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CSL PEST RISK ANALYSIS FOR *CORYTHUCHA ARCUATA*

STAGE 1: PRA INITIATION

1. What is the name of the pest?

Corythucha arcuata (Say) Tingidae : Heteroptera – Oak Lace Bug.

Synonym = *Corythuca arcuata*. Note the alternative spelling of the genus, without an "h" towards the end.

French common name: punaise reticulée du chêne.

2. What is the reason for the PRA?

This PRA was initiated by the first incidence of the pest in Europe, recorded in Italy, in May 2000 (Bernardinelli & Zandigiacomo, 2000). This is only the second insect from this genus to be found in Europe. The other, *C. ciliata* (Say), a pest of *Platanus* (plane trees), was also first found in Italy in 1964 and is now widespread in Europe and occurs in the UK. The concern is that *C. arcuata* may also spread to the UK.

3. What is the PRA area?

This PRA considers the UK as the PRA area, as the pest has already established in central Europe (see 11).

STAGE 2: PEST RISK ASSESSMENT

4. Does the pest occur in the PRA area or does it arrive regularly as a natural migrant?

No. There has been no record of the pests' arrival in the UK to date.

5. Is there any other reason to suspect that the pest is already established in the PRA area?

No.

6. What is the pest's status in the Plant Health Directive (Council Directive 2000/29/EC[1])?

C. arcuata is not listed in the Plant Health Directive.

[1] http://europa.eu.int/eur-lex/en/consleg/pdf/2000/en_2000L0029_do_001.pdf

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7. What is the quarantine status of the pest in the lists of the European and Mediterranean Plant Protection Organisation (EPPO)?

EPPO List:	A1 regulated pest list		A2 regulated pest list		Action list		Alert list	✓

Corythucha arcuata was added to the EPPO Alert List in March 2003. It remains on the Alert List, which was most recently updated on 22/09/2006, although in a recent meeting of the Panel on Quarantine Pests for Forestry (March 2007) it's deletion from the list was recommended (EPPO, 2006; EPPO, 2007).

8. What are the pests' host plants?

Table 1 lists the primary hosts for *C. arcuata* in the USA where it is native (Connell & Beacher, 1947; Drake & Ruhoff, 1965). It is also occasionally found on *Acer* (maple), *Malus* (apple) and *Rosa* (roses) (Drake & Ruhoff, 1965).

Table 1: Primary hosts of *Corythucha arcuata* in the USA (Commonly used synonyms in brackets)

Scientific name	Common name
Quercus alba	White oak
Quercus macrocarpa	Bur oak
Quercus montana (*prinus*)	Chestnut oak or rock chestnut oak
Quercus muehlenbergii or muhlenbergii (*acuminata*; *prinus*)	Chinkapin oak or yellow oak
Quercus prinoides	Dwarf chinkapin oak
Quercus rubra	Red oak or Northern red oak
Castanea dentata (americana)	American chestnut

(Flora of North America Editorial Committee, 1993+)

In Italy *C.arcuata* has been found on *Quercus robur* (common, or English oak), *Q. petraea* (sessile oak) and *Q. pubescens* (downy oak), (Bernardinelli & Zandigiacomo, 2000).

9. What hosts are of economic and/or environmental importance in the PRA area?

The UK has two native species of oak trees, *Quercus robur*, the English oak, and *Quercus petraea*, the Sessile oak. They are both deciduous, with *Q. petraea* being dominant in northern and western areas and *Q. robur* more dominant in the south. Both have been very important for timber for centuries and this has led to a large reduction in the native oak forests, but they are still common in woodlands and parks and are widely planted in hedges. In addition, there are over 30 other oak species listed as occurring in the UK, including *Q. ilex*, the evergreen oak, *Q. cerris*, the turkey oak and *Q. rubra*, red oak. Also found in the UK is *Castanea sativa*, the sweet chestnut, a

relative of the American chestnut, which is usually found in parks and gardens, (Leeds City Council, 2006; Preston, Pearman & Dines, 2002). There is laboratory evidence that *C. arcuata* can survive on *C. sativa*, and *Q. cerris*, as well as a number of *Rubus spp*. (including raspberry) and *Rosa canina* (the dog rose), all of which are also found in the UK (Bernardinelli, 2006). The UK, therefore, has several important woodland and amenity species which are known to be host plants in the US and Europe, as well as other closely related species which may be potential hosts.

10. If the pest needs a vector, is it present in the PRA area?

No vector is required. This is a free-living organism.

