

PEST RISK ANALYSIS FOR *EPICHORISTODES ACERBELLA*

STAGE 1: PRA INITIATION

1. What is the name of the pest?

Epichoristodes acerbella Walker Lepidoptera: Tortricidae

South African carnation leaf-roller

Synonyms

Epichorista ionephela (Meyr.)

Depressaria acerbella Walker

Proselena ionephela Meyrick

Tortrix iocoma Meyrick

Tubula acerbella Walker

Epichoristodes ionephela (Meyrick)

Epichorista acerbella Walker

Epychoristodes acerbella

2. What is the reason for the PRA?

Epichoristodes acerbella is the subject of European Council Directive 74/647/EEC that lays down requirements needed by EU Member States to inhibit spread of carnation leaf-rollers. A working party of Agricultural Attachés has considered repealing the Directive. A PRA is required to inform the UK decision as to whether to support repeal of 74/647/EEC.

3. What is the PRA area?

UK.

STAGE 2: PEST RISK ASSESSMENT

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

No. *E. acerbella* is not known to be established in the UK and is not a natural migrant into the UK. Maitland-Emmet & Heath (1991) classify *E. acerbella* in the UK as an adventive breeding species, i.e. a species that occasionally arrives from overseas, matures and breeds but does not establish or spread.

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

Yes. An amateur entomological website notes that there have now been a couple of reports of *E. acerbella* outdoors in the UK (<http://ukmoths.org.uk/show.php?bf=997>), with the first occurrence of a wild-caught moth being recorded in 2003 (Nash & Corley, 2003). The finds may be linked to imports or indicate that the species may be surviving in small numbers under natural conditions. The situation remains uncertain.

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

E. acerbella is not included in Council Directive 2000/29, the principal Directive that sets out the EC Plant Health regime. However, *E. acerbella* is covered by Council Directive 74/647/EEC, on the control of carnation leaf-rollers (see 2. above). It is the latter Directive that is being considered for repeal. *E. acerbella* is also covered by the EC Marketing Directive 93/49/ECC, (Anon., 1993) which is the implementing directive of 91/682/EEC, replaced by Council Directive 98/56/EC (Anon., 1998) (see 9. below).

In line with 74/647/EEC, *E. acerbella* was subject to statutory control under the Mediterranean Carnation Leaf Roller (Great Britain) Order 1975 (SI 1975/1842). This was repealed by the 1987 Plant Health Order. *E. acerbella* was nevertheless included in Schedule 3, part 76 as a pest of cut flowers, and consignments of cut flowers landed between 1st May and 15th October had to be free from *E. acerbella* although consignments of cut flowers landed between 16th October and 30th April had merely to be "substantially free" from the pest.

When the 1987 PH Order was repealed by the PH (Great Britain) Order 1993, *E. acerbella* was not explicitly included in any schedule. Through not including the organisms in the PH (GB) Order, they apparently became unregulated, although measures could still have been taken to implement Council Directive 74/647/EEC had it been necessary.

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

EPPO	A1 regulated	<input type="checkbox"/>	A2 regulated	<input type="checkbox"/>	Action	<input type="checkbox"/>	Alert	<input type="checkbox"/>
List:	pest list		pest list		list		list	

E. acerbella is not on any current EPPO list. *E. acerbella* had been on the EPPO A1 list, until it became established within the EPPO region (see 11. below). It was then transferred onto the EPPO A2 list. However, during the EPPO Council session of September 1999, it was agreed to remove *E. acerbella* from the EPPO A2 list (EPPO, 1999). The UK supported the deletion along with several other pests and noted that "*most of the pests were added to the list many years ago and are now no longer considered of quarantine concern*" (Pemberton, unpublished 1999).

8. What are the pests host plants?

E. acerbella is a polyphagous pest on a range of crops but its principal hosts are carnations and chrysanthemums. It has also been recorded on *Fragaria*

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

and *Rosa*. In South Africa it is a pest of *Vitis* (grapes) and its occurrence in table grapes exported to USA has led to consignments being rejected by US authorities.

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

Carnations, chrysanthemums, *Fragaria* and *Rosa*, noted above, are of economic importance in the PRA area. In the EC Marketing Directive 93/49/EEC, *E. acerbella* is listed as a harmful organism specifically affecting the quality of *Dendranthema x Grandiflorum* (chrysanthemums), *Dianthus caryophyllus* L. and hybrids (carnations) and *Rosa* (roses) (Anon., 1993).

