

CSL PEST RISK ANALYSIS FOR *Acizzia uncatoides*

Summary

Acizzia uncatoides is a psyllid pest found on *Acacia* and *Albizia* species, popular conservatory plants in the UK. The organism originates in Australia but has spread to a number of regions around the world, most notably the Mediterranean, and has been detected in the UK on several occasions. The potential for this pest to establish and cause damage is considered to be low and statutory control is not recommended.

STAGE 1: PRA INITIATION

1. What is the name of the pest?

Acizzia uncatoides (Ferris & Klyver)

Hemiptera: Psyllidae
Common name: Acacia sucker or Acacia psyllid
Synonym: *Psylla uncatoides*

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

Acizzia uncatoides is not listed in the Plant Health Directive.

3. What is the recommended 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	

Acizzia uncatoides is not listed as a quarantine pest by EPPO.

4. What is the reason for the PRA?

Acizzia uncatoides is a non-native plant pest that has been found on plants in the UK on a number of occasions since 1990 (Halstead, 1992). Between November 2006 and November 2007, *A. uncatoides* were found by the PHSI on four separate instances, three of which were associated with imported *Acacia longifolia* (CSL, unpublished data).

5. What is the PRA area?

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

Given that this organism is distributed in a number of EU countries (see 6) with no official control measures in place, this PRA considers the UK only.

STAGE 2: PEST RISK ASSESSMENT

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

Acizzia uncatoides is, like its hosts *Acacia* and *Albizia*, native to Australia, but existed unnoticed there until 1971. It was actually first described in New Zealand in 1932 by Ferris and Klyver and was noticed in North America (California), in 1954, although its wide distribution in California at that time suggested that it had been present for a number of years (Jensen, 1957). It has since spread to the neighbouring state of Arizona (Koehler *et al.*, 1983). The psyllid has been collected on islands in Hawaii since 1966 and by the 1970's it had become a serious pest of the endemic acacias found at high elevations in the islands (Leeper & Beardsley, 1976). *A. uncatoides* was first reported in Italy in the mid 1970's, initially only in the north-western region of Liguria, although it is now considered to be widespread, including being found in Sicily (Arzone & Vidano, 1985; Rapisarda & Belcari, 1999). Around the same time the psyllid was also reported in France (Arzone & Vidano, 1985; Onillon, 1977) and in 1990 findings were reported on Tenerife in the Canary Isles (Siverio & Montesdeoca, 1990). *A. uncatoides* was documented in Israel in 1985 and eradicated from the only known location (Halperin, 1986). The psyllid is listed as present in checklists from Chile and Mexico (Gobierno de Chile, 2004; Yang & Miller, 1996) and its presence in the Azores, Malta, Portugal, the former Yugoslavia and North Africa is reported, but without additional data (Fauna Europaea, 2007).

Table 1: Distribution of *Acizzia uncatoides*

North America:	USA (in Arizona, California and Hawaii).
Central America:	Mexico
South America:	Chile
Europe:	Azores (Portugal), Canary Isles (Spain), France, Italy, Malta, Portugal, Sicily, the former Yugoslavia.
Africa:	North Africa (no more details)
Asia:	Israel (known occurrence eradicated)
Oceania:	Native to Australia and introduced to New Zealand.

References: Arzone & Vidano, 1985; Fauna Europaea, 2007; Ferris & Klyver, 1932; Gobierno de Chile, 2004; Halperin, 1986; Jensen, 1957; Koehler *et al.*, 1983; Leeper & Beardsley, 1976; Onillon, 1977; Rapisarda & Belcari, 1999; Siverio & Montesdeoca, 1990; Thao *et al.*, 2000; Yang & Miller, 1996.

7. Is the pest established or transient[2] in the PRA area?

No, the pest is currently not considered established in the UK and is not a transient visitor.

