



CSL PEST RISK ANALYSIS FOR *ACULOPS FUCHSIAE*

Summary

Aculops fuchsiae (fuchsia gall mite) is an EU quarantine pest, specifically regulated on *Fuchsia* plants for planting. It causes severe distortion to *Fuchsia*, particularly the growing points and is very difficult to control once it has become established. The South American mite is present in the Channel Islands, France and Germany. It was found in the UK for the first time in the summer of 2007. It is likely to be able to establish in the UK, with the south being most at risk. Given the widespread popularity of the ornamental host and the fact that *Fuchsia* plants are easily cultivated by taking cuttings, on which the small pest can be spread, it will be very difficult to prevent further spread of the pest, for example from the Channel Islands and France into the UK on infested cuttings, or via aerial dispersal or attached to larger pollinating organisms such as birds and insects. Statutory action for finds, requiring all visibly affected plants to be destroyed under Notice, and an awareness campaign highlighting the risk of introducing the mite on cuttings from elsewhere in Europe should slow the spread of this pest and help more generally to raise public awareness of plant health issues. A re-evaluation of any campaign against the pest should take place in early summer of 2008.

STAGE 1: PRA INITIATION

1. What is the name of the pest?

Aculops fuchsiae Keifer

Common name(s): fuchsia gall mite, Brazilian fuchsia mite, fuchsia mite.

Taxonomic position: Acari Eriophyidae

2. What is the pest's status in the Plant Health Directive (Council Directive 2000/29/EC¹)?

Aculops fuchsiae is listed in Annex II/AI of 2000/29/EC. This means that its introduction and spread is banned if found on certain plants or plant products, i.e. *Fuchsia* intended for planting, other than seed.

Since *A. fuchsiae* is present in France, Germany and the Channel Islands (see 6.) it should technically be listed within Annex II/AII of 2000/29/EC.

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

^{1b} www.eppo.org

3. What is the recommended quarantine status of the pest in the lists of the European and Mediterranean Plant Protection Organisation (EPPO^{1b})?

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

Until recently *Aculops fuchsiae* was designated as an A1 regulated pest (for pests absent from the EPPO region), but in September 2007, recognising that it was widespread in Guernsey and present in France and Germany, the EPPO Council re-categorised it within the A2 regulated list (for pests present in the EPPO region) (EPPO, 2007a).

4. What is the reason for the PRA?

The fuchsia gall mite, *Aculops fuchsiae*, has been found in the UK, in private gardens in Andover, Fareham and Warash, Hampshire, and in a private garden in Middlesex. This follows the first findings of *A. fuchsiae* in the Channel Islands (Guernsey and Jersey) in 2006 (EPPO, 2007b; EPPO, 2007c).

5. What is the PRA area?

This PRA considers the UK only.

STAGE 2: PEST RISK ASSESSMENT

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

Aculops fuchsiae was first described in 1972, from specimens found near Sao Paulo in Brazil and is believed to be native to South America. It was accidentally introduced to the San Francisco area in California in 1981 and spread rapidly to neighbouring counties and to southern California (Ostojá-Starzewski *et al.*, 2007; Natter, 1982; Keeseey, 1985). It has also, intermittently, been found further north up the coast in Oregon and Washington State, but does not appear to survive when they have harsh winters (Anon., 2006). In 2003 it was reported in Brittany in France, however some sources indicate it was first noticed in 2002 at the Festival de Trévarez on a sample brought in by a private collector (Streito *et al.*, 2004; Jardin au fil des pages, 2007). Eradication measures were implemented but despite this the pest has gradually spread around Brittany and Pays de la Loire (Anon., 2007). It has also been reported in Germany in Wolfhagen near Kassel (Euro-fuchsia News, 2007).

Aculops fuchsiae was first confirmed in Guernsey in 2006 where it was found to be widespread (EPPO, 2007b). It was also found in Jersey in 2006 and 2007 but only at a few locations (EPPO, 2007c). Plant Health authorities in Jersey have implemented official control measures against the pest in an attempt to eradicate it but since infestations are in private gardens and it is difficult to target the mite, and because it can spread in air currents and via

pollinators eradication has not been successful. The first confirmed reports in the UK came in the summer of 2007 (Ostojá-Starzewski *et al.*, 2007).

Table 1: Distribution of *Aculops fuchsiae*

North America:	USA: California
South America:	Brazil: Known to be in the Sao Paulo area, but probably more widespread.
Europe:	France: Brittany and Pays de la Loire. Germany: Wolfhagen, near Kassel. Jersey and Guernsey. UK (Hampshire & Middlesex).
Africa:	No reports
Asia:	No reports
Oceania:	No reports

7. Is the pest established or transient² in the PRA area?

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?

