Rapid assessment of the need for a detailed Pest Risk Analysis for *Contarinia maculipennis*

Disclaimer: 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?
Contarinia maculipennis Felt (Diptera: Cecidomyiidae)
Known as blossom midge.

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]?
This pest is not listed in the EC Plant Health Directive and is not recommended for regulation as a quarantine pest by EPPO, nor is it on the EPPO Alert List. It is however, recorded as a regulated pest by some countries, for example the Agri-Food and Veterinary Authority of Singapore record it as a Regulated Non Quarantine Pest (RNQP) (AVA, 2010).

3. What is the reason for the rapid assessment?
Contarinia maculipennis was intercepted on four occasions in 2011, in each case on a consignment of orchids from Thailand. A Dutch PRA already exists for this pest (van der Gaag *et al*., 2007). After discussion at the October 2011 Risk Management Workstream meeting, a Rapid Assessment was requested for this pest to help identify the most appropriate actions to take when it is intercepted. A recommendation for destruction / re-export was issued after the first interception, although the consignment had not been detained. After a subsequent interception, a forward-looking recommendation was issued that no action should be taken when the pest is found on cut flowers on the basis that there was unlikely to be a pathway from packaged cut flowers to orchid growers.

STAGE 2: RISK ASSESSMENT

4. What is the pest's present geographical distribution?
Contarinia maculipennis is thought to have originated in South East Asia, and to have subsequently been distributed elsewhere through the international trade in *Dendrobium* cut flowers (Uechi *et al*., 2011). It is currently known to be present in Japan, Thailand and the USA (Hawaii and Florida) (Gagné, 1995).

5. Is the pest established or transient, or suspected to be established/transient in the UK? *(Include summary information on interceptions and outbreaks here).*
Contarinia maculipennis is not known to be present in the UK; it is known only from interceptions at UK points of entry.

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

6. What are the pest's natural and experimental host plants; of these, which are of economic and/or environmental importance in the UK?
Contarinia maculipennis is a polyphagous species that has been recorded from eight plant families with the greatest number of separate hosts recorded from the Solanaceae. However, the primary hosts appear to be species of *Dendrobium* orchids, and possibly also bitter gourd (*Momordica charantia*) (Uechi *et al*., 2007), although reduction of fruit yield on the latter has not yet been reported (Uechi *et al*., 2011).

The midge has been recorded from the following hosts (Uechi *et al*., 2011):

Amaranthaceae: *Pseuderanthemum laxiflorum*;
Apocynaceae: *Plumeria* rubra (frangipani);
Brassicaceae: *Brassica chinensis* (Chinese cabbage or pak-choi);
Cucurbitaceae: *Momordica charantia* (bitter gourd);
Malvaceae: *Hibiscus* sp., *Hibiscus rosa-sinensis*;
Oleaceae: *Jasminum sambac* (Arabian jasmine);
Orchidaceae: *Dendrobium phalaenopsis*, *Dendrobium* spp;
Solanaceae: *Capsicum frutescens*, *Capsicum annuum* (peppers), *Lycopersicon chilense*, *Lycopersicon esculentum* (tomato*)*, *Lycopersicon peruvianum*, *Solanum melongena* (aubergine or egg plant), *Solanum tuberosum* (potato), *Solanum rantonnetii* (blue potato bush or Paraguay nightshade)*.*

Early experimental work (Jensen, 1946) demonstrated that adults reared from one host could attack the flower buds of other host plant species.

The following hosts are grown under glass in the UK: *Dendrobium* spp., *Hibiscus* spp., *Brassica chinensis*, *Capsicum annuum, Lycopersicon esculentum, Solanum melongena.*

7. If the pest needs a vector, is it present in the UK?
The pest does not require a vector.

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

(a) Trade in Dendrobium cut flowers: The pest is already thought to have been distributed through the international trade in *Dendrobium* cut flowers.

The four UK interceptions were all on orchid cut flowers from Thailand. There is some confusion over the hosts involved as the use of the terms "Phalaenopsis" or "Phalaenopsis hybrids" outside of a scientific context may refer to the known host species *Dendrobium phalenopsis* rather than the genus *Phalenopsis* (note that the Japanese plant quarantine service have intercepted the pest on *Dendrobium phalaenopsis* from both Thailand and Singapore: Iwaizumi R. *et al*., 2007).

Contarinia maculipennis was reported to have been found in a Dutch orchid glasshouse in 2001; the population was subsequently eradicated. A report from 2007 that *C. maculipennis* reached a second Dutch glasshouse (population also eradicated) was not officially confirmed by the Dutch Plant Protection Service. In addition, the Dutch intercepted *C. maculipennis* "several times in imported *Dendrobium* cut flowers from Thailand" between 2004 and 2007 (van der Gaag *et al*., 2007) (no subsequent information available).