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

Table 2: Distribution of *Corythucha arcuata*

North America:	Mostly reported in eastern USA, but it has an extensive range extending from Georgia and Alabama in the south to Maine in the north, and as far west as North and South Dakota, Utah and Texas (Refs. 1 to 8). Also reported in Canada, Quebec and Ontario (Refs. 1 and 8)
Central America:	No records – assumed absent
South America:	No records – assumed absent
Europe:	Northern Italy and southern Switzerland (Refs 9 and 10)
Africa:	No records – assumed absent
Asia:	Reported in Turkey (11)
Oceania:	No records – assumed absent

Refs: (1) Solomon et al., 2004; (2) Weiss, 1916; (3) Osborn & Drake, 1917; (4) Connell & Beacher, 1947; (5) Wheeler et al., 1975; (6) Minnesota Department of Natural Resources, 2000; (7) Shetlar, D.J., 2000; (8) Drake & Ruhoff, 1965; (9) Bernardinelli, 2000; (10) Forster et al., 2005; (11) Mutun, 2003.

Corythucha arcuata originates in North America and has a wide geographical range, as Table 2 shows. In Europe, the pest is known to be widely distributed throughout northern Italy, in the Lombardy and Piedmont regions (Bernardinelli, 2000; Bernardinelli, 2001) and, in 2002, was also found in southern Switzerland (Forster et al. 2005). The size of the area over which the pest was found in 2000 suggested its introduction was not recent, (Bernardinelli, 2000; Bernardinelli, 2001).

12. How likely is the pest to enter the PRA area[2]?

Very unlikely		Unlikely		Moderately likely	✓	Likely		Very likely	

[2] Pest entry includes an assessment of the likelihood of transfer to a suitable host (ISPM No. 11, FAO, Rome)

In 1964, a related species, *Corythucha ciliata* (Sycamore lace bug), was discovered in Italy for the first time. It has since spread over southern and central Europe, including France, (Aguilar, Pralavorio, Rabasse & Mouton, 1977; Maceljski, 1986). In Autumn 2006, *C. ciliata* was intercepted in the UK, on nurseries in Bedfordshire, where it was found on *Platanus* trees imported from France and Italy (Malumphy *et al*., 2006). Based on the similar spread so far of *C. arcuata*, through northern Italy and southern Switzerland, there is a risk of the pest entering the UK by natural spread at some point. It is, however, not likely to happen quickly, based on the relatively slow spread of *C. ciliata* over a number of decades. The highest risk remains with imports of infected plants, as has occurred with *C. ciliata*. The first recording of *C. arcuata* in Italy was made in one of the parks near Milan (Bernardinelli & Zandigiacomo, 2000), and studies soon after showed that the highest populations were found around the Milan area (Bernardinelli, 2000). This suggests that the introduction may have started by planting infected imported plants. As the adults are known to overwinter under the loose bark scales of oak tree trunks and larger branches (Connell & Beacher, 1947), even the import of leafless specimen trees could bring the pest into the UK.

13. How likely is the pest to establish outdoors in the PRA area?

Very unlikely		Unlikely		Moderately likely		Likely	✓	Very likely	

The presence in the UK of known host plants of *C. arcuata* together with it's geographical distribution in the USA, across many of the northern and eastern states and into southern Canada, suggests that it would have no problem establishing and overwintering in the UK. In Delaware, USA, where it is native, *C. arcuata* is known to have two and a partial third generation per year, with some adults from the second generation and those from the third overwintering (Connell & Beacher, 1947). In Italy, with the warmer climate, *C. arcuata* can complete three generations a year and have a partial fourth (Bernardinelli, 2000). In the UK the pest would be more likely to follow the lifecycle pattern from the north eastern states of the USA, which has a more comparable climate.

14. How likely is the pest to establish in protected environments in the PRA area?

Very unlikely		Unlikely	✓	Moderately likely		Likely		Very likely	

Host plants are not commonly grown in protected environments.

15. How quickly could the pest spread[3] within the PRA area?

Very slowly		Slowly	✓	Moderate pace		Quickly		Very Quickly	

[3] ISPM No 5. defines spread as the expansion of the geographic distribution of a pest within an area. Note that just because an organsim can move or be transported quickly, does not mean that it will spread quickly, i.e. it also has to establish.

The spread of *C. ciliata* through Europe, from Italy, has taken several decades to be documented (Maceljski, 1986). *C. arcuata* also seems to spread quite slowly, so far only being detected in Italy and southern Switzerland (Forster et al., 2005), despite being introduced prior to 2000. Based on the dispersal in Italy, the pests' movement is thought to be favoured by road traffic, (Bernardinelli, 2000). Despite being able to fly, it may be that without this and the accidental planting of infested plants, its' dispersal would not be as great. On this basis it seems likely that the spread of *C. arcuata* within the UK would be gradual, although spread may occur some time before detection.