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

[2] Transience: presence of a pest that is not expected to lead to establishment (ISPM 5)

Yes. In spring 2007 *Acizzia uncatoides* was identified from a sample taken from a plant established outdoors in a private garden in Surrey. The pathway of introduction is unknown, but the plant itself has been growing in the garden since 1998. Additional findings since November 2006 have been made on plants imported by nurseries from Italy. Action was taken at these nurseries to eradicate the pest, but some plants from the same imported batches were sold on to garden centres and potentially the general public before the pest was discovered (CSL, unpublished data). Since 1990, where the history of host plants is known, each *A. uncatoides* detection has been associated with imported plants, from either France or Italy (Halstead, 1992; CSL, unpublished data).

9. What are the pest's host plants?

Most psyllids are host specific. *Acizzia uncatoides* is unusual, since it feeds on many species in the *Acacia* and *Albizia* genera. In California it has been documented on 68 species of *Acacia* and several *Albizia* species (Munro, 1965) with further *Acacia* species being shown experimentally to be susceptible (Koehler *et al.*, 1983). Eggs have occasionally been laid on non-hosts, such as *Citrus*, but the psyllid does not survive beyond the first instar nymphs (Koehler *et al.*, 1983).

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

Acacia and *Albizzia* are popular in the UK as conservatory plants (Halstead, 1992) and certain species may also be grown outside in sheltered areas. There are nurseries that specialise in exotics such as these, but they can also be bought from a wide range of garden centres and multiple retailers. Prices vary depending on the size of plant, but a large *Acacia* from a specialist nursery can cost between £45 and £70 (Hamer, 2006). One species of *Acacia* (*Acacia melanoxylon*) is popular in gardens in coastal areas with a mild climate and has become naturalised on cliffs in south Devon and in woods on Tresco in the Scilly Isles (Preston *et al.*, 2002). This species is known to be susceptible to the acacia psyllid (Koehler *et al*., 1983; Munro, 1965). Recent UK findings of the psyllid have been associated with imported *Acacia longifolia*, also one of the more hardy species of *Acacia* and capable of growing outdoors in the UK.

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

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

12. Describe the pathway(s) considered by this PRA[3].

The most important pathway for *Acizzia uncatoides* into the UK is on host plants imported from countries where the pest has already established. The

[3] A pathway description would typically identify a geographic origin, a host and what the intended use of the host is.

majority of detections made in the UK have been on *Acacia longifolia* that have been imported from Italy.

13. How likely is the pest to enter the PRA area[4]?

Very unlikely		Unlikely		Moderately likely		Likely	✓	Very likely	

Acizzia uncatoides has already been detected in the UK on a number of occasions since 1990 (Halstead, 1992 & CSL, unpublished data).

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

Very unlikely		Unlikely		Moderately likely		Likely	✓	Very likely	

A recent finding of *A. uncatoides* outdoors, in a private suburban garden in Surrey, on a plant which is known to have been growing there for nine years and for which there is no known infestation route does suggest that the pest is capable of surviving outdoors in the UK, but its survival is probably limited to sheltered urban and southern coastal areas, where known hosts (e.g. *Acacia melanoxylon*) are able to survive in gardens and have naturalised.

Acizzia uncatoides has become established in regions generally known to have a warmer, drier climate than that in the UK, for example the Mediterranean and California in the USA. This preference for a warm, but not hot climate is borne out by studies carried out at constant temperatures, ranging from 15°C to 45°C. Development was found to be incomplete at 30°C (the eggs hatched, but the nymphs failed to survive) and at 45°C the adults died before any eggs could be laid. However, the proportion of adults completing development from the egg doubled from 42.2% at 15°C to 89% at 20°C, then decreased to 61.7% at 25°C. Under the experimental conditions the optimum immature survival occurred at 20°C, as did optimum longevity with an upper temperature limit of 25-30°C. Minimum temperature limits were not empirically determined, but the data suggests that for development they are quite high and would lie between 10°C and 15°C (Madubunyi & Koehler, 1974). (Annex 1 estimates the threshold temperature for development to be 10.2^{o}C).

