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SLU Risk Assessment of Plant Pests

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Coccotrypes cyperi – distribution, host plants and potential for establishment in Sweden and the Nordic region

1 Terms of reference

The bark beetle species *Coccotrypes cyperi* (Beeson) was intercepted in Sweden in February 2021 on a bonsai tree of *Ficus retusa* most probably introduced from another country. Scolytidae[1] spp. (non-European) are regulated as quarantine pests in the EU (Regulation (EU) 2019/2072). In order to adapt and optimize the risk management of the interception of *C. cyperi* further information about the species, e.g. in terms of distribution, host species and the potential impact, is needed.

SLU Risk Assessment of Plant Pests was requested by the Swedish Board of Agriculture to make a quick assessment of the species and to provide answers to the following questions:

1) Can it be confirmed that *Coccotrypes cyperi* is a non-European species?
2) What is the likelihood of establishment outdoors in Sweden and the Nordic region?
3) Can *C. cyperi* attack plant species relevant for Sweden and the Nordic region?

2 Distribution and climatic suitability

Coccotrypes cyperi originates in South East Asia (Wood 2007), but has spread far outside its native range. It is for example stated to have been introduced to America in the early 1900s and intercepted on imported bird seeds and avocado seeds (Wood 1982). More recently in Europe, the species has been intercepted, e.g. in Cyprus on plants for planting of *Ficus microcarpa* from China in 2013 and 2015 (EPPO 2013, 2015).

[1] Scolytidae was previously considered a distinct family but is currently considered a subfamily, named Scolytinae, of Curculionidae (EPPO, 2021).

Currently *C. cyperi* is reported from Africa (the Seychelles), Asia, Central and South America, North America and Oceania (Table 1). In continental North America, the distribution is limited to the most southern parts (only present in Louisiana and southern Florida in the USA). No record of *C. cyperi* being present in Europe was found and thus it fulfills the criteria in Regulation (EU) 2019/2072 of being a non-European species.

Table 1. Distribution of *Coccotrypes cyperi*

Continent	Country	Comment	References
Africa	The Seychelles	In fruit (*Sandorictrrn indicum*), seed (*Pentadesma butyracea*) and twig (*Calophyllum inophyllum*). All records from the mountains (250-700 m). First country record.	Beaver 1987
Asia	China	From bark of *Pinus kesiya* in southern parts of Yunnan province. Also reported from Fujian, Xizand (Tibet)	Chang et al. 2017; Bright 2021
	India	Andaman Islands, Assam, Karnataka, Kerala, Maharashtra, Tamil Nadu, West Bengal	Maiti & Saha 1986; Wood 2007; Bright 2021
	Indonesia	Java	Maiti & Saha 1986; Wood 2007; Bright 2021
	Malaysia	Breeding in bark (no host species specified)	Wood 2007; Bright 2021
	Myanmar (Burma)	Breeding in bark (no host species specified)	Maiti & Saha 1986; Wood 2007, Bright 2021
	Sri Lanka		Bright 2021
	Taiwan		Beaver & Liu 2010; Bright 2021
	Vietnam		Bright 2021
Central America & Caribbean	Barbados		Bright 2021
	British Virgin Islands		Bright 2021
	Costa Rica	Petioles of *Cecropia obtusifolia, C. peltana, C. insignis*, cut branches of *Apeiba tibourbou, Eschweilera biflava, Gustavia*	Jordal & Krikendall 1998; Wood 2007; Morillo & Berkov 2019; Bright 2021

Continent	Country	Comment	References
		brachycarpa, Lonchocarpus macrophyllus, Luehea seemannii. Alien species.	
	Cuba	From *Rhizophora mangle*	Gomez et al. 2020
	Dominica		Bright 2021
	Dominican Republic		Bright 2021
	Grenada		Bright 2021
	Guadeloupe		Wood 2007; Bright 2021
	Honduras		Bright 2021
	Jamaica		Bright 2021
	Monserrat		Young 2008; Bright 2021
	Martinique		Wood 2007; Bright 2021
	Netherlands Antilles		Bright 2021
	Panama	Branch of *Spondias mombi* and seed of *Mangifera indica.*	Atkinson & Martinez 1985; Wood 2007; Bright 2021
	Puerto Rico	In logs of *Calophyllum calaba*, *Ceiba pentandra* and *Sloanea berterana*. In seeds of *Mammea americana*, *Pouteria multiflora* and *Mammea americana.*	Wood 1978; Bright & Torres 2006; Bright 2021
North America	Mexico	Trap catches and from *Magnifera indica*	Equihua-Martinez 1992; Pérez-De La Cruz et al. 2009; Bright 2021
	USA	Found in Louisiana, Florida (southern tropical part) and Hawaii. First recorded in USA in 1934.	Wood 1978; Atkinson & Peck 1994; Haack 2001; Wood 2007; Haack & Rabaglia 2013; Bright 2021
South America	Bolivia		Bright 2021
	Brazil	Trap catches	Maiti & Saha 1986; Wood 2007; Bright 2021
	Chile, Easter Island	First recorded in 2009	Kirkendall 2018; Bright 2021
	Ecuador		Bright 2021