Yes. The mite has been confirmed at locations Hampshire and Middlesex and may be more widespread but unreported elsewhere in South-East England.

9. What are the pest's host plants?

Aculops fuchsiae infests three *Fuchsia* species (*F. arborescens*, *F. magellanica* and *F. procumbens*) and more than 30 *Fuchsia* cultivars (Koehler *et al.*, 1985). All three species are hardy or half-hardy. At least six *Fuchsia* species, one sub-species and several cultivars have been found to be highly resistant to the pest (Koehler *et al.*, 1985). More than 100 *Fuchsia* species are known, mostly from Central and South America, but also from New Zealand and Tahiti (Dixon, 1998 and Jones & Miller, 2005), and there are many thousands of cultivars and hybrids, only a small proportion of which have been evaluated for their susceptibility to this pest (Koehler *et al.*, 1985).

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

Fuchsias are very popular plants in the UK, with many locally based societies dedicated to them. There is also a national British Fuchsia Society. Fuchsias are commonly produced in many nurseries, and there are also a number of specialised nurseries. In 2005, 8.1 million boxes, trays, packs and pots of fuchsias were produced by the UK horticultural industry, with a value of over £4.5 million (Basic Horticultural Statistics, 2006). All three of the known susceptible species are cultivated in the UK and may be found at shows run

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

by the British Fuchsia Society (Dixon, 1998) and the majority of hardy fuchsias are cultivars derived from crosses between *F. magellanica* and less hardy species (Jones & Miller, 2005). *F. magellanica* is also found as a hedge plant up the western side of the UK, from Cornwall to the islands of Scotland (BSBI, 2000).

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 PRA³.

A. fuchsiae was discovered in Brittany in 2002 and on the Channel Islands Jersey and Guernsey in 2006. The first finding in the UK was in Fareham, close to the ports of Portsmouth and Southampton. This may link the UK outbreak to those on the Channel Islands or in Brittany, but it is not possible to say for certain how it arrived. Considering the entry of the pest into other areas of Europe the most likely pathways are:

- Inadvertent transport on cuttings shared between amateur gardeners and *Fuchsia* enthusiasts,
- Introduction of infested commercial plants,
- Dispersal by birds, bees or other insects,
- Natural wind dispersal.

The initial finding of *A. fuchsiae* in Brittany on plants in private collections led to the belief that it entered Europe by exchange of plant material between growers (Streito, *et al.*, 2004), and it seems likely that this happened in Germany also (Euro-fuchsia News, 2007). The natural dispersal of the mite by wind or pollinators is also a likely cause of local spread, and due to the widespread and unlinked infestations it is thought this may be how the pest arrived in Guernsey (EPPO, 2007b).

A *Fuchsia* enthusiast from Jersey collected live *Fuchsia* material in South America and brought it back in their luggage avoiding any plant health checks. The many varieties of *Fuchsia* in the enthusiasts' garden all became heavily infested with *A. fuchsiae*. Over 200 properties, mostly downwind from the infested garden were also affected (Meadows, pers. comm.).

13. How likely is the pest to enter the PRA area⁴?

Very unlikely Unlikely Moderately likely Likely Very likely

The pest has already entered the UK on an unidentified pathway. A number of unregulated pathways exist (see 12.) and it is most likely that the pest entered the UK on one of these. Preventing further entry on such unregulated pathways will not be possible.

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

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

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

Very unlikely Unlikely Moderately likely Likely Very likely

The geographic distribution and abundance of an organism that cannot control or regulate its body temperature is largely determined by climate. Details of the climate from the known distribution of an organism can help predict the potential limits of establishment and abundance of the organism in new geographic regions. Hence comparing the climates of Brittany, the Channel Islands and locations in the USA where *A. fuchsiae* occurs, with the UK will indicate where in the UK the pest is likely to be able to establish, assuming that hosts are present. The mite is known to over-winter successfully in Brittany and Guernsey that have very similar climates. In the USA *A. fuchsiae* is established in the warm, temperate and dry conditions of coastal California (Koehler *et al.*, 1985). Infestations have been found further north from Portland in Oregon to Tacoma in Washington where *A. fuchsiae* were capable of surviving warmer winters. However, after a cold winter between 2005 and 2006, when temperatures fell to -4°C and below for seven nights, no damage was found on hardy fuchsias the following summer (Anon, 2006). Overall the UK is somewhat cooler and wetter than the Channel Islands, Brittany and coastal California although whether the UK's cooler conditions are sufficiently cool to prevent establishment of *A. fuchsiae* is unknown. There is no experimental data on the thermal requirements of *A. fuchsiae*. Nevertheless, it is likely that *A. fuchsiae* will be able to establish in the warmer parts of the UK, at least in the south-west and south-east.