Table 1: Data showing differences in development at a range of experimentally produced temperatures (Madubunyi & Koehler, 1974)

Temperature °C	15	20	25	30
Mean development time (days)	31.8	19.7	18.5	-
Mean generation time (days)	61.0	40.5	35.5	-
Mean adult male longevity (days)	36.0	41.6	37.0	27.7
Mean adult female longevity (days)	57.1	62.2	43.0	29.3
Proportion of adults completing development	0.4	0.9	0.6	0.0

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

This narrow temperature tolerance may limit the psyllid's geographical range for establishment. *A. uncatoides* is a known pest of Tasmanian blackwood (*Acacia melanoxylon*) in New Zealand (Nicholas & Brown, 2002), but while its host is found at the extremes of both the north and south islands (Webb, 1980) there is little detail on the distribution of *A. uncatoides* and nothing to suggest its limits for overwintering and how it tolerates lower temperatures than those experimentally investigated, or if its distribution is more strongly connected to its host range than temperature. *Acizzia uncatoides* was first documented in New Zealand on a specimen from the northern end of the south island (Ferris & Klyver, 1932) and, along with other psyllids in New Zealand, is more prevalent at dry exposed sites, than in cooler, shady or wetter areas (Nicholas & Brown, 2002).

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

Very unlikely		Unlikely	✓	Moderately likely		Likely		Very likely	

There is no information on the establishment of *Acizzia uncatoides* under protection, probably because the countries where it has established all have naturalised or garden host species. *Acacia* and *Albizia* are popular as conservatory plants in the UK and temperatures inside the home are likely to be favourable for the development of *A. uncatoides*. This kind of establishment, however, is limited to individual plants in confined, secluded positions and does limit the possibility of the pest spreading. The main danger to protected crops is on a specialised nursery where they may be propagating or growing on liners as well as importing stock from abroad, but again establishment is likely to be limited, with imported stock usually being held separately from other units.

16. How quickly could the pest spread[5] within the PRA area?

Very slowly		Slowly	✓	Moderate pace		Quickly		Very Quickly	

Spread around the PRA area is most likely to coincide with the distribution of plants from a grower to garden centres and then on to the public. *Acizzia uncatoides* only feeds on *Acacia* and *Albizzia* species, which does mean that unless the psyllids are transported with a host they are very unlikely to establish. Plants are, however, able to withstand moderate infestations without much obvious damage (Koehler *et al.*, 1966) and so an infested plant may not be noticed before being marketed. As discussed above (see 15), the movement of plants aimed at the conservatory market is unlikely to lead to establishment, but hardy species may allow the establishment of the pest

[5] 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.

outside in a garden, and from there spread to hosts in the vicinity. This may be what happened in the case of the infestation found in a private garden earlier this year. The spread of the psyllid following establishment in the UK will also depend on its reproductive cycle. In coastal central California there are at least 8 overlapping generations of *Acizzia uncatoides* a year, while in northern Italy there are between 6 and 8 (Koehler *et al.*, 1966; Arzone & Vidano, 1985). It is unknown how many generations the psyllid could produce in the UK, but even one generation per year would be enough to perpetuate the host. Temperatures in areas of southern UK, certainly correspond for much of the year with those found experimentally to be amenable to the psyllids development and although the suggestion is that development may slow down over colder periods in the winter there is no evidence to suggest *Acizzia uncatoides* would be unable to survive (Madubunyi & Koehler, 1974). A slow development of a population may account for the finding of the psyllid in a Surrey garden, nine years after the *Acacia* was planted, particularly as only the damage caused by a heavy infestation is likely to be noticed.

17. Which part of the PRA area is the endangered area?

The south of the UK is the area most at risk. This is mainly due to the climate in areas such as the south Devon coast and in urban heat islands, and the locations of garden grown and naturalised host plants.