Continent	Country	Comment	References
	Peru	Trap catches and from *Cecropia*. New country record.	Smith et al. 2017; Bright 2021
	Saint Lucia		Bright 2021
	Saint Vicente and the Grenadines		Bright 2021
	Suriname		Wood 2007; Bright 2021
	Trinidad and Tobago		Wood 2007; Bright 2021
	US Virgin Islands		Bright 2021
Oceania	Australia	Status provided "Exotic Species Outbreak in Australia". Reported from Queensland.	Walker 2008; Bright 2021
	Cook Islands		Beaver and Maddison 1990; Bright 2021
	Fiji	Trap	Wardlaw et al. 2012; Bright 2021
	French Polynesia		Wood 1978
	Micronesia		Bright 2021
	New Zealand	'an introduction'	Bright 2021
	Papua New Guinea	Leaf litter samples	Lucky et al. 2015; Bright 2021
	Samoan Islands		Maiti & Saha, 1986; Wood 2007; Bright 2021

No studies were found specifying the climatic requirements for *C. cyperi*, but the species is reported to occur in tropical and subtropical environments (e.g. Atkinson & Peck 1994; Kirkendall 2018; Table 1).

On a larger scale the Köppen-Geiger climate zones can be used to identify the climate types prevailing in areas where *C. cyperi* is present. Based on the Köppen-Geiger climate classifications as defined by Beck et al. (2018), many of the reports are from areas with tropical climates, either regions with only tropical climate represented e.g. the Seychelles, Puerto Rico, Trinidad and Tobago and other Caribbean Islands or with location coordinates in tropical zones, e.g. Costa Rica (Morillo & Berkov 2019) and Peru (Smith et al. 2017). The species is also reported from areas with a temperate type of climate e.g. in Yunnan province in China (Chang et al. 2017) which is represented by sub-tropical climates (Köppen-Geiger climate types Cwa,

Cwb). It can be noted that in a survey across Costa Rica at different altitudes, *C. cyperi* was not found in the 'Highlands' (Jordal & Kirkendall 1998).

The Nordic region is mainly represented by temperate, cold and polar climates (Figure 1). The temperate Köppen-Geiger climate Cfb (Temperate oceanic, with no dry season and warm summers), which is found in Europe from France up to the southern parts of the Nordic region, is also found in some parts at high altitude, in some of the countries/states/provinces where the species is reported. There is, however, no specific support for that the species has been found or is able to survive in this type of temperate climate (c.f. Jordal & Kirkendall 1998).

In conclusion, based on the current distribution of *C. cyperi* the climate of the Nordic region is assessed as unsuitable for potential establishment.

