The Food & Environment Research Agency

Rapid Pest Risk Analysis (PRA) for

Eccopisa effractella

STAGE 1: INITIATION

1. What is the name of the pest?
Eccopisa effractella (Lepidoptera, Pyralidae): royal knot-horn moth.

2. What initiated this rapid PRA?
Following the creation of the Plant Health Risk Register in summer and autumn of 2013, this pest was marked as a priority for an updated PRA, especially to clarify the situation in the Netherlands, as the previous two page UK summary PRA was written 18 years ago following the finding of a single adult in the UK (MacLeod 1996).

3. What is the PRA area?
The PRA area is the United Kingdom of Great Britain and Northern Ireland.

STAGE 2: RISK ASSESSMENT

4. 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]?
Eccopisa effractella 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.

5. What is the pest's current geographical distribution?
This pyralid moth is known from much of continental Europe, from the Baltic and Balkans to the Iberian Peninsula, though it is apparently absent from Scandinavia (with the exception of Denmark). There are also records from the European part of Russia. It has not been recorded from other regions of the world.

Table 1: Distribution of *Eccopisa effractella*	
North America:	Absent
Central America:	Absent
South America:	Absent
Europe:	Found throughout central and southern continental Europe
Africa:	Absent
Asia:	Absent
Oceania:	Absent

Specific European country records include: Austria (Embacher 2006); Belgium (Huisman and Koster 1994); Bosnia and Herzegovina, Germany, Romania, Spain and Switzerland (Agassiz 1996); Bulgaria (Ganev 1984; Andreev 2005); the Czech Republic (Laštůvka and

[1] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2000L0029:20100113:EN:PDF
[2] https://www.eppo.int/QUARANTINE/quarantine.htm

Liška 2010); Croatia (Rebel 1904); Denmark (first reported as new to the country by Buhl *et al.* 1993; and now included in the latest checklist by Karsholt and Nielsen 2013); France (Drouet 2011); Hungary (Pastorális 2007); Italy (Huemer 2004); Lithuania (Ivinskis 2004); the Netherlands (Huisman and Koster 1994); Poland (Palm 1986; in Agassiz *et al.* 1997); Portugal (Corley *et al.* 2007); Slovenia (Lesar and Govedič 2010); and two adults from the UK (Agassiz 1996; Dungeness Bird Observatory 2007). Additionally, Karsholt *et al.* (2013) have found records from Greece, Latvia, Luxembourg, Macedonia, Russia (citing Sinev 1986) and Slovakia.

6. Is the pest established or transient, or suspected to be established/transient in the UK/PRA Area? *(Include summary information on interceptions and outbreaks here).*
There have been no interceptions of this species in the UK.

Two adults have been caught in light traps in the last 20 years, but there is no evidence of a breeding population. The first report was in 1995, in Buckingham Palace Gardens in London (Agassiz 1996), but the origin of the specimen was unknown. Since then, there has been one other report in 2006, again of a single adult, at Dungeness on the South Coast (Dungeness Bird Observatory 2007). This second record at least appears to be a genuine migrant from continental Europe. There are no other records of this species known from the UK (Mark Parsons, pers. comm. 7 August 2014). The adult is a very plain phycitine moth, with very few markings, but the male does have a very distinctive structure on the hindwing, illustrated by Agassiz (1996), which would aid identification.

7. What are the pest's natural and experimental host plants; of these, which are of economic and/or environmental importance in the UK/PRA area?
The main recorded host is *Malus sylvestris* (crab apple), with other hosts including *Prunus* (e.g., plum) and *Corylus* (hazel) (Agassiz 1996). In Bulgaria, adults were trapped in orchards containing apples, *Cydonia oblonga* (quince), *Prunus persica* (peach) and plums (Andreev 2005). Given that several genera of trees are suitable hosts, it is possible that additional species may be attacked on occasion, though Andreev (2005) did not find damage on pear, apricot or cherry.

8. What pathways provide opportunities for the pest to enter and transfer to a suitable host and what is the likelihood of entering the UK/PRA area? (*By pathway*):
<u>Plants for planting</u>
There is conflicting information about the biology of the larvae, which means that judgements made on this pathway are subject to a low level of confidence.