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

Very small		Small	✓	Medium		Large		Very large	

Plants are able to withstand moderate infestations without too much obvious damage, but the psyllid tends to be associated with new growth and heavy populations can cause chlorosis on the leaves and tip dieback. Large numbers of acacias are grown in California along the highways, but compared with an agricultural or horticultural crop, a higher level of damage can occur before an economic threshold is reached (Pinnock *et al.*, 1978). It seems that in California the psyllid is considered more of a nuisance than an economic pest, with problems occurring when the psyllid invades gardens, its presence and that of its honeydew deposits limiting recreational activities (Koehler *et al.*, 1966). Predation, especially by introduced predators, has been shown to reduce psyllid populations (and insecticide bills) in California, and early season psyllids seem to be tolerated or temporarily reduced with sprays (Pinnock *et al.*, 1978; Dreistadt & Hagen, 1994). In Italy it is also mainly within gardens, parks or along roads that the psyllid is considered a pest (Rapsardia & Belcari, 1999). In New Zealand *Acizzia uncatoides* is one of three psyllids commonly found associated with Tasmanian blackwood, an *Acacia* species grown in plantations for soil conservation and as a speciality timber. The psyllids are considered major pests, but management options generally don't involve the use of chemicals (see 23) (Stace, 2007). Hawaii has probably

suffered the biggest environmental impact due to *Acizzia uncatoides*, with an endemic *Acacia* species, *Acacia koa*, suffering serious damage in the early 1970's, but there, as in California, there has been success at control with an introduced Australian predator (Leeper & Beardsley, 1976).

19. What is the pest's potential to have economic, environmental or social impacts in the PRA area?

Very small	Small	Medium	Large	Very large
	✓			

The host plants have become naturalised in some areas in the south of the UK (Devon and Tresco), but are not widespread. Damage to individual plants in private gardens or conservatories appears to be only likely with high levels of infestation and amateur products may be used to control the pest. Damage on nurseries could be more severe if the pest becomes widespread, but while batches of plants have been destroyed in recently reported UK cases, control may again be possible and there are more chemicals available to commercial growers.

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

Acizzia uncatoides is not a known vector of plant pathogens. However, as with other Hemiptera, the honeydew produced by the psyllid is a medium on which sooty moulds can develop and become secondary pests.

STAGE 3: PEST RISK MANAGEMENT

21. If not already present in the PRA area, how likely is the pest to continue to be excluded from the PRA area?

	Very likely	Likely	Moderately likely	Unlikely	Very unlikely
Outdoors:				✓	

Acizzia uncatoides has already been reported in the UK on a number of occasions and these findings have not always been associated with a plants initial import into the PRA area. Continued vigilance against this pest should limit its entry, but it is unlikely to be excluded entirely and damage may not be immediately obvious. Recent detections do suggest that the psyllid may already be established in small populations.

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

Exclusion from protected areas is more likely as there is less chance of existing protected propagation and liner units on nurseries coming into direct contact with newly imported plant material. Imported conservatory plants are

likely to be distributed fairly quickly to garden centres, multiple retailers and the public, possibly before any damage is obvious. However, as discussed (see 15), the probability of establishment on host plants kept in private houses is considered unlikely.

22. If the pest enters or has entered the PRA area how likely are outbreaks to be eradicated? (✓)

Very likely		Likely	✓	Moderately likely		Unlikely		Very unlikely	

All known occurrences of the pest in the UK have either been eradicated, or the pest is under control. In some cases the growers opted to destroy the infested plants, in others a contact insecticide was used (CSL, unpublished data). However, damage caused by low numbers of the pest may, and it seems have in the past, gone unnoticed, and infested plants may be unknowingly distributed around the UK, making treatment and eradication more difficult.

