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# Risk Assessment: The effect of the Red Lily Beetle, *Lilioceris lili* (Scop.) on horticulture in the UK:

## Results of two surveys of professional horticulturalists in the UK.

### Summary Report

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## Summary report of the lily beetle risk assessment survey.

### Introduction

The scarlet or red lily beetle (*Lilioceris lili*), is a bright red leaf beetle which has become a pest of lilies (*Lilium*: Liliaceae) in the UK and parts of North America. The report below is a preliminary assessment of the risk this beetle poses to UK horticulture. In addition to a review of the literature, the assessment has been made by conducting surveys of commercial providers of the beetle's host plants and the end user, both professional and amateur.

The primary aims of the surveys were:

- 1 To determine the current problems with lily beetle in the UK, for the providers of plants, the amenity horticulturist and amateur gardener.
- 2 To quantify how lily beetle host plants are grown in the UK, and the extent of the industry.
- 3 To gain an insight into control measures used against the beetle.
- 4 To assess the likely future effect of the lily beetle on horticulture in the UK.



Red lily beetle adult (R. Key)

**Background (Information from the literature)**

- Both the adult and larval stages of the lily beetle can cause foliar damage to host plants throughout the growing season (March to October). No stage in the beetle's life cycle attacks or is attached to the bulb.
- The beetle has only one generation a year. Inaccurate earlier literature stating that there is more than one generation is often repeated in modern pest control texts.
- Plants at risk are limited to *Lilium*, *Fritillaria* and *Cardiocrinum* (referred to as lilies), despite statements in earlier literature listing up to 20 genera. There is some evidence that not all plants in these genera are equally susceptible; more research is needed to assess these differences.
- Lily beetle is distributed throughout Eurasia. It is an alien pest in North America and the UK. It has been established in England since 1939, but has only become common outside the south-east during the past 17 years. It has recently become established in parts of Scotland and Northern Ireland, and is becoming widespread in Wales (Fig 1).
- Generalist predators are unlikely to have a significant effect on the lily beetle.
- There are four species of parasitic (parasitoid) wasp that attack and kill lily beetle larvae in Europe. Two species occur in the UK. It is thought that a combination of three or more parasitoids in mainland Europe can reduce lily beetle populations below damaging levels.
- The proportion of enquiries about lily beetle to the Royal Horticultural Society has risen from 0.5% of all pest enquiries in the 1970s to 3% in the 2000s. It is now consistently a top five pest enquiry.
- There is a risk to native lilies in the USA and it is thought that it poses a threat to the *Lilium* industry in the USA (worth \$65 million in 2003).
- The risk to native populations of *Fritillaria meleagris*, which is now a rare UK wildflower should be assessed.
- Current control methods for the beetle are inadequate. Manual removal is time consuming and the use of broad spectrum insecticides expensive and considered by many to be environmentally damaging.
- Biological control using three parasitoids in the USA is being attempted. One species is now established and reductions in lily beetle infestation have been observed.
- It has been suggested that introducing a further parasitoid to the UK may have an

effect on the lily beetle problem. However the necessary safety tests and research required to satisfy the legislation would take many years and the cost of work under quarantine conditions is likely to be prohibitive.