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

No vector is needed, this is a free living organism.

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

Table 1: Distribution of *Epichoristodes acerbella* (South African carnation leaf-roller)

North America:	No records – assumed absent.
Central America:	No records - assumed absent.
South America:	Intercepted in UK from Colombia – perhaps present in Colombia.
Europe:	Bulgaria, Croatia, France, Italy, Romania, Serbia, Slovenia, Spain.
Africa:	South Africa, Kenya, Madagascar (perhaps also Botswana, Democratic Republic of Congo, Malawi, Mozambique, Namibia, Tanzania, Zambia and Zimbabwe).
Asia:	No records – assumed absent.
Oceania:	No records - assumed absent.

Sources: CABI (2009), EPPO (1998) and Glavendekic, 2006.

E. acerbella is indigenous to South Africa and has been recorded elsewhere in Africa from Kenya and Madagascar, with an unreliable record from Zimbabwe. It is possible that it has a larger distribution in Eastern Africa (Tanzania, Malawi, Mozambique, Botswana, Namibia, Zambia and maybe the Southern part of the Democratic Republic of Congo) (CABI, 2009). A specimen has been intercepted in the UK on *Dianthus* from Columbia, suggesting *E. acerbella* is also present in South America.

Until the 1960s *E. acerbella* was confined to Africa. There were regular interceptions of *E. acerbella* on carnations in Europe and occasional outbreaks in Scandinavian glasshouses were eradicated. By 1970 it was established in Italy. Since then *E. acerbella* has become widespread in Italy and is now well established in southern France, Croatia and Spain. More recently it has been reported in the Balkans from Bulgaria, Croatia, Romania, Serbia and Slovenia (Glavendekic, 2006).

12. How likely is the pest to enter the PRA area²?

very ☐ Unlikely ☐ Moderate ☐ Likely ☒ very ☐
 Unlikely ☐ likelihood ☐ Likely ☐ Likely ☐

In international trade, this pest is liable to be carried, in any of its stages, on plants and cut flowers of carnations, chrysanthemums, pelargoniums and roses. Bradley *et al.* (1973) refer to the pest being intercepted several times “in recent years” i.e. in the 1970s. Between 1st January 1996 and 31st March 2009 *E. acerbella* was intercepted twice in the UK, once on *Dianthus* from Italy (August, 1998) and once on *Dianthus* from Columbia (March, 2000). Interceptions have also occurred in Austria on carnations from Italy, in Germany on Italian and South African carnations, in the Netherlands on carnations from Kenya, Italy and Spain and in the USA on carnations and grapes from South Africa. However, interception records can be misleading as an indication of entry potential since carnations and chrysanthemums moved within the EU are unlikely to receive many inspections and young larvae and eggs may be difficult to detect.

The ability of *E. acerbella* to transfer to a suitable host on entry is less clear. As noted in 4., Maitland-Emmet & Heath (1991) classify *E. acerbella* as an adventive breeding species in the UK, so suitable hosts have been found by the moth on entry. In the past UK growers of cut flowers have imported material from overseas and packed this on site in production areas. This appears to no longer be as common, but does still occur at some production sites. Also, some larger garden centres now have on site florists, which also import cut flowers (PHSI, pers. comm.). There is, therefore, a potential risk of transfer to flower crops grown under protection. However, there are no data on the volume and frequency of host plant imports from other EU member states, so the scale of the threat is difficult to judge.

It thus seems likely that *E. acerbella* could enter the UK and find a suitable host, but there is also a moderate level of uncertainty due to lack of detailed information on the volume of trade and possibilities for transfer to a suitable host. Based on the low numbers of interception records, the lack of outbreaks and only occasional records of transient breeding the frequency of this entry appears to be small, but it is unclear to what extent current legislation is responsible for this.

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

very ☐ Unlikely ☒ Moderate ☐ Likely ☐ very ☐
 Unlikely ☐ likelihood ☐ Likely ☐ Likely ☐

Based on its current distribution, *E. acerbella* favours a more continental rather than a maritime climate. Although adults have been found outdoors in the UK (see 4. and 5.), these may be transients and there is no conclusive evidence that the organism has yet established. Establishment outdoors is, therefore unlikely, medium level of uncertainty.