23. If eradication is not possible, what management options are available for containment and control?

In New Zealand, *Acacia melanoxylan* (Tasmanian blackwood) is grown in plantations and several species of psyllids are major pests, but the use of systemic insecticides, as well as being expensive and impractical in these plantations, is also considered to be too detrimental to the natural predators to use (Nicholas & Brown, 2002). Instead, intensive pruning is used to correct damage and the trees are grown amongst other plants as the psyllids are averse to shade (Stace, 2007).

In California, in the early 1970's six predaceous insects were released in a California Department of Transport funded investigation of suitable biological control methods for *Acizzia uncatoides* (Pinnock *et al.*, 1978). Only one of these established, the beetle *Diomus pumilio*, but it is believed to have been responsible for a substantial reduction in psyllid populations where it colonised. Another introduced species, *Anthocoris nemoralis*, has also been recorded as an abundant predator and, along with other predators, these species control the *A. uncatoides* population density in the San Francisco area for much of the growing season (Dreistadt & Hagen, 1994). Early season psyllids seem to be either tolerated or temporarily controlled with insecticidal soap or horticultural oil.

In Hawaii there has been similar success with the introduction of a predator beetle, in this case the beetle *Harmonia conformis* (Leeper & Beardsley, 1976).

It seems, therefore, that control of the pest is possible, even on the much larger scales required in regions where the host plant species are widely grown. In the UK, native predators and parasites (which include the predatory bug *Anthocoris nemoralis*) may exert some level of control and gardeners could try to increase this with the use of garden products such as insecticidal soaps and fatty acids, which will reduce populations. Contact insecticides, such as deltamethrin and bifenthrin can give more persistent control, but may also reduce native biocontrol agents and have a limited availability to

gardeners. Plants coming into the UK should also be monitored, particularly when the plants are showing new growth and the stimulation of new growth by pruning and shearing should be avoided if the pest is suspected (Malumphy *et al.*, 2007).

24. Conclusion

Acizzia uncatoides is unlikely to be a serious pest in the UK, on the grounds that its host plants are limited in distribution, both in gardens and naturalised, and temperatures, except in the sheltered southern areas where its hosts are found, are unlikely to be suitable for its reproduction. There are effective chemical controls available and a known effective predator is native to the UK. Individual plants in private homes are probably at most risk, particularly when purchased and already infested. While plants from an infested batch may be widely distributed geographically, the plants are usually relatively isolated and the psyllid is unlikely to spread and cause widespread damage. Having established itself in the Mediterranean, *A. uncatoides* is a minor pest and is not listed by either EPPO or the EC and there is no recommendation that it should be. While awareness of this pest amongst growers should be raised, especially as low level infestations may be difficult to spot, statutory control is not recommended if it is found in the UK as it is considered a low priority in terms of damage.

Further work that would reduce uncertainties

Area of PRA	Uncertainties	Further work that would reduce uncertainty
Taxonomy	None	
Pathway	The level of imports of *Acacia* and *Albizia* into the UK is unknown.	More information on import levels.
Distribution	Is *Acizzia uncatoides* found at the southern (coldest) end of New Zealand? The level of establishment within the UK is unclear.	Contact forestry research in New Zealand to determine where they have encountered problems with the pest. Survey of areas where acacias are grown or are naturalised to determine extent of establishment in the UK.
Establishment	Which is more important to establishment, host range, temperature or some other factor? Overwintering mechanisms and capability are unknown.	Experimentation of the psyllids development potential below 15°C. Investigation of the psyllids survival at lower temperatures.
Spread	There is no information on the number of annual generations the psyllid would be able to produce in the UK.	Further investigation of the insects reproduction at a range of temperatures.
Impact	The pest is largely considered a nuisance rather than economic pest, even in countries which use the host plants in large scale amenity and landscape planting. How big an impact it has in Europe is not clear, but on current data the impact in the UK is considered to be small.	Cost of eradication / control compared to actual cost from damage to the plants. More detail on the impact the psyllid has had in European countries where it is known to have established.
Management	None	