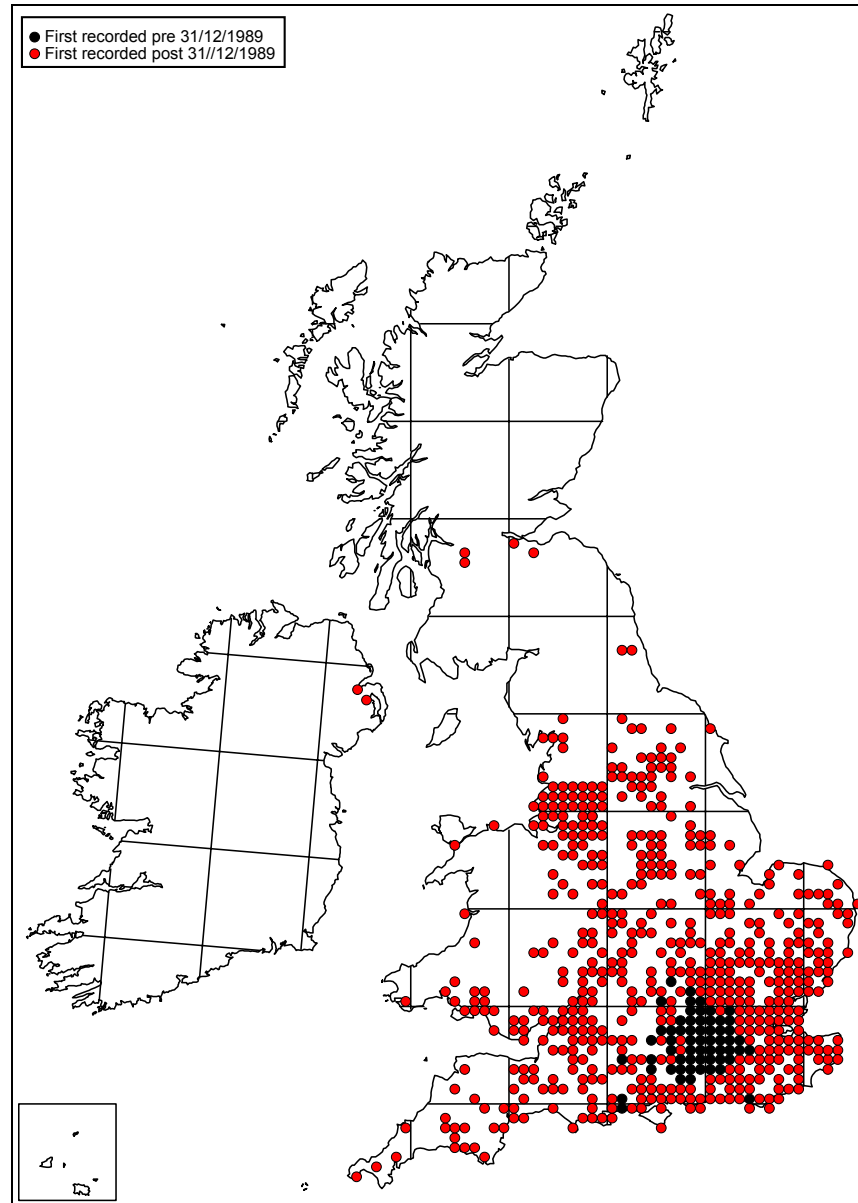


Fig. 1. Post 1939 10 km dot distribution map of the lily beetle from RHS data (at 01/01/2007). Produced using DMAP©.

- Research into the interaction of the beetle and its parasitoids with chemicals naturally occurring in the environment (e.g. volatile chemicals released by lily plants) may provide improved control measures.

- The lily beetle is a significant problem for the amateur lily grower throughout England and Wales and it is likely to expand from its current localised distribution in Scotland and Northern Ireland.

### **Risk assessment survey part 1: Effect of the lily beetle in amateur gardens.**

In order to gain some insight into consumer confidence, members of the RHS who phoned, e-mailed or visited a pest advisor at one of the RHS shows were asked (after advice was given about control of *L. lili*): “If you continue to have a lily beetle problem would you stop growing lilies (fritillaries) in the future?”

- Between March 2005 and August 2006, 148 people with a *L. lili* problem responded: 26% (39) said they would not continue to grow lily beetle hosts in the future (Fig 2).
- If the result is representative of the lily-growing public it indicates that *L. lili* could cause a decline in the sales of lilies and may already be restricting sales.

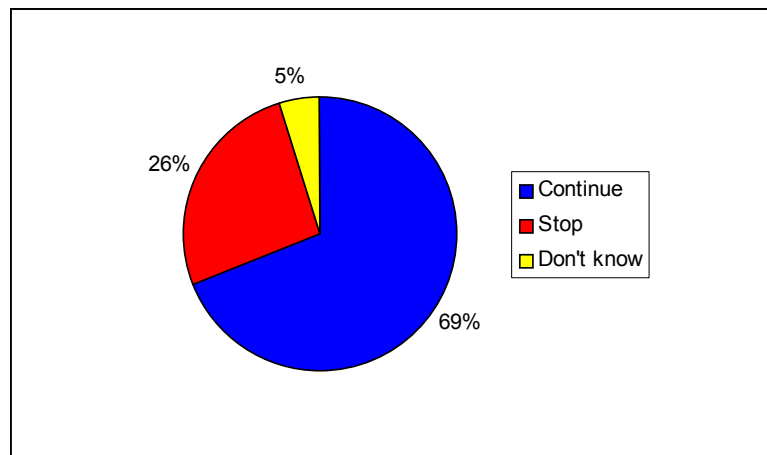


Fig 2. Replies from 148 enquirers who were asked “If you continue to have a lily beetle problem would you stop growing lilies (fritillaries) in the future?”

### **Lily beetle risk assessment survey part 2: providers of lily beetle host plants.**

In order to gain an insight into the current and perceived impact that the lily beetle has on the lily-supplying industry (lily providers) in the UK, survey forms were sent to 682 providers of lilies (HDC members and providers listed in the RHS Plant Finder). Responses were received from 102 providers of lilies. A range of different provider types responded; from growers providing 10 plants per year to those providing 2 million cut

flowers; including wholesalers, retailers and those propagating plants. The 102 providers represented nearly 7 million plants sold in the UK during 2005, and more than 300 *Lilium*, *Fritillaria* and *Cardiocrinum* species, varieties and cultivars.