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

Outdoors in southern Europe, *E. acerbella* has four generations between April and October, and five to six generations in glasshouses. Females lay from 200 to 240 eggs each on the upper surface of carnation leaves. Eggs hatch after 10 days or so, and larvae feed on leaves within a shelter of silk. Later they mine into flower buds and stems. The threshold for development is about 6°C, but larvae (the overwintering stage) are able to withstand lower temperatures. Development from egg to adult takes 170 days at 11°C, 70 days at 17°C and 40 days at 20°C. The optimum temperature for all developmental stages is between 15 and 25°C (Vrie, 1991; Anon., 1997).

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

very ☐ Unlikely ☐ Moderate ☐ Likelihood ☒ Likely ☐ very ☐ Likely ☐

During the 1960's there were a number of outbreaks of *E. acerbella* in German and Scandinavian glasshouses that were successfully eradicated. Although absent from Russia, Izhevskii (2000), warned of the likely introduction of *E. acerbella* into Russian glasshouses, perhaps due to its spread in the Balkans. Similarly in Poland, though absent, it is regarded as a potentially serious pest in glasshouses (Abanowski, 1988). In France, where *E. acerbella* has been established since 1970, the damage caused by this species to glasshouse grown carnations is considered to be of greater importance than that of the Mediterranean carnation leafroller, *Cacoecimorpha pronubana* (Bertaux *et al.*, 2004) and *E. acerbella* is also considered less vulnerable to chemical treatments (see 16. below).

Looking at outbreaks in other areas of Europe it seems likely that *E. acerbella* could establish in a UK ornamental glasshouse, despite chemical treatments which may already be being used to control *C. pronubana*. Medium level of uncertainty.

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

very ☐ Slowly ☐ Slowly ☐ Moderate ☒ pace ☐ Quickly ☐ Quickly ☐ very ☐ Quickly ☐

Spread between glasshouses could occur at a moderate pace via exchange of infested material. *E. acerbella* may be carried on plants for planting or cut flowers of carnations, chrysanthemums, roses and other host plants.

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

very ☐ Small ☐ Small ☐ Medium ☒ Large ☐ Large ☐ very ☐ Large ☐

In South Africa and Madagascar, *E. acerbella* is a serious pest of carnations and chrysanthemums. Even slight damage to carnation flowers can greatly lower their market value. An Italian report from 1977 noted infestations

reached 12-15 larvae per plant, causing severe damage. In Spain during the 1970s, pesticides were frequently applied to carnations 40-50 times a year (sometimes up to 70 times) for caterpillar control. More recently *E. acerbella* was still regarded as a significant pest of ornamentals in Italy (Parrini & Rumine, 1989; Baraldi & Baraldi, 1996) and *E. acerbella* and *C. pronubana* are amongst the major pests that concern floricultural trade with northern European markets (Baraldi, 1996). *E. acerbella* is also a major pest of carnations in France (Bertaux *et al.*, 2000; Bertaux *et al.*, 2004), and is considered to be a more important pest than *C. pronubana* because, on carnations, the larvae carry out most of their development inside the stems of host flowers, with only the first larval stage, which is very short, lasting less than a week, being exposed and thus vulnerable to chemical treatments. Since overlapping generations may be present this means that treatments need to be applied very frequently to catch this vulnerable stage, particularly during the summer months (Bertaux *et al.*, 2004). *E. acerbella* also has a greater resistance to heat and drought than *C. pronubana*. The damage caused by *E. acerbella* involves both the perforation of young leaves by the early larval instar and the drying out of the growing shoots and leaves caused by the tunnelling within the stem (Bertaux, *et al.*, 2004). The host plant, however, seems to influence larval behaviour, because on chrysanthemums the larvae feed only on the leaves and never mine the stems (Vrie, 1991).

If *E. acerbella* were introduced into a UK glasshouse growing hosts such as chrysanthemum or *Dianthus*, it would be able to survive. Damage to individual premises could be significant unless measures used to control routine lepidopteran pests were effective. While the area of production of carnations, pinks and chrysanthemums in England & Wales is very small (see Table 2 below), the value of cut flowers produced in the UK in 2005 was just under £16 million (Defra Basic Horticultural Statistics, 2006).

Table 2: Area of ornamental flower production in England & Wales 2000 – 2005 (ha)

Ornamental hosts	2000	2001	2002	2003	2004	2005
Carnations & pinks	8	4	5	5	5	7
chrysanthemums (AYR cut flowers)	24	26	18	19	18	13
other chrysanthemums	44	33	30	27	25	19
other cut flowers	67	52	55	53	52	50
sum	143	115	108	104	100	89

Source: Defra Basic Horticultural Statistics (2006).

Note that ornamental statistics have not been collected in recent years.