According to Agassiz (1996) and Huisman and Koster (1994), larvae feed in shoots and spun leaves of their host plants and have been found in July and August in the Netherlands (Huisman and Koster 1994). Therefore, there is a possibility that they could be moved with imports of trees, though deciduous trees are most commonly transported while dormant and thus would not have larvae associated with them. However, pupation can occur in leaf litter (Agassiz 1996), and so the pest may still be able to travel with dormant trees in containers with infested leaf litter.

However, studying the pest in Bulgaria, Andreev (2005) found that the larvae feed on wood, living under the bark, and only occasionally infest fruit. Pupation also takes place under the bark, and thus all life stages other than adults are highly cryptic, and could escape detection. In Bulgaria, the species is bivoltine (with a partial third generation), and the overwintering stage is reported to be larvae in diapause under bark (Andreev 2005). Therefore, these overwintering larvae could easily escape detection, and be moved with dormant plants.

Currently, there is a lack of interceptions or other data indicating this species is moving in trade, but as this trade is within the EU, it is unregulated and as such is not a priority target for inspections. Overall, this pathway is considered moderately likely but, due to the uncertainties over the biology, this has a low confidence rating.

Another factor that could potentially affect this assessment is that *E. effractella* appears to be increasing its range in the Netherlands, though it is apparently still rather a rare species. The first record of *E. effractella* from the Netherlands was in 1984, but now, based on the map of records available in Corver *et al.* (2010), there are scattered records from at least 14 locations, mostly widely separated. As over 3,000 tonnes of fruit and nut trees were imported from the Netherlands to the UK each year between 2010 and 2013 (EUROSTAT 2014), if *E. effractella* was to increase its population density in the Netherlands, then consideration would need to be given to increasing the rating for this pathway.

Fruit

Larvae occasionally feed on seeds within fruit, and though damaged fruit mostly drops from the tree (Andreev 2005) and thus will not be harvested, there is a small chance that occasional larvae could be moved in trade, concealed inside apples and other fruit. However, the numbers of larvae will be low, and fruit is usually rapidly dispersed and quickly eaten or processed. Additionally: (i) larvae would need to find a suitable host to complete development, (ii) a minimum of one male and one female would need to successfully emerge as adults, be able to locate each other and mate, and (iii) the female would need to find a suitable host for oviposition. While the UK imported over 0.3 million tonnes of fresh apples, pears and quinces from continental Europe each year between 2010 and 2013 (EUROSTAT 2014), no interceptions of *E. effractella* have been made in the UK to date. Overall this pathway is considered very unlikely, with medium confidence.

Soil

Larvae pupate in in a cocoon, often in soil litter according to Agassiz (1996), and hence there is a possibility the pupae could be moved with soil. Though soil moving within much of the EU is not subject to statutory controls, it is considered unlikely that it will contain sufficient leaf litter and other large detritus that would be likely to harbour pupae. Therefore, this pathway is considered very unlikely.

Natural spread

Though adults are small moths, they do apparently migrate at least on occasion. One of the two UK findings was at Dungeness, on the south-east coast of England (Dungeness Bird Observatory 2007), and the most likely origin of this specimen would seem to be a migrant. The Danish specimen from 1992 was also thought to be a migrant (Buhl *et al.* 1993). The UK has a large number of amateur lepidopterists, many of whom run light traps and report unusual findings through the entomological literature and otherwise. Though adults of *E. effractella* are rather drab moths with few clear wing markings, the male has a very distinctive structure on the hindwing that aids identification. If this species was regularly migrating to the UK, there would almost certainly be more reports of adults from light traps, and therefore natural spread has an overall rating of unlikely for the situation at the current time. However, *E. effractella* does appear to have been increasing its range within the last ten years in the Netherlands and Belgium, and, given the species does migrate at least occasionally, it may be that adults will arrive naturally in the UK with increasing frequency in the future. As it is not clear how fast the species is spreading in the Low Countries, the confidence for this assessment is medium.