Therefore, the trade in *Dendrobium* cut flowers from Thailand is known to be an active pathway and the pest is known to be arriving at UK ports-of-entry. However, there is no apparent clear pathway from imported cut flowers to orchid growers (unless UK orchid growers are importing and then re-packaging cut flowers).

Dendrobium cut flowers:	Very unlikely		Unlikely	X	Moderately likely		Likely		Very likely	

(b) Trade in Dendrobium cuttings: In Europe, *C. maculipennis* has only been officially intercepted on cut flowers. This seems likely to be related to the biology of the pest as the larvae feed inside the unopened buds. Cut flowers transported in trade usually carry buds; orchid cuttings usually do not. However, were plants with infested buds to be imported, and the Dutch report that this does happen albeit at very low levels (van der Gaag *et al*., 2007), the pathway to UK orchid growers would be more direct. What is unknown is the exact way in which UK orchid growers source new varieties and cuttings, and the scale of such importation. In the case of the Dutch outbreak of 2007 the affected grower had imported a small consignment of plants with buds from Thailand; the 2001 Dutch outbreak is thought to have been sourced from infected nursery stock from Thailand (van der Gaag *et al*., 2007). More information on the trade in new cuttings and varieties, in the UK would reduce uncertainty, particularly how many come in with buds and soil attached.

Dendrobium cuttings:	Very unlikely		Unlikely	X	Moderately likely		Likely		Very likely	

9. How likely is the pest to establish outdoors or under protection in the UK?
Text✓✓ *(put tick in box)*

Contarinia maculipennis is a species that originated within, and is adapted to tropical climates and is very unlikely to establish outdoors in the UK. However, it is has shown the ability to survive and/or thrive under glasshouse conditions. It is present under glass in Japan (Okinawa Island), and in central and southern Florida (Gagné, 1995). It has been found twice under glass in the Netherlands (van der Gaag *et al*., 2007).

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

10. How quickly could the pest spread in the UK?
Natural spread is unlikely to be a major factor within the UK as the pest is unlikely to establish outdoors; spread by the trade is a more likely means of distribution within the UK. However, this would require movement of plants with infested buds between different production sites, as the adult is short-lived and a weak flier (although sites adjacent to an infested glasshouse would be at risk). Further information is required as to whether or not such movement occurs.

Natural spread:	Very slowly	X	Slowly		Moderate pace		Quickly		Very quickly	
In trade:	Very slowly		Slowly	X	Moderate pace		Quickly		Very quickly	

11. What is the area endangered by the pest?
Glasshouse production sites that grow any of the pest's known hosts, though *Dendrobium* production sites are the main risk (particularly if they source plants from Thailand).

12. What is the pest's economic, environmental or social impact within its existing distribution?
Infested flower buds usually remain closed and become deformed and discoloured. In severe cases, this may lead to premature bud or blossom drop. Even light damage to the

buds can make the subsequent flowers unmarketable. This sort of damage has been seen on *Dendrobium* species in Hawaii, Japan, and the Netherlands. In Thailand the midge is reported to not be very important as a pest (Tokuda *et al*., 2002), although the number of interceptions on orchids imported from Thailand could contradict this. On Okinawa Island in Japan, because the commercial value of the infested orchids is reduced to zero the frequency of insecticide applications on orchid crops doubled once the pest arrived under glass (Tokuda *et al*., 2002). Several growers in Japan gave up the cultivation of orchids because of the occurrence of blossom midge (Tokuda, 2002). In Hawaii, the midge is able to cause severe damage on orchid farms and control can be difficult (van der Gaag *et al*., 2007, quoting a personal communication from Arnold Hara). No specific indication of damage levels on other hosts is given in the literature (van der Gaag *et al*., 2007) although other hosts such as hibiscus, tomato and jasmine have been attacked in Hawaii, and hibiscus has also been attacked in Florida.

Very small		Small		Medium		Large	X	Very large	

13. What is the pest's potential to cause economic, environmental or social impacts in the UK?

The effect of the midge would be economic and limited to glasshouse production of orchids, and possibly other hosts, particularly hibiscus. If UK orchid growers became infested, crop damage is likely to lead to plants or crops of high value becoming unmarketable. Based on the Dutch experience, eradication is likely to be expensive because in 2007 all flowers were removed and crops were treated three times a week for three weeks, both labour and chemically intensive. Assuming eradication can be achieved, the short term impact would be high, but there would be no long term impact of the pest. The low potential for spread is likely to isolate impacts to growers receiving propagation material from the same sources.

There is further uncertainty about the potential impact as (a) it is unclear how likely it is that the pest would transfer to a new host and so cause damage to hosts other than *Dendrobium*, and (b) the extent and inter-connectivity of cultivated *Dendrobium* and *Hibiscus* in the UK needs further investigation.

The midge does not have the potential to cause environmental or social impacts in the UK.

Very small		Small		Medium		Large	X	Very large	

14. What is the pest's potential as a vector of plant pathogens?

Contarinia maculipennis is not known to vector any plant pathogens.