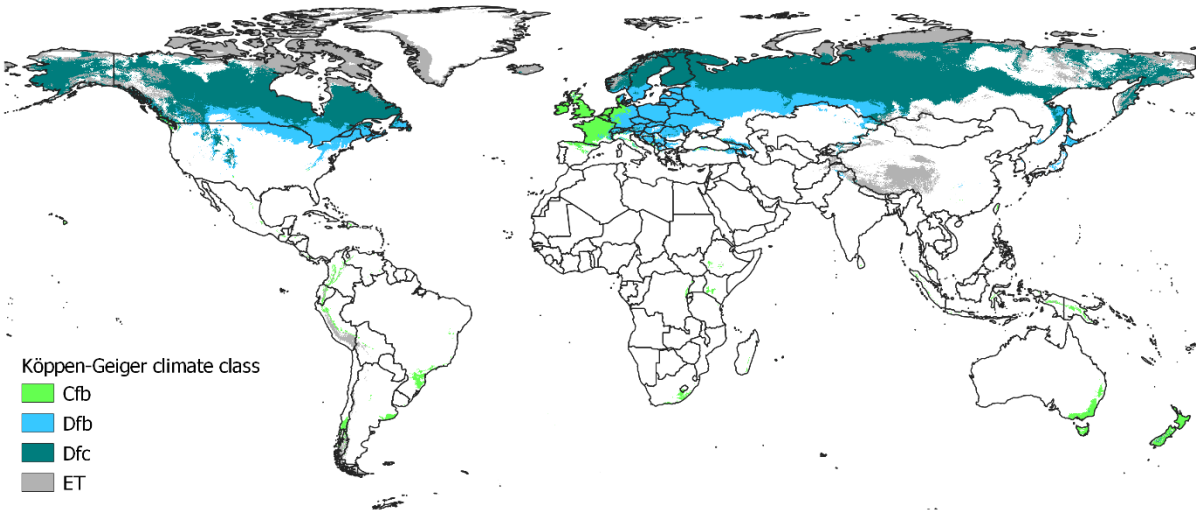

Figure 1. The global prevalence of the main Köppen-Geiger climate types found in the Nordic region (Cfb = Temperate oceanic climate; Dfb = Warm-summer humid continental climate; Dfc = Subarctic climate; ET = Tundra climate). The Köppen-Geiger climate classifications map data are from Beck et al. (2018) and based on the climate during the period 1980-2016 (available under the CC BY-NC 4.0 license, downloaded from www.gloh2o.org/koppen and here displayed in a modified version). Country borders are from naturalearthdata.com. The maps were created using qGIS (QGIS Development Team 2020).

3 Host plants

Coccotrypes cyperi breeds in fruits, seeds (referred to as a seed borer), petioles, phloem, twigs, under bark of branches and logs (Roberts 1976; Beaver 1987; Jordal & Kirkendall 1998; Walker 2008; Kirkendall 2018).

The species is very polyphagous and has been reported from at least 50 host plant species (Table 2). However, none of the host plants listed at species level are established outdoors in Sweden (Dyntaxa 2021) nor in the Nordic regions (Euro+Med 2021). *Persea americana* is a host of *C. cyperi* and it is listed in both Dyntaxa (2021) and Euro+Med (2021) but since it does not survive the winters we do not consider it as a potential outdoor host in the Nordic area. At the genus level it can be noted that e.g. *Myrica* sp. are listed as hosts and *Myrica gale* is present in the Nordic region, but it is not present in the current area of distribution of *C. cyperi* (POWO 2019). Due to the expected large differences between the environmental conditions in areas where *C. cyperi* is established and those in the Nordic region it is not considered relevant to list all species present in the Nordic regions which belongs to the same genus as other known hosts.

Table 2. Host plants of *Coccotrypes cyperi* (EPPO Code: COCOCY) based on a litterature search including both primary and secondary sources.

Plant species	EPPO Code	Comment	Reference for host status
Aesculus punchuana			Wood 2007
Amoora walichii			Wood 2007
Apeiba tibourbou	APBTI	Dead wood, Costa Rica	Morillo & Berkov, 2019
Artocarpus lacucha	ABFLA	Recorded as *Artocarpus lakoocha*	Wood 2007
Attalea vitrivir	ORBOL	Recorded as *Orbignya oleifera*	Wood 2007
Borassus flabellifer	BASFL		Wood 2007
Calophyllum calaba	CMUCA	Log	Bright & Torres 2006
Calophyllum inophyllum	CMUIN	Twig, the Seychelles	Beaver 1987
Canarium strictum			Wood 2007
Carallia brachiata	KRLBR	Recorded as *Carallia lucida*	Wood 2007
Cecropia sp.	1CECG	In Peru	Smith et al. 2017
Cecropia insignis		In Costa Rica	Jordal & Kirkedall 1998

Plant species	EPPO Code	Comment	Reference for host status
Cecropia obtusifolia		In Costa Rica	Jordal & Kirkedall 1998
Cecropia peltata	CECPE	In Costa Rica	Jordal & Kirkedall 1998
Ceiba pentandra	CEIPE	Log	Bright & Torres 2006
Coffea sp.	1COFG	From "coffee berries"	Beaver (1987) citing LePelley (1968)
Cossia arabica			Wood 2007
Cynometra hemitobophylla			Wood 2007
Dipterocarpus retusus	DIXRE	*"Diptocarpus trinervis"* is assumed to be a misspelling of "*Dipterocarpus trinervis"* which is a synomym of "*Dipterocarpus retusus*"	Wood 2007
Eleocarpus oblongus			Wood 2007
Eschweilera biflava		Dead wood, Costa Rica	Morillo & Berkov, 2019
Eugenia spp.	1EUEG		Wood & Bright 1992
Eugenia formosa	SYZFR		Wood 2007
Euterpe oleracea	ETQOL	Palm trees in Peruvian Amazonia	Delobel et al. 1995
Ficus glomerata	FIUGM		Wood 2007
Ficus retusa	FIURT	On an imported bonsai tree	Swedish Board of Agriculture 2021, personal communication
Gluta travancoria			Wood 2007
Gustavia brachycarpa		Dead wood, Costa Rica	Morillo & Berkov, 2019
Lonchocarpus macrophyllus		Dead wood, Costa Rica	Morillo & Berkov, 2019
Luehea seemannii	LUHSE	Dead wood, Costa Rica	Morillo & Berkov, 2019
Macademia indica			Wood 2007
Macaranga denticulata	MCRDE		Wood 2007