There are conflicting reports on the method of over-wintering of *A. fuchsiae*. Natter (1982) states that *A. fuchsiae* survive the winter as eggs or dormant adults, hiding in leaf bud scales whilst Crawford (1983) talks of immature and mature forms over-wintering, and Keesey (1985) states that they do not “hibernate”, although this may be referring to behaviour during a winter temperature of 4.5°C (40°F).

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

Very unlikely Unlikely Moderately likely Likely Very likely

Information suggests that the mite does not survive well in glasshouse conditions and attempts to breed it in such conditions have been unsuccessful (Koehler *et al.*, 1985). However, there are reports of the mite being a pest in glasshouse crops (Gilrein, 2007), and as glasshouse temperatures in the UK may not at times be dissimilar to outside temperatures in California the possibility of establishment should not be excluded.

16. How quickly could the pest spread⁵ within the PRA area?

Very slowly Slowly Moderate pace Quickly Very Quickly

In the warm, temperate and dry conditions of coastal California *A. fuchsiae* spread rapidly, although it has not spread into the hotter inland areas (Koehler *et al.*, 1985). The spread around California and Brittany took only a couple of years and the pest is already widespread in Guernsey (Koehler *et al.*, 1985; Streito, *et al.*, 2004; EPPO, 2007b).

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

The area most at risk is the south of the UK. Fuchsias are naturalised in the west and grown by gardeners all over the UK, with societies as far north as Aberdeen, and hardy fuchsias grown successfully in the Scottish highlands (Jones & Miller, 2005). However, the further north the more likely there will be colder winters and the mite will be unable to survive, as in Oregon and Washington States in the USA (Anon, 2006). Despite this, there is still a danger of damage and if milder winters become more common there is a greater chance the pest could spread further within the UK.

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

Very small Small Medium Large Very large

The fuchsia gall mite infests the plants growing points, young leaves and flowers. As they feed they inject hormone like substances and infested areas become twisted, stunted, swollen and blistered and may turn red (Koehler *et al.*, 1985). In the early stages the thickened tissues and distortion can look like heavy aphid infestation (Natter, 1982). The mites live and reproduce in the folds of galled tissue and among plant hairs and as the plants grow some mites leave the galls and move to attack new growth and blossoms. In time this can stop all new growth and the whole plant is often severely stunted and disfigured (Koehler *et al.*, 1985). As such, infested plants are badly damaged by this pest. A single female will lay about 50 eggs at a time, which take 7 days to hatch at 18°C. Of these 50% will be female and it takes only 21 days to complete a full lifecycle at this temperature (Keeseey, 1985).

Fuchsias were very popular in California prior to the introduction of fuchsia gall mite. Since then their popularity has suffered a decline among both amateur and professional gardeners and it is now more common for the plants to be sold as annual hanging basket or bedding plants than the traditional garden shrub (Baye, 2007). One of the main problems is that the mite is difficult to eliminate from the plants and readily transferred between plants, by pollinators, the wind or gardeners themselves. The treatments growers can use to try and control the mite are labour intensive and mites spreading from uncared for infested fuchsias in an area can negate the efforts

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

of other gardeners (Bergquist, 2004; Syndor, 2004). Also, many of the popular, large, double flowered varieties of fuchsia are among those most susceptible to the mites (Helsel, 2004). *A. fuchsiae* has quarantine status in California, enabling county authorities to take exclusion measures. All these problems have led to some gardeners no longer growing fuchsias in California and fewer younger members of *Fuchsia* societies in the state (Helsel, 2004; Ostojá-Starzewski *et al.*, 2007). In France the mite has only recently been introduced and the economic and social impact is not yet known, but the environmental damage is similar to that in California.

In Jersey the Plant Health authorities are discouraging the planting of *Fuchsia* plants for the foreseeable future.

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

There is a relatively high economic value to *Fuchsia* production in the UK and there is a risk that even if these production nurseries remain free from *A. fuchsiae* there may be a decline in the popularity of plants susceptible to infestation, which itself would be a blow to the industry. The UK, like California, has a strong history of *Fuchsia* societies and enthusiasts and, these too may be affected if the plants become harder to grow successfully.

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

A. fuchsiae is not known to be a vector (Oliver & Pryse, 1988) although some species of Eriophyid mites are known to transmit plant viruses (Cloyd, 2004).

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?

Outdoors: Very likely Likely Moderately likely Unlikely Very unlikely

The pest has recently been confirmed within the PRA area, on plants growing outdoors in private gardens and the pathway of introduction to the UK is unknown.