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).*

Exclusion: There is a single pathway, cut flowers of *Dendrobium*, along which this midge is known to be moving. The risk of this pathway to UK orchid growers is believed to be low; however, it would be significant if growers have adjacent facilities for orchids imported from South East Asia. The biology of the pest makes introduction on *Dendrobium* cuttings without buds unlikely. However, Dutch orchid growers have estimated that 1 in 10,000 *Dendrobium* cuttings can have buds. Depending on the level of infestation in the country of export this could present a risk. The risks of outbreaks could be reduced by careful sourcing of planting material and nurseries holding planting material in quarantine areas after receipt. In addition, inspection (at import by PHSI and by nursery staff) of any buds found on *Dendrobium* cuttings may help prevent introduction.

Eradication and Containment: Glasshouse infestations have twice been successfully eradicated in the Netherlands (2001, 2007: van der Gaag *et al*., 2007). The outbreak in 2001 was not easy to eradicate, and the outbreak in 2007 was controlled by the removal of flowers and buds in addition to three insecticide treatments a week for three weeks. However, UK growers are more restricted in the range of chemicals immediately available for use. To replicate the eradication strategy used by the Netherlands at least two Specific Off Label Approvals (SOLAs) would need to be applied for. Also eradication could be prolonged by the fact that only the adult stage is vulnerable to contact insecticides; the larval stages are protected within the buds and the pupae burrow into the soil. Thus, the standard eradication strategy of attempting to target all life stages might be difficult to achieve. Nevertheless, good crop hygiene controls – such as removing and destroying all fallen buds, as well as infested buds still on the plant – are important management practices for controlling this blossom midge (Hara, & Niino-DuPonte, 2002). Containment is also likely to be possible by preventing the movement of plants to other orchid growers.

16. Summary and conclusion of rapid assessment.
(Highlight key uncertainties and topics that will require particular emphasis in a detailed PRA) General / overall summary and conclusion and then specific text on each part of assessment...

This rapid assessment shows:

Risk of entry
Successful entry is considered to be unlikely because, although the trade in *Dendrobium* cut flowers from Thailand is significant and the pest has been intercepted at UK ports-of-entry, there is a low likelihood of transfer to orchid production. There is no apparent clear pathway from imported cut flowers to orchid growers (unless UK orchid growers are importing and then re-packaging cut flowers; it is not known whether such a scenario actually occurs). In Europe, *C. maculipennis* has only been intercepted on cut flowers.

Cut flowers transported in trade usually carry buds (where the larvae feed); orchid cuttings usually do not. However, if cuttings with infested buds were to be imported, the pathway to UK orchid growers would be more direct. What is unknown is the exact way in which UK orchid growers source new varieties and cuttings, and the scale of such importation. More information on the trade in new cuttings and varieties, in the UK would reduce uncertainty, particularly how many come in with buds and soil attached.

Risk of establishment
The Dutch experience, two outbreaks under glass between 2001 and 2007, shows that establishment under glasshouse conditions is likely. Spread between different glasshouse

sites would likely require movement of plants with infested buds between different production sites. Further information is required as to whether or not such movement occurs.

As a tropical organism, the midge is very unlikely to establish outdoors.

Economic impact
The midge has had a major economic impact under glass in Japan and Florida. If UK orchid growers became infested, the crop damage is likely to lead to unmarketable plants or crops. Based on the Dutch experience, the short term cost of eradication is likely to be expensive, particularly in view of the cryptic nature of some life stages of the pest, but assuming that eradication can be achieved there would be no long term impact of the pest. The low potential for spread is likely to isolate impacts to growers receiving propagation material from the same sources.

There is further uncertainty about the potential impact as (a) it is unclear how likely it is that the pest would transfer to a new host and so cause damage to hosts other than *Dendrobium*, and (b) the extent and inter-connectivity of cultivated *Dendrobium* and *Hibiscus* in the UK needs further investigation.

Endangered area
Glasshouse production sites that grow any of the pest's known hosts, though *Dendrobium* production sites are the main risk (particularly if they source plants from Thailand). Further information is required on the number of such production sites.

Risk management
The risks of outbreaks could be reduced by careful sourcing of planting material and nurseries holding planting material in quarantine areas after receipt. Outbreaks of the pest in the Netherlands have been eradicated by roguing and insecticide treatments.

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. *(for PH Risk Management Work stream to decide)* ✓ *(put tick in box)*

Based on current information, it is recommended that this PRA is sufficient.

No	X

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

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

(a) Cut flowers: provided we can confirm with our industry that there is no clear pathway from cut flowers to orchid production we would recommend no statutory action on cut flowers.

Yes Statutory action		No Statutory action	X

(b) Cuttings going to a nursery: due to the potential direct pathway to growers

Yes Statutory action	X	No Statutory action	

19. IMAGES OF PEST

	
Fera	*Fera*

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