The Food & Environment Research Agency

Rapid Pest Risk Analysis for

Dialeuropora decempuncta (Breadfruit whitefly)

This document provides a rapid assessment of the risks posed by the pest to the UK in order to assist Risk Managers decide on a response to a new or revised pest threat. It does not constitute a detailed Pest Risk Analysis (PRA) but includes advice on whether it would be helpful to develop such a PRA and, if so, whether the PRA area should be the UK or the EU and whether to use the UK or the EPPO PRA scheme.

STAGE 1: INITIATION

1. What is the name of the pest?

Dialeuropora decempuncta (Quaintance & Baker, 1917) (Hemiptera: Aleyrodidae); commonly known as the breadfruit whitefly.

Synonyms: *Dialeurodes dothioensis* Dumbleton 1961; *Dialeurodes perseae* Corbett 1935: *Dialeurodes (Dialeuropora) setigerus* Takahashi 1932; *Dialeuropora decempunctata* Takahashi.

2. What is the pest's status in the EC Plant Health Directive (Council Directive 2000/29/EC[1]) and in the lists of EPPO[2]?

Not listed in the EC Plant Health Directive, or in any of the EPPO lists.

3. What is the reason for the rapid assessment?

Dialeuropora decempuncta is a whitefly that feeds on a wide range of plants, belonging to 24 families. It is native to southern Asia, and has spread to Australia, the Pacific Region and the Middle East. It is one of the most commonly intercepted whitefly species in England and Wales. Since 1996, it has frequently been found on imported aquatic plants at exceptionally high densities (up to 300+ immature stages per leaf), and with many mature puparia from which adults emerge while the sample is examined at the Fera laboratory. The majority of interceptions of other whitefly species on plant material are of early instars at much lower densities, and adults are very rarely observed. Statutory action has been taken against *Dialeuropora decempuncta* on two occasions, when it was found infesting 30 plants of *Echinodorus radican/ Piper sarmentosum* (both plant names appear on the original paperwork) imported from Singapore in 2003, and *Limnophila* plants imported from Singapore in 2012. A rapid assessment was requested to help determine if a detailed PRA is required in order to guide policy.

STAGE 2: RISK ASSESSMENT

4. What is the pest's present geographical distribution?

Dialeuropora decempuncta is native to Asia, and has spread to Australia, the Pacific and the Middle East. The main reference for the following geographical records is Evans (2008), other records were obtained from the Natural History Museum (NHM), London.

North America: absent.
Central America: absent.
South America: absent.
Caribbean: absent.
Europe: absent.
Africa: absent.

[1] http://europa.eu.int/eur-lex/en/consleg/pdf/2000/en_2000L0029_do_001.pdf
[2] http://www.eppo.org/QUARANTINE/quarantine.htm

Middle East: Iran; Israel.
Asia: Andaman and Nicobar Islands (Vasantharaj & Dubey, 2006); Cambodia; India (Dubey *et al*., 2004; Jesudasan *et al*., 2003; Sundararaj & Dubey, 2007); Indonesia; Malaysia; Myanmar (Burma) (David & Dubey, 2012); New Guinea; Pakistan; Philippines; Singapore; Sri Lanka; Sulawesi; Taiwan; Thailand.
Oceania: Australia; Cook Islands; Guam; New Caledonia.

5. Is the pest established or transient, or suspected to be established/transient in the UK? *(Include information on interceptions and outbreaks here).*

There have been multiple (40) interceptions of *D. decempuncta* in England since 1996 on plant produce and growing plants imported from Asia (see Appendix 1). It has been most frequently intercepted on *Piper sarmentosum* aquatic plants imported from Singapore, and on guava *Psidium guajava* foliage imported from India and Pakistan. The guava leaves are used for packing guava fruit. The true number of accidental imports of *D. decempuncta* into England is likely to be much higher, as the plant health inspectors no longer submit samples of the whitefly found on leaves from India and Pakistan to the Fera laboratory.