16. What is the pest's potential to cause economic and/or environmental damage in the PRA area?

Very small		Small	✓	Medium		Large		Very large	

The pest feeds by sucking fluid from cells between the upper and lower epidermis of the leaves, causing the leaves to lose their colouring and reducing photosynthesis. This will reduce the vigour of the tree and may cause minor branch die-back if severe, (Minnesota Department of Natural Resources, 2000). In the case of heavy infestations, the pest may cause early leaf drop. It may also increase their susceptibility to other insects and diseases, (Connell & Beacher, 1947). In the USA *Corythucha arcuata* is well known in forests, and as a common pest of ornamental trees and shrubs. It is of particular importance to amenity trees as the discoloration and premature leaf fall reduces their ornamental value. In the forests natural enemies are usually effective, but control measures tend to be taken early on shade and ornamental trees, while the insect is on it's first generation and before visible scarring occurs (Shetlar, 2000; Connell & Beacher, 1947; Solomon et al., 2004). In Italy it is known to have caused damage in parks and is seen as a threat to both woodland and amenity trees (Bernardinelli & Zandigiacomo, 2000). It's potential threat is often compared to that caused by *C. ciliata*, which has caused a lot of damage to *Platanus* in parks and on roadsides in northern Italy (Maceljski, 1986).

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

There is no documentation of *C. arcuata* associated with any plant pathogen. However, the related *C. ciliata* is known to be associated with fungal pests in northern Italy (Maceljski, 1986).

STAGE 3: PEST RISK MANAGEMENT

18. How likely is the pest to continue to be excluded from the PRA area?

Outdoors:	Very likely		Likely		Moderately likely	✓	Unlikely		Very unlikely	

As noted in 15, the spread of *C. arcuata* is fairly slow in Europe, so it is not likely to arrive in the UK naturally for some time. The most likely route into the

UK is via contaminated imported hosts. It is worth noting that the related *C. ciliata* has only recently been found in the UK, despite being in Italy since the 1960's and France since the mid 1970's (Maceljski, 1986), although an increased level of imports from Italy may have contributed to this.

In protection:	Very likely	Likely	Moderately likely	Unlikely	Very Unlikely
		✓			

Host plants are not commonly grown in protected environments.

19. How likely are outbreaks to be eradicated?

Very likely	Likely	Moderately likely	Unlikely	Very unlikely
		✓		

The outbreak in Italy seems to have been established for a number of years, making eradication difficult (Bernardinelli, 2000). If a similar outbreak occurred in the UK, the pest could be difficult to control; but if brought in on infected stock to nurseries, and discovered early, isolated outbreaks could be controlled, (see 20).

20. What management options are available for containment and control?

In the USA there are a number of native predators, including syrphid larvae; two mirid bugs, *Hyaliodes vitripennis* and *Deraeocoris nebulosus,* and the anthocorid *Orius insidiosus* (which is used in IPM), (Connell & Beacher, 1947; Wheeler et al., 1975), but, apart from syrphid larvae, none of these appear to be naturally present in the UK (Schaefer & Panizzi, 2000).

Control tactics employed on lacebugs in general include:

- Syringing – using a strong jet of water to dislodge the young nymphs as they hatch. The nymphs often die before they can find their way back to suitable leaves.
- Physically acting insecticides - such as petroleum oil, potassium phosphate or natural plant extract products.
- Chemical control using contact insecticides such as bifenthrin or deltamethrin (Shetlar, 2000; Malumphy *et al*., 2006).

Further work that would reduce uncertainties

Area of PRA	Uncertainties	Further work that would reduce uncertainty
Taxonomy		
Pathway	How pest entered Europe	
Distribution	Current extent of distribution	Further sampling
Establishment		
Spread		
Impact	Is the pest a pathogen vector.	
Management		

21. Summary

Corythucha arcuata is primarily a minor pest of oak trees, though it may survive on other genera such as *Rosa* and *Rubus*. The effect on the host plant is usually minor (unless the infestation is particularly heavy) but it does reduce the overall vigour of the plant, which can leave it prone to other pests or diseases. It is present in North America, mainly in the east and north, and has established itself in northern Italy, southern Switzerland and possibly Turkey. It seems to be slow to spread outwards from a particular location, but if it arrived undetected on imported plant material it would be able to survive and establish in the UK.

22. Conclusions

Corythucha arcuata is not normally present in the UK and is capable of entering and establishing. Although unlikely to cause major economic damage, it would attack trees in native woodlands, parks and gardens and phytosanitary procedures should be considered if detected.

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