Plants for planting	Very unlikely	☐	Unlikely	☐	Moderately likely	☑	Likely	☐	Very likely ☐
Confidence	High Confidence	☐	Medium Confidence	☐	Low Confidence	☑			
Fruit	Very unlikely	☑	Unlikely	☐	Moderately likely	☐	Likely	☐	Very likely ☐
Confidence	High Confidence	☐	Medium Confidence	☑	Low Confidence	☐			

Soil	Very unlikely	✓	Unlikely		Moderately likely		Likely		Very likely	
Confidence	High Confidence		Medium Confidence	✓	Low Confidence					
Natural spread	Very unlikely		Unlikely	✓	Moderately likely		Likely		Very likely	
Confidence	High Confidence		Medium Confidence	✓	Low Confidence					

9. How likely is the pest to establish outdoors or under protection in the UK/PRA area? (*The likelihood rating should be based on the area of potential establishment, e.g. where hosts are present and the climate is suitable, within the UK/PRA area)*
Suitable hosts (e.g., *Malus sylvestris*) are very commonly planted throughout England and much of Wales, though they are less widespread in Scotland (BSBI 2014).

There are records of *E. effractella* from large parts of the Netherlands and Belgium, where the climate is broadly comparable to the UK. In Belgium, there are records of this species in the last 10 years from all provinces, other than the two southernmost provinces of Namur and Luxembourg (De Prins and Steeman 2010). The central provinces of Brabant and Liège have records dating back to pre-1980, as well as more contemporary reports (De Prins and Steeman 2010). In the Netherlands, following the first finding of the species in 1984 (Huisman and Koster 1994), there have been a number of other records. These scattered sightings extend through much of the southern and central parts of the Netherlands, from around the Maastricht area in the south, reaching as far north as locations around Amsterdam and Zwolle (Corley *et al.* 2007). Overall, given the species' existing distribution in Europe, establishment outdoors is considered very likely, at least in southern England.

While *E. effractella* does feed on a number of deciduous tree species, there is no evidence of wider polyphagy, and, given the recorded list of hosts, suitable species are not commonly grown under protection. Additionally, no records could be found of *E. effractella* in protected cultivation. Therefore, establishment in protected environments is considered very unlikely with high confidence.

Outdoors	Very unlikely		Unlikely		Moderately likely		Likely		Very likely	✓
Confidence	High Confidence	✓	Medium Confidence		Low Confidence					
Under protection	Very unlikely	✓	Unlikely		Moderately likely		Likely		Very likely	
Confidence	High Confidence	✓	Medium Confidence		Low Confidence					

10. If the pest needs a vector, is it present in the UK/PRA area?
No vector is required. This is a free-living organism.

11. How quickly could the pest spread in the UK/PRA area?
Overall, this species appears to have the capacity to move reasonable distances by natural spread, as it does seem to migrate, at least on occasion. However, there are comparatively few records of migrants from Northern Europe and, overall, the rate of spread is assessed as occurring at a moderate pace, and this judgement is considered to have medium confidence.

There is no evidence that this species is commonly moving in trade, but larvae appear to have cryptic lifestyles, possibly hiding under bark or inside spun shoots of the host, and so there is a potential for the species to move quickly in trade, as low levels of infestation may

be hard to detect. However, due to the uncertainties in larval feeding habits and thus the potential for moving in trade, this judgement has medium confidence.

Natural Spread	Very slowly	☐	Slowly	☐	Moderate pace	☑	Quickly	☐	Very quickly	☐
Confidence	High Confidence	☐	Medium Confidence	☑	Low Confidence	☐				

With trade	Very slowly	☐	Slowly	☐	Moderate pace	☐	Quickly	☑	Very quickly	☐
Confidence	High Confidence	☐	Medium Confidence	☑	Low Confidence	☐				

12. What is the pest's economic, environmental and social impact within its existing distribution?

There is almost no information available on the impacts of this species. There is one record from Bulgaria that reports damage, and gives some quantification. Damage to fruit was very rarely seen, with less than 3% of quince fruit and less than 1.2% of apple fruit showing feeding damage, and damaged fruit usually fell to the ground (Andreev 2005). However, apples and other fruit are usually high-value crops with very little tolerance for damage, and thus even minor feeding damage may affect the value of the crop, though no reports of economic impacts could be found. Also, feeding on fruit does not seem to be the usual habitat, as larvae are reported to feed most commonly under bark (Andreev 2005). Again, no impacts from this method of feeding have been reported, though heavy infestations may affect the health of the tree over time, and the injuries could allow the entry of secondary pathogens.