Dialeuropora decempuncta has been found together with the regulated whitefly pests *Bemisia tabaci* on twelve occasions and *Aleurocanthus woglumi* on five occasions (Appendix 1).

No breeding populations of *D. decempuncta* have been found in the UK, and it's current status is absent.

6. What are the pest's natural and experimental host plants; of these, which are of economic and/or environmental importance in the UK?

Dialeuropora decempuncta feeds on plants assigned to at least 24 families (see Table 1). It is most commonly recorded on tropical crops that are not grown in the UK, however, it has been recorded feeding on aubergine, cucumber, *Prunus,* rose, *Rubus* and tomato. It also feeds on marginal aquatic plants that are grown indoors in the UK, including *Echinodorus radican, Limnophila* and *Piper sarmentosum*.

Bandyopadhyay & Santhakumar (2002) were the first to record it on a range of vegetable crops grown in West Bengal.

Table 1: Hosts plants of *Dialeuropora decempuncta* (main sources Evans (2008) and NHM collections)

Plant family	Host plant	Comment
Alismataceae	*Echinodorus radican*	Aquatic ornamental
Anacardiaceae	*Mangifera indica*	Mango
Annonaceae	*Annona cherimola*	Cherimoya
	Annona reticulata	Custard apple (Jesudasan et al., 2003)
	Annona squamosa	Soursop
Araceae	*Colocasia*	
Asteraceae	*Helianthus annuus*	Sunflower
Boraginaceae	*Cordia myxa*	Assyrian Plum
Burseraceae	*Canarium* sp.	
Combretaceae	*Terminalia* sp.	
Cucurbitaceae	*Cucumis sativus*	Cucumber
Fabaceae	*Acacia longifolia*	Long-leaved wattle
	Dalbergia sissoo	Indian rosewood
Lauraceae	*Cinnamomum* sp.	Cinnamon
	Machilus sp.	
	Persea americana	Avocado
Loganiaceae	*Strychnos* sp.	
Malvaceae	*Abutilon indicum*	Indian mallow
Meliaceae	*Lansium* sp.	
	Sida cordifolia	Country mallow
Moraceae	*Artocarpus altilis*	Breadfruit
	Morus alba	White mulberry
	Ficus racemosa	Cluster fig tree
	Streblus asper	Toothbrush tree
Myrtaceae	*Eucalyptus camalduleis*	River red gum tree
	Psidium guajava	Guava fruit
	Xanthostemon sp.	

Musaceae	*Musa* sp.	
Rhamnaceae	*Alphitonia* sp.	
Piperaceae	*Piper betle*	Betle
	Piper sarmentosum	Wild betle
Phyllanthaceae	*Breynia* sp.	
	Glochidion sp.	
Plantaginaceae	*Limnophila*	Ornamental aquatic plant
Rosaceae	*Prunus* sp.	
	Rosa indica	Rose
	Rosa sp.	Rose
	Rubus sp.	
Solanaceae	*Solanum indicum*	
	Solanum lycopersicum	Tomato
	Solanum melongena	Aubergine
	Solanum nigrum	Black nightshade
Sapotaceae	*Dimocarpus longan*	Longan fruit

7. If the pest needs a vector, is it present in the UK?
No vector is required. These are free-living organisms.

8. What are the pathways on which the pest is likely to move and how likely is the pest to enter the UK and transfer to a suitable host? (*By pathway*):

Pathway 1. Aquatic ornamental plants imported from Asia
There have been multiple interceptions of *D. decempuncta* on aquatic plants (mainly *Piper sarmentosum*) imported from Singapore. The infested plants are usually grown as marginal aquatic water plants and are not submerged in water. *D. decempuncta* is polyphagous and it is therefore possible that it could transfer from the marginal aquatic plants to other ornamental plants grown under protection in the vicinity.

There is also an unquantifiable risk that adult *D. decempuncta* could transfer from infested marginal aquatic plants to tomato plants, if both types of plant were sold from the same garden centre.