- A third (35, 34%) of lily providers stated that the lily beetle had been a problem. These providers represent 9% (nearly 600 000) of the plants covered by the survey.
- Almost all sectors of the industry are vulnerable to the lily beetle. Lily beetle was reported by at least one provider under each category of growing regime (including under protection). The source of the plants (own propagation, purchased externally or imported) or how plants are propagated does not appear to affect whether or not lily beetle is a problem.
- Pesticides were probably used as a control measure against the beetle on most (up to 84%) of the lilies that were infested.
- Most providers think that lily beetle will decrease sales of lilies (Fig 4). Despite this perception, most growers have seen sales increase or stay the same over the past five years.

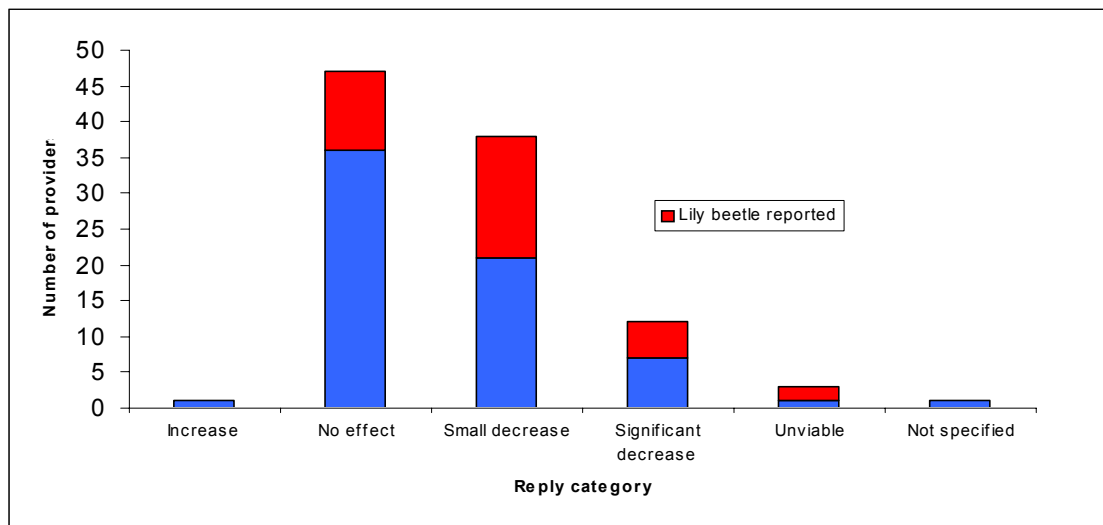


Fig. 4. Perceived impact of the lily beetle on lily sales.

- Lily beetle is the second most frequent pest (after aphids) encountered by providers but has largely been a problem for small-scale growers.

**Lily beetle risk assessment survey part three: professional users of lily beetle host plants.**

A survey of gardens open to the public has provided some insight into the problems faced by the professional user of lilies. Surveys were sent to 330 gardens open to the public; these were National Trust, RHS partner gardens and English and Scottish Heritage properties. Responses were received from 135 gardens (41%), 115 of which grew lilies.

- Fifty-one (43%) of gardens growing lilies reported that lily beetle had been a problem, 16 (14%) of which were in 10 km grid squares where lily beetle had not previously been reported, including some areas of Scotland and Wales.
- All 43 gardens that took control measures against the beetle used manual removal, including 4 (8%) that also used insecticides. Thus insecticide use against the beetle in gardens open to the public is limited, however staff time is being spent on removing the beetles.
- A quarter of gardens would reduce or stop planting lilies if lily beetle becomes a problem.
- Most (over 70%) of responding gardens source lilies from UK suppliers, and primarily as bulbs (over 70%).
- Almost all gardens (98%) grew at least some plants outside, but lily beetle could still be a problem whether the plants were in pots, open ground or under protection (Fig 5).
- Lily beetle was reported as the second most frequent pest (after slugs) on lilies. A different set of pests appears to affect lilies in gardens compared to those affecting the providers.
- Only 16% of gardens currently use any chemical inputs on lilies.
- Of the 135 survey forms returned, 91 (70%) sold plants on site, 45 of which sold lilies. Most (28, 24%) stated that sales of lilies were increasing.