By repealing 74/657/EEC, it is not clear whether UK growers will be exposed to significant additional plant health risk from *E. acerbella*. An early UK risk assessment from 1979 (Anon., 1979) rated *E. acerbella* as a pest likely to be of economic significance under glass. However, in the 30 years since then, there have been no incidents of note involving this pest in the UK. This includes the ten years since 1999 when EPPO agreed to remove *E. acerbella* from the EPPO A2 list (EPPO, 1999) (see 7.).

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

E. acerbella is not known as a vector of plant pathogens.

STAGE 3: PEST RISK MANAGEMENT**18. How likely is the pest to continue to be excluded from the PRA area?**

Outdoors: very ☐
 Likely ☐ Likely ☒ Moderate ☐
 likelihood ☐ Unlikely ☐ very ☐
 Unlikely ☐

Although *E. acerbella* is very likely to continue to be transported to the UK, e.g. via imported carnations, it is not likely to establish out of doors so continued exclusion outdoors is likely.

In very ☐
 protection Likely ☐ Likely ☐ Moderate ☒
 likelihood ☐ Unlikely ☐ very ☐
 Unlikely ☐

Similarly, while it is recognised that *E. acerbella* is very likely to continue to be transported to the UK e.g. via imported carnations, and establishment in protected ornamental glasshouses is not only possible, but could have an impact locally, the likelihood of this happening is low unless imported cut flowers are packed on the same premises. There is no evidence that such an existing pathway has led to *E. acerbella* outbreaks in the past. The uncertainty lies in the extent to which the current legislation has influenced the situation.

19. How likely are outbreaks to be eradicated?

very ☐
 Likely ☐ Likely ☒ Moderate ☐
 likelihood ☐ Unlikely ☐ very ☐
 Unlikely ☐

Previous outbreaks in glasshouse conditions in northern Europe have been successfully eradicated (CABI, 2009). Establishment has occurred in French and Italian glasshouses, but in the Mediterranean region it is possible that larger numbers of overlapping generations and reinfestation by outdoor populations has prevented successful eradication.

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

Chemical control of *E. acerbella* is possible using pyrethroids such as deltamethrin, but applications need to be frequent to ensure that susceptible developmental stages are contacted. Products used against *C. pronubana*, such as *Bacillus thuringiensis* var. *kurstaki* and teflubenzuron could also be used to control *E. acerbella*. The use of beneficial insects has also been investigated (Bertaux *et al.*, 2004).

21. Conclusions

Epichoristodes acerbella is principally a pest of carnations and chrysanthemums. It is known to be established in six EU member states

(Bulgaria, France, Italy, Romania, Slovenia and Spain). Adults have been collected outdoors in the UK, but these are assumed to be transients and there is no conclusive evidence that *E. acerbella* has established.

Based on current knowledge *E. acerbella* is likely to enter the UK and find a suitable host. While establishment of *E. acerbella* outdoors seems unlikely, establishment in UK glasshouse crops is considered to be likely if the pest enters on cut flowers since imports are still packed at some production sites. Judging by the evidence from France the potential impact of this pest on carnations in particular is likely to be significant. Although eradication has been achieved in some northern European countries, it has not been possible to eradicate this pest from glasshouse grown carnations in France, where *E. acerbella* is now a more important pest than the European species, *C. pronubana*, due to its differing biology and lifestyle. Therefore, it may be that control measures already in place in the UK for *C. pronubana* would be insufficient to control *E. acerbella*.

However, there remains some uncertainty particularly regarding the ability of *E. acerbella* to transfer to suitable hosts and establish both outdoors and under protection in the UK and the volume and destination of cut flower imports. Further information from EU member states where this pest is known to be established would help clarify the extent of the threat posed by this species.

Although technically regulated by 74/647/EEC, no measures were taken against *E. acerbella* on the few occasions it has been intercepted in the UK. There have been no outbreaks of this pest in UK glasshouses following interceptions. *E. acerbella* is also covered by the EC Marketing Directive 93/49/ECC, (Anon., 1993), which is the implementing directive of 98/56/EC (Anon., 1998). By repealing 74/657/EEC, it is not clear whether UK growers will be exposed to significant additional plant health risk from *E. acerbella*. An early UK risk assessment from 1979 (Anon., 1979), supported by this PRA, rated *E. acerbella* as a pest that is likely to be of economic significance under glass. In the 30 years since then there have been no serious incidents involving this pest, but it is not clear what role the legislation and inspections have had in this success.

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