Very unlikely	Unlikely	Moderately likely	Likely	Very likely
		X		

Pathway 2. Produce imported from Asia
There have been multiple interceptions of *D. decempuncta* on foliage used for packing fruit imported from India and Pakistan, however, these leaves are likely to be discarded shortly after arrival, and there is no obvious pathway to growing plants.

Very unlikely	Unlikely	Moderately likely	Likely	Very likely
X				

9. How likely is the pest to establish outdoors or under protection in the UK?
Dialeuropora decempuncta occurs widely in tropical and subtropical areas and establishment is therefore likely to be restricted to protected ornamental plants (e.g., marginal aquatic plants) or botanical collections with tropical houses. Considering the large amount of movement of the pest with imports, it seems surprising that no colonies of *D. decempuncta* have been reported on protected ornamentals in the UK. This may be due to populations of *D. decempuncta* being overlooked or unreported, as they are not causing any noticeable damage.
Bandyopadhyay & Santha Kumar (2008) reported that in greenhouses in West Bengal, kept at 25 degrees C with 80% relative humidity, the duration required for the completion of one life cycle of the whitefly was 40-60 days. Data are not available regarding its development at lower temperatures.

	Very unlikely	Unlikely	Moderately likely	Likely	Very likely
Outdoors	X				
Under protection		X	X		

10. How quickly could the pest spread in the UK?
The adults are the main dispersal stage but are weak fliers. Spread is likely to be in trade.

Natural dispersal

Very slowly		Slowly		Moderate pace		Quickly		Very Quickly	
	X								

Trade

Very slowly		Slowly		Moderate pace		Quickly		Very Quickly	
			X		X				

11. What is the area endangered by the pest?
The endangered area is protected ornamental plantings, and to a lesser extent glasshouse vegetable crops. Botanical collections grown under tropical conditions are at greatest risk, and it may be limited to a small number of large public botanical collections.

12. What is the pest's economic, environmental or social impact within its existing distribution?
Large populations of *D. decempuncta* can cause chlorosis and leaf loss, and it is a major pest of mulberry (the food plant of the silk moth), occasionally causing huge economic losses in West Bengal, India (Bandyopadhyay et al., 2000, 2001, 2002a, 2002b, 2004, 2005, 2006, 2007, 2008 and 2010; Mukhopadhyay et al., 2005; Rajkhowa & Chakravorty, 2004; Singh et al., 2005). It also damages custard apple *Annona reticulata* in India (Jesudasan et al., 2003), and has been recorded on a range of crops in West Bengal, including aubergine, cucumber, sunflower and tomato (Bandyopadhyay & Santhakumar, 2002), and banana (Bandyopadhyay & Kumar, 2006), although there is no indication of economic impact to the latter.

Mulberry in West Bengal

Very small		Small		Medium		Large		Very large	X

Other host plants in Asia, Australia, Pacific Region and the Middle East

Very small		Small	X	Medium		Large		Very large	

13. What is the pest's potential to cause economic, environmental or social impacts in the UK?
In the absence of control measures it may have the potential to have an impact on individual ornamental plants in tropical hothouses, or occasionally on glasshouse vegetable crops such as aubergine, cucumber and tomato. However, there have been no reports of it causing economic damage to glasshouse vegetable crops, and there is no clear pathway from botanical collections to commercial vegetable crops. It is a major pest of mulberry in India, and black and white mulberry are grown outdoors in the UK as ornamentals, and black mulberry for fruit, however, *D. decempuncta* is likely to be restricted to indoor plantings in the UK. Therefore, its potential economic, environmental and social impact in the UK is likely to be negligible, especially as there are no reports of established colonies despite ample opportunity.

Very small		Small		Medium		Large		Very large	
	X								

14. What is the pest's potential as a vector of plant pathogens?
Dialeuropora decempuncta is not known to be vector of any plant pathogen.

