriophyoid mite-proof screens.	Entry (reduce contamination/ infestation)/Spread
Managed growing conditions	Plants collected directly from natural habitats, have been grown, held and trained for at least two consecutive years prior to dispatch in officially registered nurseries, which are subject to an officially supervised control regime	Entry (reduce contamination/ infestation)/Spread
Roguing and pruning	Roguing is defined as the removal of infested plants and/or uninfested host plants in a delimited area, whereas pruning is defined as the removal of infested plant parts only without affecting the viability of the plant.	Spread/Impact
Chemical treatments on crops including reproductive material	Sulphur is a common pesticide against eriophyoid mites. There is uncertainty on whether *P. parviflora* could tolerate this active substance. Sulfur (and other contact insecticides/ acaricides) is expected to have a low efficacy as long as the mites are hidden in the sheaths, but that of systemic insecticides and acaricides are expected to be efficient (as for other eriophyids).	Spread/Impact
Chemical treatments on consignments or during processing	According to Navia et al. (2010) fumigation with methyl bromide was very effective against eriophyoid mites. This fumigant is prohibited in the EU.	Entry/Spread
Physical treatments on consignments or during processing	Navia et al. (2010) reported a dose of radiation necessary to control most mites of around 300 Gy. Should this dose not be harmful for the host plant (*P. parviflora*), it could be used against *S. parviflorae*.	Entry/Spread
Cleaning and disinfection of facilities, tools and machinery	The physical and chemical cleaning and disinfection of facilities, tools, machinery, transport means, facilities and other accessories (e.g. boxes, pots, pallets, palox, supports, hand tools). The measures addressed in this information sheet are: washing, sweeping and fumigation.	Entry/Spread

Control measure/Risk reduction option (Blue underline = Zenodo doc, Blue = WIP)	RRO summary	Risk element targeted (entry/ establishment/ spread/impact)
Waste management	If roguing is applied, the removed parts should be destroyed (e.g. burned/deep burial)	Establishment/Spread
Heat and cold treatments	According to Navia et al. (2010) thermal treatments for eriophyoid mites have been recommended for containment and could be used as a complementary RRO.	Entry/Spread
Controlled atmosphere	Navia et al. (2010) consider that low O_2 storage probably would not replace pre-storage fumigation with methyl bromide against eriophyoid mites but could provide a complementary RRO.	Entry/Spread (via commodity)
Post-entry quarantine and other restrictions of movement in the importing country	A post-entry quarantine period of 3 months during period of active growth is applied to naturally or artificially dwarfed plants of *P. parviflora* from Japan (Commission implementing regulation 2020/1217/EC).	Establishment/Spread

3.6.1.2. Additional supporting measures

Potential additional supporting measures are listed in Table 6.

Table 6: Selected supporting measures (a full list is available in EFSA PLH Panel, 2018) in relation to currently unregulated hosts and pathways. Supporting measures are organisational measures or procedures supporting the choice of appropriate risk reduction options that do not directly affect pest abundance

Supporting measure (Blue underline = Zenodo doc, Blue = WIP)	Summary	Risk element targeted (entry/ establishment/ spread/impact)
Inspection and trapping	Inspection is defined as the official visual examination of plants, plant products or other regulated articles to determine if pests are present or to determine compliance with phytosanitary regulations (ISPM 5). The effectiveness of sampling and subsequent inspection to detect pests may be enhanced by including trapping and luring techniques.	Establishment/Spread
Laboratory testing	Examination, other than visual, to determine if pests are present using official diagnostic protocols. Diagnostic protocols describe the minimum requirements for reliable diagnosis of regulated pests.	Establishment/Spread
Sampling	According to ISPM 31, it is usually not feasible to inspect entire consignments, so phytosanitary inspection is performed mainly on samples obtained from a consignment. It is noted that the sampling concepts presented in this standard may also apply to other phytosanitary procedures, notably selection of units for testing. For inspection, testing and/or surveillance purposes the sample may be taken according to a statistically based or a non-statistical sampling methodology.	Establishment/Spread
Phytosanitary certificate and plant passport	An official paper document or its official electronic equivalent, consistent with the model certificates of the IPPC, attesting that a consignment meets phytosanitary import requirements (ISPM 5) (a) export certificate (import) (b) plant passport (EU internal trade)	Entry/Establishment/ Spread