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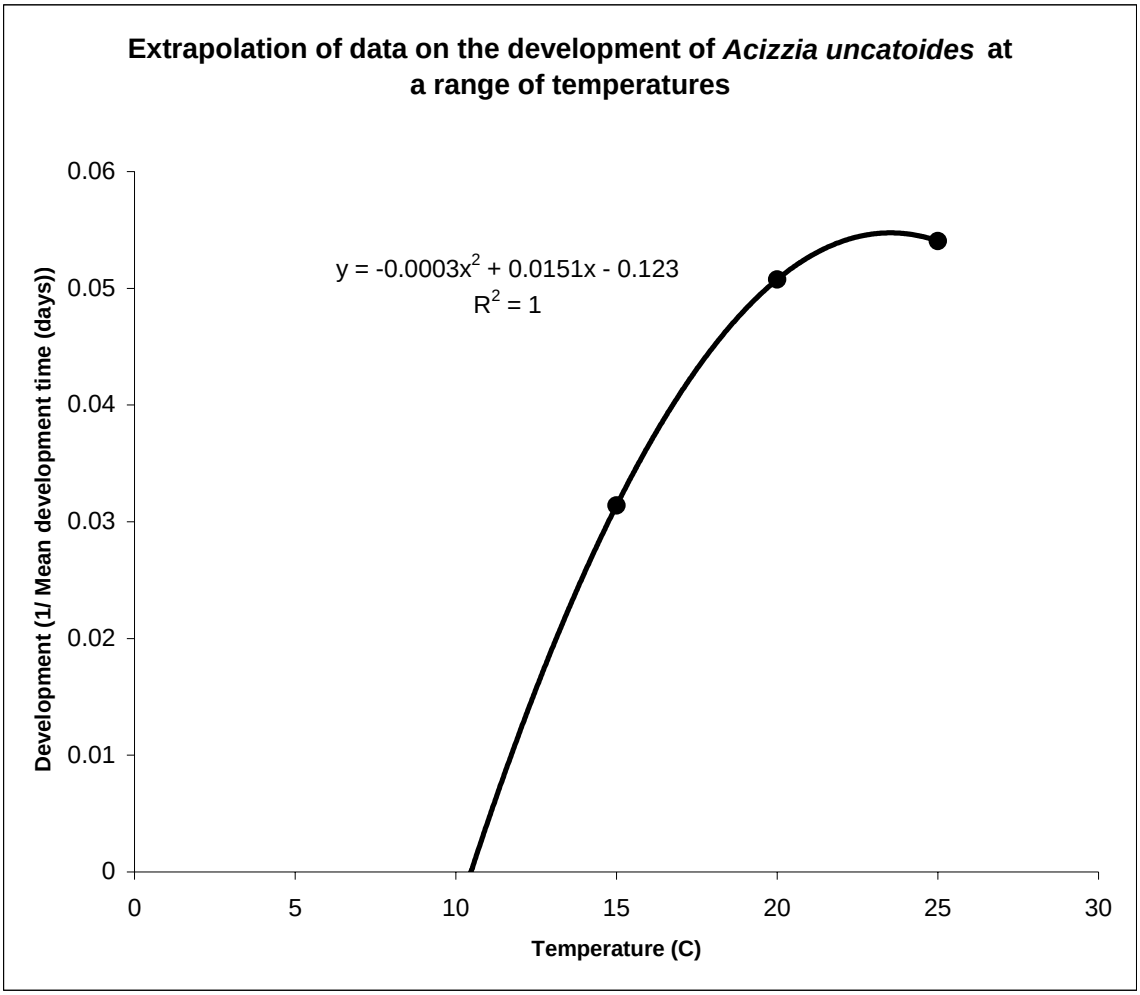
Appendix 1. To determine the threshold temperature for development of *Acizzia uncatoides*

(Data taken Madubunyi and Koehler, 1974).



Threshold temperature for development = 10.2^{o}C