Given *E. effractella* is found through much of Europe, if it was causing economic damage even on occasion, it seems likely that there would be more literature available on the species. There are a number of other native European lepidopterous pests of orchards, mostly from the family Tortricidae, e.g. *Cydia pomonella* or *Adoxophyes orana*. Therefore there is a chance that (1) damage by *E. effractella* is not reported as it is confused with that of other orchard pests, and/or (2) routine insecticide sprays against the tortricids also keep populations of *E. effractella* in check. As there is so little information, and no papers were found detailing control measures against it, therefore, the overall impact in its native range is considered to be very small with a high level of confidence.

Impacts	Very small	☑	Small	☐	Medium	☐	Large	☐	Very large	☐
Confidence	High Confidence	☑	Medium Confidence	☐	Low Confidence	☐				

13. What is the pest's potential to cause economic, environmental and social impacts in the UK/PRA area?

While *E. effractella* is recorded from the Low Countries in Europe, and thus is thought to be capable of establishing outdoors in the UK, it is considered unlikely to be capable of more than one generation per year in the UK, thus limiting the potential population densities. In the remainder of its range in Continental Europe, the summer temperatures are significantly higher than in the UK and, in Bulgaria, there are two complete generations per year, with a partial third generation (Andreev 2005). Therefore, although apples are a high-value crop in the UK (worth over £100 million per year between 2010 and 2013) (Defra 2014), it is considered that *E. effractella* will cause little damage in the UK, even if it were to reach population levels seen in the South of Europe, which is considered unlikely. Routine sprays against native tortricid pests may also keep the populations of *E. effractella* under control. When this is combined with the very scarce literature on the species, indicating few if any impacts in its current range, the potential economic, social and environmental impacts of this species in the UK are all considered to be very small with a high level of confidence.

Economic Impacts	Very small	✓	Small		Medium		Large		Very large	
Confidence	High Confidence	✓	Medium Confidence		Low Confidence					
Environ-mental Impacts	Very small	✓	Small		Medium		Large		Very large	
Confidence	High Confidence	✓	Medium Confidence		Low Confidence					
Social Impacts	Very small	✓	Small		Medium		Large		Very large	
Confidence	High Confidence	✓	Medium Confidence		Low Confidence					

14. What is the pest's potential as a vector of plant pathogens?
Eccopisa effractella is not a known vector of any plant pathogen.

15. What is the area endangered by the pest?
Southern parts of the UK would seem most at risk from this species, given the warmer summers. However, given the lack of data on the temperature requirements, it is possible that *E. effractella* may be capable of establishing outdoors in more northern areas.

STAGE 3: PEST RISK MANAGEMENT

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

Exclusion

Given there have been no interceptions of this pest to date in the UK, and only two adults have been trapped in the wider environment, continued exclusion would seem possible at the current time. However, if the larvae feed under bark, they are very cryptic and may not be detected on trees moving in trade, particularly as this moth is present in the EU, where trade in the host trees is unregulated. However, as noted in the answer to question 8, on the section on natural spread, if *E. effractella* is found more frequently in the Low Countries in future, where it is apparently expanding its range, the number of migrants arriving in the UK may increase, and thus the prospects for continued exclusion would decrease. An increase in population density in the Netherlands could also mean that trees imported from the Netherlands have a higher chance of being infested with this insect, and as noted above, larvae may not be detected in phytosanitary inspections.

Eradication and containment

If *E. effractella* was to establish in the UK, either eradication or containment would be very difficult. The low levels of damage caused by this pest would mean low populations might not be detected, giving it time to spread before its presence was identified. Trees affected will be in the wider environment, and may be too large to inspect easily, while the adults are reasonably mobile moths. If larvae feed on shoots (Agassiz 1996), then they will be more visible and there is the potential for chemical control. However, if larvae feed under the bark in wood (Andreev 2005), then infestations will be very difficult to detect. Control of any insect feeding inside growing wood is also difficult.