Supporting measure (Blue underline = Zenodo doc, Blue = WIP)	Summary	Risk element targeted (entry/ establishment/ spread/impact)
Certified and approved premises	Mandatory/voluntary certification/approval of premises is a process including a set of procedures and of actions implemented by producers, conditioners and traders contributing to ensure the phytosanitary compliance of consignments. It can be a part of a larger system maintained by the NPPO in order to guarantee the fulfilment of plant health requirements of plants and plant products intended for trade. Key property of certified or approved premises is the traceability of activities and tasks (and their components) inherent the pursued phytosanitary objective. Traceability aims to provide access to all trustful pieces of information that may help to prove the compliance of consignments with phytosanitary requirements of importing countries.	Establishment/Spread
Certification of reproductive material (voluntary/official)	Plants come from within an approved propagation scheme and are certified pest free (level of infestation) following testing; Used to mitigate against pests that are included in a certification scheme.	Establishment/Spread
Delimitation of Buffer zones	ISPM 5 defines a buffer zone as 'an area surrounding or adjacent to an area officially delimited for phytosanitary purposes in order to minimise the probability of spread of the target pest into or out of the delimited area, and subject to phytosanitary or other control measures, if appropriate' (ISPM 5). The objectives for delimiting a buffer zone can be to prevent spread from the outbreak area and to maintain a pest free production place (PFPP), site (PFPS) or area (PFA).	Spread
Surveillance	Surveillance to guarantee that plants and produce originate from a Pest Free Area could be an option.	Spread

3.6.1.3. Biological or technical factors limiting the effectiveness of measures

- Minute eggs and motiles difficult to detect.
- Symptomless plants.

3.7. Uncertainty

To the best of our knowledge, there is only one report on this species (Kuang, 1998). Eriophyoid mites usually have a very narrow host range. The genus *Setoptus* is limited to *Pinus* and *Tsuga*. *S. parviflorae* is known to occur on *P. parviflora* in Nanjing (China), only. However, *P. parviflora* is not native to China. Therefore, the host range of *S. parviflorae* could be wider than known and could perhaps breed on other *Pinus* spp. occurring in the EU, where impact cannot be ruled out. However, eriophyoid mites are usually host specific. Moreover, *S. parviflorae* could have been introduced in China with its host from Japan or Korea, where *P. parviflora* is indigenous and, therefore, be more widespread than currently known. This uncertainty, though, is not key and does not affect the conclusions of this categorisation, as there are no reports of damage in China, Korea and Japan.

4. Conclusions

S. parviflorae does not satisfy all of the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union quarantine pest, as there is no evidence of impact (Table 7).

Table 7: The Panel's conclusions on the pest categorisation criteria defined in Regulation (EU) 2016/2031 on protective measures against pests of plants (the number of the relevant sections of the pest categorisation is shown in brackets in the first column)