STAGE 3: PEST RISK MANAGEMENT

15. What are the risk management options for the UK? *(Consider exclusion, eradication, containment, and non-statutory controls; under protection and/or outdoors).*

The cultural, biological and chemical management of *D. decempuncta* has been studied in great detail on mulberry in West Bengal (Bandyopadhyay *et al*., 2000, 2002, 2004, 2005, 2006, 2010; Bandyopadhyay & Kumar, 2000, 2007; Bandyopadhyay & Santha Kumar, 2007; Patnaik *et al*., 2009).

Dialeuropora decempuncta is likely to be continually introduced into England on aquatic ornamental plants imported from Singapore. Destruction of infested plants and precautionary treatment of those remaining may be the simplest and most straightforward way of achieving eradication. *Dialeuropora decempuncta* is likely to be restricted to protected plants and may be controlled by using the same products used against the regulated whitefly pest *Bemisia tabaci*.

16. Summary and conclusion of rapid assessment.

This rapid assessment shows:

Risk of entry –moderately likely (on growing plants from Asia)

There have been multiple interceptions of *D. decempuncta* on marginal aquatic plants (mainly *Piper sarmentosum*) imported from Singapore. *D. decempuncta* is broadly polyphagous and it is therefore possible that it could transfer from aquatic plants to other ornamental plants grown under protection in the vicinity. It is likely to continue to enter the UK on growing plants from Asia and there may be localised transient populations on protected ornamental plants. There is no clear pathway from protected ornamental plant collections to commercial vegetable glasshouses.

Risk of establishment – unlikely to moderately likely on indoor plantings, very unlikely outdoors

Dialeuropora decempuncta is a tropical species that is very unlikely to naturalise and overwinter outdoors in Britain, but may establish on indoor plantings. It has been regularly intercepted in the UK for a decade on growing plants, and no incursions have so far been reported.

Rate of spread – moderate (in trade)

Economic impact – may have a small impact to indoor ornamentals

Dialeuropora decempuncta is an economic pest of a small number of crops, most notably mulberry, however, mulberry is usually grown outdoors in the UK whereas *D. decempuncta* is likely to be restricted to indoor plantings. It can breed on a range of glasshouse vegetable crops, including aubergine, cucumber and tomato, although it has not been recorded having an economic impact on these crops.

Endangered area – indoor plantings

Risk management – may be controlled by using the same products currently used for other whiteflies

In the absence of phytosanitary measures *D. decempuncta* is likely to continue to arrive in the UK. However, if incursions occur, it may be controlled using the same products used for other glasshouse whiteflies already present in the UK.

17. Is there a need for a detailed PRA? If yes, select the PRA area (UK or EU) and the PRA scheme (UK or EPPO) to be used.

No	X

Yes		PRA area: UK or EU		PRA scheme: UK or EPPO	

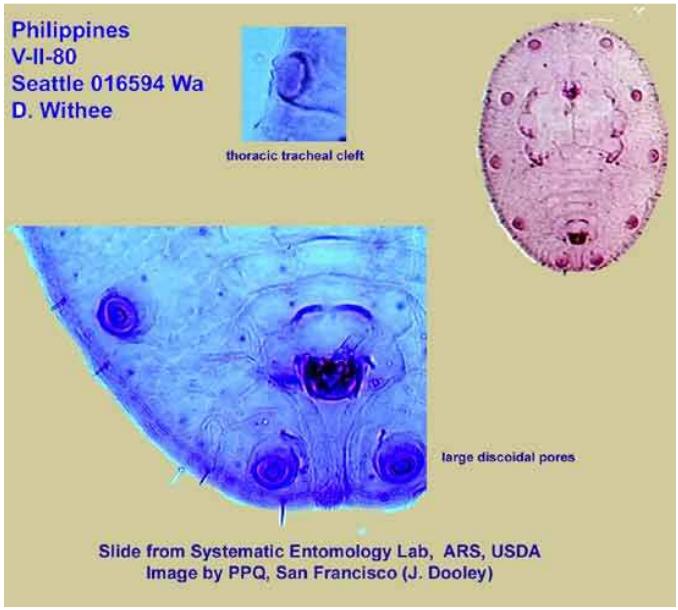
18. IMAGES OF PEST

Dialeuropora decempuncta puparium showing the blue iridescent wax secretions

Dialeuropora decempuncta adult showing the banded wings

Dialeuropora decempuncta puparium *showing* the blue iridescent wax secretions

Dialeuropora decempuncta empty pupal case with wax secretions removed



19. Given the information assembled within the time scale required, is statutory action considered appropriate / justified?