Non-statutory controls

Publicity to raise awareness of *E. effractella* among nurseries importing fruit trees from continental Europe, as well as commercial orchards could be considered. It is likely that some control of the pest would be achieved during the application of insecticides to control

other moth species such as codling moth and other Tortricidae, although the degree of control would be strongly influenced by the timings of the applications.

17. Summary and conclusions of the rapid PRA.
Provide an overall summary and conclusions and then short text on each section:

This rapid PRA shows:
Eccopisa effractella is a little-studied pyralid moth, found in most parts of continental Europe: from the Balkans to the Baltic, through the Low Countries to the Iberian Peninsula. However, it is not recorded from most of Scandinavia. While it feeds on apple, plum, quince and some other deciduous trees, only one report of any damage could be found, from Bulgaria, and even this report did not consider the species to be a significant pest.

Risk of entry
Four pathways were considered relevant, of which plants for planting was rated moderately likely. Although there is no evidence of the species moving in trade, inspectors may not be targeting the relevant plants for inspection, as they are moving within the EU and thus the trade is unregulated. However, larvae may be associated with shoots or found under bark (though sources disagree), and pupae with leaf litter, so there is a possibility this species could be moved in the trade in trees. As *E. effractella* is present in the Netherlands, though it is apparently not common, the ratings for this pathway would need revision if it was to increase in numbers, due to the large volume of trade between Dutch nurseries and the UK.

Movement of larvae in fruit and pupae with soil were both considered very unlikely, given the low chance of the relevant life stages being associated with each commodity, and the lack of previous interceptions.

Natural spread was considered unlikely. Although this species is a migrant that is present in continental Europe, and has been recorded at least once in the UK as a migrant, this is an uncommon event.

Risk of establishment
It is considered very likely to be able to establish outdoors, given the similarity of the UK climate to parts of the Netherlands and Belgium where *E. effractella* has been found.

It is considered very unlikely to establish in protected cultivation, due to a lack of suitable hosts grown under cover in the UK, and because this is not a recorded glasshouse pest.

Economic, environmental and social impact
In its native range, there are almost no data on any impacts and it does not seem to be a significant pest in any country, though there is a possibility the damage could be confused with other tortricid moth pests in orchards. *Eccopisa effractella* is considered unlikely to be capable of more than one generation per year in the UK, and thus is less likely to be able to build up to damaging levels. There is also the possibility this species will be controlled with routine insecticide treatments against existing orchard pests. When this is combined with the almost complete lack of reports of damage on the continent, the potential impacts in the UK are all considered to be very small.

Endangered area
Southern or sheltered parts of the UK may be more suitable for establishment than more northern areas due to the warmer temperatures.

Risk management options
Continued exclusion may be possible, but with the gradual expansion of the species' range in the Low Countries, if *E. effractella* were to become more common in the Netherlands or Belgium, then natural spread may mean exclusion from the UK over the long term is unlikely. As suitable hosts are grown outdoors, and larvae are potentially highly cryptic, eradication or

containment would not be easy. Non-statutory measures could include raising awareness of the pest among staff at tree nurseries and orchards.

Key uncertainties and topics that would benefit from further investigation
Which part of the host the larvae feed on is a key area of uncertainty: if they feed under bark, then the risk of introducing diapausing larvae on growing trees is much greater than if they feed on shoots, as trees are usually transported in a dormant state and larvae in the wood will be much harder to detect. The control options available will also depend on the feeding site of the larvae.

18. Is there a need for a detailed PRA or for more detailed analysis of particular sections of the PRA? If yes, select the PRA area (UK or EU) and the PRA scheme (UK or EPPO) to be used.
(For completion by the Plant Health Risk Group) ✓ *(put a tick in the box)*

No	✓

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

19. IMAGES OF THE PEST

Images of *Eccopisa effractella* adults, both live and pinned, can be seen at http://www.lepiforum.de/lepiwiki.pl?Eccopisa_Effractella

20. Given the information assembled within the time scale required, is statutory action considered appropriate / justified?
[*For completion by the Plant Health Risk Group*] *(put a tick in the box)*

Yes Statutory action		No Statutory action	✓

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