In protection: Very likely Likely Moderately likely Unlikely Very unlikely

Attempts in California to rear the fuchsia gall mite under glasshouse conditions were unsuccessful (Koehler, *et al.*, 1985), but it has been recorded as a pest in such conditions (Gilrein, 2007). As many producers propagate fuchsias under protection there is a danger of infected plant material being introduced to a protected system. Strict control of plant material and

knowledge of sources would help the mites' exclusion and the lack of wind and restricted movement of pollinators from outside reduces the risk from natural dispersal.

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

The pest is already known to have entered the PRA area. Once fuchsias are infested the mite is difficult to control as it lives and reproduces within the folds of distorted plant tissue and chemical sprays are unable to reach all individuals of a population. It is possible to achieve local eradication by destroying infected plant material or carrying out a spray programme (Wiedner, 2006). However, given the variety of ways the pest can be spread, the difficulties of preventing spread and the occurrence of the pest in private gardens, it is likely that further spread will occur quickly.

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

By the time symptoms of the mites appear it may already be too late to apply acaricides, as the mites are likely to be hidden inside plant structures. It is advisable to apply acaricides before the mites have entered the terminal growth and repeated applications are necessary to break the mites' lifecycle. In California there has been some success with sprays on a four day cycle, enabling treatments to catch juvenile mites as they hatch and before they have had a chance to lay more eggs. At least three sprays were needed to gain control (Wiedner, 2006). In the UK, statutory action has been taken where the pest has been detected requiring all visibly affected plants to be destroyed by incineration or bagging and burial (not composted). Advice for gardeners on containment and control is also given as follows:

- Keep infested plants in a cool windless place and isolate them from other Fuchsias if possible.
- Maintain hygiene: change clothing, wash hands, clean shoes and clean tools with alcohol after contact with infested plants.
- Prune and remove all infested parts of the plants and burn or destroy them. Do not compost them. Seal infested plants in a bag then place this in another bag for domestic waste disposal.
- Spray remaining plants with an approved product, such as insecticidal soap.
- Do not visit other *Fuchsia* growers, or exchange plant material
- Try to keep hardy *Fuchsia* varieties outside, colder weather may kill off the mites (Anon, 2006).

24. Conclusion

Aculops fuchsiae, the fuchsia gall mite, has been confirmed for the first time in the UK. Negative impacts on hosts are expected. Insufficient information is currently available to permit an accurate estimate of the likely area within which *A. fuchsiae* can establish, although a cold winter is expected to reduce populations. Regulatory measures will assist eradication but are unlikely to be completely successful if the climate proves suitable for the pest. Regulatory measures aimed at slowing the spread of the pest are justified. Therefore continuation of a suppression campaign is recommended with a re-evaluation of the success in early summer of 2008.

Phytosanitary measures should include destruction of infested plants and hard pruning of nearby plants, with strong advisory recommendations to gardeners to hard prune all *Fuchsia* and dispose of the cuttings safely (burning, double bagging or deep burial).

All commercial *Fuchsia* growers should be advised to take similar action.

Consideration should be given to the introduction of emergency regulations requiring plant passporting and SCPH should be requested to consider plant passports and other phytosanitary measures to regulate the movement of *Fuchsia* and this pest within the EC. Stakeholders should be consulted on this proposed regulation.

Fuchsia societies should be contacted and made aware of the plant pest notice by Ostojá-starzewski *et al.* (2007) and of the control measures suggested above (see 23).

Further work that would reduce uncertainties

Area of PRA	Uncertainties	Further work that would reduce uncertainty
Taxonomy	N/A	
Pathway	It is not known how the pest came to the UK. In one case a householder brought cuttings back from a holiday home in Brittany. Another finding is thought to relate to nursery bought plants.	Investigations into the import of cuttings or whole plants by <i>Fuchsia</i> growers.
Distribution	There have been a number of geographically separate findings of the mite in the UK. The pest may be more widespread and un-reported.	Survey <i>Fuchsia</i> in gardens and producers to check for signs of the fuchsia gall mite.
Establishment	It is not known what the mites survival limits are in terms of temperature or other environmental conditions.	Investigations into temperature requirements for establishment and over-wintering of the pest.
Spread	It is not known how much of the UK is under threat from this pest. Unknown rate of exchange of material between enthusiasts.	Data on the environmental conditions preferred by the mite should be linked to environmental data for the UK.
Impact	The extent of the financial impact on the <i>Fuchsia</i> production industry	Monitoring of sales of Fuchsias.
Management	Are the current control methods the best?	Research into alternative methods of control.

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