Plant species	EPPO Code	Comment	Reference for host status
Mangifera indica	MNGIN	In seed, Panama and Puerto Rica, also in Mexico	Atkinson & Martinez 1985; Bright & Torres 2006; Pérez- De La Cruz et al. 2009
Mammea americana	MAFAM	Seeds	Bright & Torres 2006; Wood 2007
Myrica sp.	1MYRG		Wood 1978
Oenocarpus bataua	IESBA	Recorded as *Jessenia bataua*. Palm trees in Peruvian Amazonia	Delobel et al. 1995
Pentadesma butyracea	PNDBU	Seed, the Seychelles	Beaver 1987
Persea americana	PEBAM	Seeds	Wood 1982; Wood 2007
Phytelephas macrocarpa	PJPMA	"*Phytellephas macrocarpa"* is presumed to be a misspelling	Wood 2007
Pinus caribaea	PIUCB	Found once in dead stems in Fiji	Roberts 1976
Pinus kesiya	PIUKE	Southern parts of Yunnan province, China	Chang et al. 2017
Pouteria multiflora	POJMU	Seeds	Bright & Torres 2006
Pronia copaifer			Wood 2007
Rhizophora mangle	RHZMA	Cuba	Gomez et al. 2020
Salmalia sp.		India	Maiti & Saha 1986
Sandoricum koetjape	SNOKO	Recorded as *Sandoricum indicum*. Immature fruit, in the Seychelles	Beaver 1987
Scheelea bassleriana		Palm trees in Peruvian Amazonia	Delobel et al. 1995
Spondias mombin	SPXMO	Branch, in Panama	Atkinson & Martinez 1985
Swietenia macrophylla	SWIMA		Wood 2007
Swintonia floribunda	SWOFL		Wood 2007
Terminalia myriocarpa	TEMMC		Wood 2007

Plant species	EPPO Code	Comment	Reference for host status
Theobroma cacao	THOCA		Wood 2007
Vateria indica	VATIN		Wood 2007
Xylia xylocarpa	XYLXY	Recorded as *Xylia dolabriformis*	Wood 2007

4 Impact

Few publications were found where *C. cyperi* was considered to be a potential pest outdoors. Roberts (1976) for example states that *C. cyperi* should be regarded as a potential pest on pines in Fiji. He found *C. cyperi*, sometimes in high densities, in four to six months old bark-covered pine logs, but not in freshly felled trees. He states that such attacks on "old" wind felled trees normally would not be of any economic concern but due to the special circumstances in Fiji, where hurricane damage can be expected almost annually, *C. cyperi* could potentially become a pest.

According to Beaver (1987) there is no evidence that *C. cyperi* should cause any significant economic damage and according to Kirkendall (2018) there are no known risks associated with *C. cyperi*.

5 Conclusion

It is clear from the literature that *Coccotrypes cyperi* is a non-European species. The likelihood of establishment outdoors in Sweden and the Nordic region, is assessed[2] as very low (with low uncertainty) since 1) based on the evidence provided the ecoclimatic conditions in Sweden and the Nordic region is assessed as unsuitable for establishment of *C. cyperi* outdoors and 2) there appears to be a lack of host plant species established outdoors. Taking also the low potential for impact into account the likelihood that *C. cyperi* could become an outdoor pest in the Nordic region was assessed as very low with low uncertainty.

6 Acknowledgement

We would like to thank Åke Lindelöw (SLU) and Torstein Kvamme (NIBIO) for reviewing the report.

[2] The likelihood was assessed using a 5-level scale (very low, low, moderate, high, very high) and the uncertainty using a 3-level scale (low, moderate, high) used by EPPO (2020).

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