Criterion of pest categorisation	Panel's conclusions against criterion in Regulation (EU) 2016/2031 regarding Union quarantine pest	Key uncertainties
Identity of the pest (Section 3.1)	*Setoptus parviflorae* Kuang is a clearly defined species of eriophyoid mite.	None
Absence/presence of the pest in the EU (Section 3.2)	*Setoptus parviflorae* is not known to occur in any part of the EU.	None
Pest potential for entry, establishment and spread in the EU (Section 3.4)	Due to their small size eriophyoid mites are easily moved around with plant material, with plants for planting being the most important pathway for entry and subsequent spread. There is uncertainty on the climatic requirements for establishment.	None
Potential for consequences in the EU (Section 3.5)	There is no evidence of impact in the area where the mite is known to occur (Nanjing, China), nor in the countries where the host (*P. parviflora*) is native (Japan and Korea). As a consequence, whether this mite could have an impact on the EU territory is unlikely.	None
Available measures (Section 3.6)	There are measures to prevent pest entry (i.e. pest free areas), establishment (i.e. post quarantine requirements), spread and impact.	None
Conclusion (Section 4)	*S. parviflorae* does not satisfy all of the criteria that are within the remit of EFSA to assess for it to be regarded as a potential Union quarantine pest as there is no evidence of impact.	None
Aspects of assessment to focus on/scenarios to address in future if appropriate:	At present it is impossible to identify *Setoptus* spp. from Eastern Asia to species level (NVWA, 2020). The accepted 15 *Setoptus* species are described scattered over the world: Europe, Asia, Africa, North and South America (Chetverikov et al., 2019). Identification of most of these species relies on their original descriptions and they can often be separated based on minor morphological characters only. Chetverikov et al. (2019) stated: '*S. pini* and all *Setoptus* spp. described from China need to be redescribed because the original descriptions are very poor, with inadequate drawings and morphometrics. Often type material is lost or not available for study by deterioration'. As a consequence, a revision of the taxonomy of the genus *Setoptus* would be instrumental to refine this categorisation, as well as any other of *Setoptus* spp. occurring in Eastern Asia.	

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Abbreviations

EPPO	European and Mediterranean Plant Protection Organization
FAO	Food and Agriculture Organization
IPPC	International Plant Protection Convention
ISPM	International Standards for Phytosanitary Measures
MS	Member State
PFA	pest free area
PFPP	pest free production place
PFPS	pest free production site
PLH	EFSA Panel on Plant Health
PZ	Protected Zone
TFEU	Treaty on the Functioning of the European Union
ToR	Terms of Reference

Glossary

Containment (of a pest)	Application of phytosanitary measures in and around an infested area to prevent spread of a pest (FAO, 2021).
Control (of a pest)	Suppression, containment or eradication of a pest population (FAO, 2021).
Entry (of a pest)	Movement of a pest into an area where it is not yet present, or present but not widely distributed and being officially controlled (FAO, 2021).
Eradication (of a pest)	Application of phytosanitary measures to eliminate a pest from an area (FAO, 2021).
Establishment (of a pest)	Perpetuation, for the foreseeable future, of a pest within an area after entry (FAO, 2021).
Greenhouse	A walk-in, static, closed place of crop production with a usually translucent outer shell, which allows controlled exchange of material and energy with the surroundings and prevents release of plant protection products (PPPs) into the environment.
Hitchhiker	An organism sheltering or transported accidentally via inanimate pathways including with machinery, shipping containers and vehicles; such organisms are also known as contaminating pests or stowaways (Toy and Newfield, 2010).
Impact (of a pest)	The impact of the pest on the crop output and quality and on the environment in the occupied spatial units.
Introduction (of a pest)	The entry of a pest resulting in its establishment (FAO, 2021).
Pathway	Any means that allows the entry or spread of a pest (FAO, 2021).
Phytosanitary measures	Any legislation, regulation or official procedure having the purpose to prevent the introduction or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests (FAO, 2021).
Quarantine pest	A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled (FAO, 2021).
Risk reduction option (RRO)	A measure acting on pest introduction and/or pest spread and/or the magnitude of the biological impact of the pest should the pest be present. A RRO may become a phytosanitary measure, action or procedure according to the decision of the risk manager.
Spread (of a pest)	Expansion of the geographical distribution of a pest within an area (FAO, 2021).

Appendix A – *Setoptus parviflorae* host plants/species affected

Host status	Host name	Plant family	Common name	Reference
Cultivated hosts	*Pinus parviflora*	Pinaceae	Japanese white pine	Kuang (1998)

Appendix B – Distribution of *Setoptus parviflorae*

Region	Country	Sub-national (e.g. State)	Status	Reference
Asia	China	Jiangsu	Present, no details	Kuang (1998)