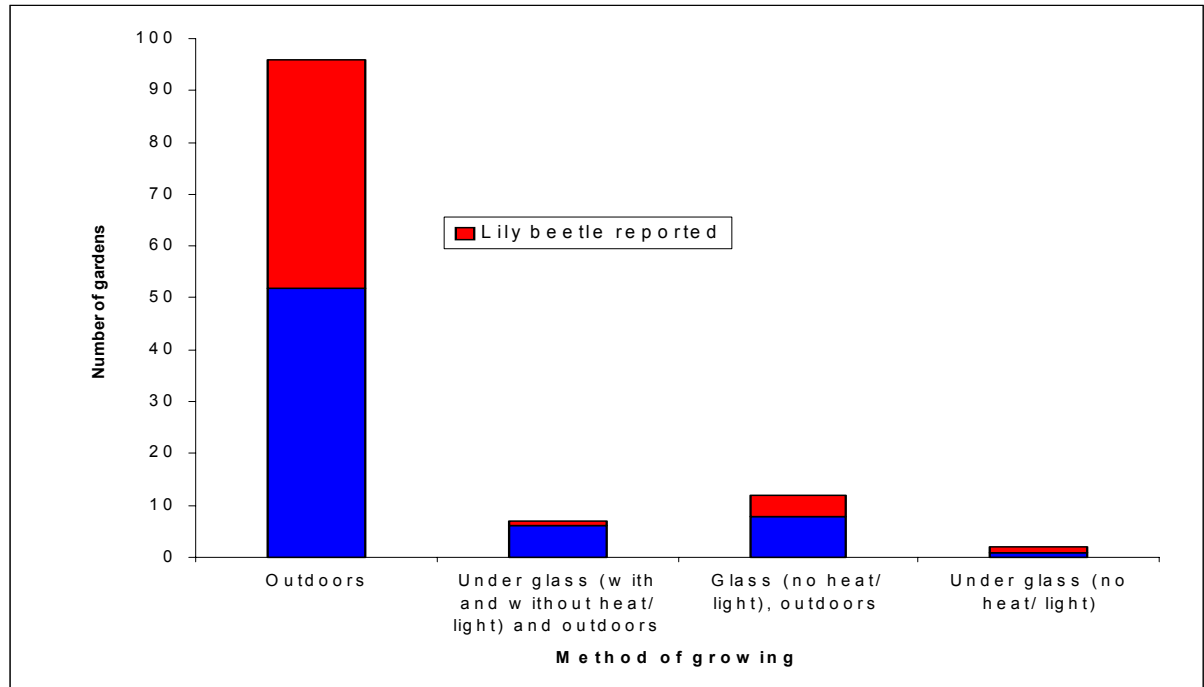


Fig. 5. How lilies are grown in gardens open to the public.

### Conclusions.

- The beetle's recent rapid spread in England and Wales, survival in Scotland and Northern Ireland and its worldwide distribution indicate that it will eventually become distributed throughout the UK, wherever its host plants are grown.
- A considerable proportion of professional gardeners and providers of lilies have experienced a problem with the beetle.
- Lily beetle can be a problem under almost any growing regime, including under protection.
- Based on current knowledge the lily beetle problem is likely to worsen, and it can be expected that more providers and gardeners will experience infestations.
- Lily beetle infestations are unlikely to increase chemical inputs in gardens open to the public, although the time spent removing the beetles manually is likely to increase.
- In commercial production, lily beetle infestations are likely to increase the use of broad-spectrum insecticides and staff time in maintaining lily crops, resulting in increases in production costs.
- The likely effect of the beetle on lily sales is unclear. Both amateur and

professional gardeners have indicated that fewer lilies would be planted / bought if lily beetle becomes a problem. However the surveys have indicated that sales of lilies have increased during the past five years, despite the increasing beetle problem faced by amateur gardeners.

- It has often been suggested that the lily industry may be spreading the beetle throughout the UK through distribution of potted plant material. There is no evidence from these surveys for or against this theory. It is likely that most of the beetles spread in England and Wales has been due to other factors, although these remain unknown.
- Many lily providers import lilies from abroad, most frequently from Holland. It should also be considered that if the lily beetle does affect sales the industry outside of the UK may also be affected.

### **Recommendations**

- It is recommended that lily providers and professional gardeners remain vigilant and take action against the beetle as necessary.
- For lily providers, currently the most successful action is likely to be the use of a broad spectrum foliar insecticide; this may need repeating throughout the natural growing season of susceptible plants.
- Providers who supply lilies in pots should take care that all outgoing stock is free of the beetle and its damage. This is especially important for those providers supplying lilies to large retail outlets where contamination with beetles can result in significant economic penalties and rejected shipments.
- Overwintering survival of one species of parasitic wasp that kills lily beetle larvae is reduced by the presence of mulch. It is therefore advisable that, where possible, lilies in gardens are not mulched.