Dialeuropora decempuncta is a tropical species and although transient incursions may occur on protected ornamental plants, the potential economic, environmental and social impact in the UK is likely to be negligible.

Yes Statutory action		No Statutory action	X

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Appendix 1.

Interceptions of *Dialeuropora decempuncta* in England and Wales

F = foliage; P = growing plant

Host plant	Type	Country of origin	Date	Regulated whitefly species in the sample
Unspecified	F	Thailand	22-Nov-96	
Echinodorus radican, *Piper sarmentosum*	P	Singapore	12-Jun-03	*Bemisia tabaci*
Psidium guajava	F	Pakistan	07-Dec-05	*Bemisia tabaci*
Psidium guajava	F	India	06-Jan-06	*Bemisia tabaci*
Psidium guajava	F	Pakistan	21-Feb-06	*Bemisia tabaci*
Piper sarmentosum	F	Thailand	08-May-06	
Piper betle	F	Thailand	23-Aug-06	
Piper betle	F	Thailand	15-Dec-06	
Psidium guajava	F	Pakistan	05-Jan-07	*Aleurocanthus woglumi, Bemisia tabaci*
Psidium guajava	F	Pakistan	20-Feb-07	*Bemisia tabaci*
Psidium guajava	F	Pakistan	08-Mar-07	*Aleurocanthus woglumi*
Piper sarmentosum	F	Thailand	01-Jun-07	
Annona reticulata	F	India	10-Aug-07	*Aleurocanthus woglumi*
Psidium guajava	F	India	10-Sep-07	*Aleurocanthus woglumi, Bemisia tabaci*
Psidium guajava	F	India	30-Oct-07	*Bemisia tabaci*
Piper sarmentosum	F	Thailand	31-Dec-07	
Psidium guajava	F	India	21-Jan-08	*Bemisia tabaci*
Unspecified	P	Singapore	13-May-08	
Psidium guajava	F	Pakistan	03-Nov-08	*Bemisia tabaci*
Piper sarmentosum	P	Singapore	29-Sep-09	
Psidium guajava	F	India	10-Aug-10	*Bemisia tabaci*
Piper sarmentosum	P	Singapore	26-May-11	
Annona reticulata	F	India	31-Aug-11	*Aleurocanthus woglumi*
Piper sarmentosum	P	Singapore	29-Sep-11	
Piper sarmentosum	P	Singapore	06-Oct-11	
Piper sarmentosum	P	Singapore	20-Oct-11	
Piper sarmentosum	P	Singapore	09-Nov-11	
Piper sarmentosum	P	Singapore	15-Nov-11	
Piper sarmentosum	P	Singapore	15-Nov-11	
Piper sarmentosum	P	Singapore	16-Nov-11	
Piper sarmentosum	P	Singapore	23-Nov-11	
Piper sarmentosum	P	Singapore	25-Nov-11	
Piper sarmentosum	P	Singapore	30-Nov-11	
Piper sarmentosum	P	Singapore	30-Nov-11	
Piper sarmentosum	P	Singapore	07-Dec-11	
Limnophila	P	Singapore	09-Mar-12	
Limnophila	P	Thailand	28-Jun-12	*Bemisia tabaci*
Piper sarmentosum	P	Camdodia	26-Oct-12	
Piper sarmentosum	P	Cambodia	2-Nov-12	
Alternenthera	P	Thailand	28-Nov-12	