Monitoring raspberry beetle (Byturus tomentosus) with white sticky traps: the experience from three geographically distinct European areas

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Introduction

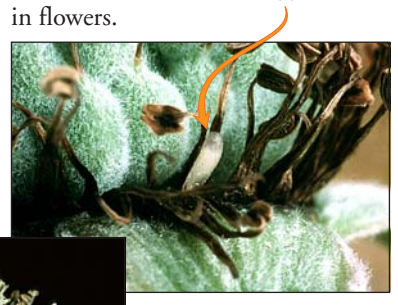
1 Raspberry (*Rubus idaeus*) is a high value crop, grown in many European countries for the fresh market and processing.

Scotland

Switzerland

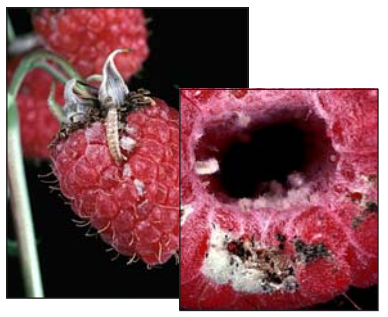
2 Raspberry beetle (*Byturus tomentosus*) damages flower buds, flowers and, especially, fruits. Adults emerge from the soil in spring and feed on young foliage until flower buds develop.

They feed, mate and lay eggs in flowers.



Adult feeding damage to flower.

3 Larvae cause the greatest damage. Infestations or contamination can make fruit unsaleable.



4 Most growers routinely apply one or two insecticide sprays before harvest.

5 A 2-year EU project, **'Reduced Application of Chemicals in European Raspberry Production'** (see 'RACER' panel) developed methods to decrease dependence on routine "insurance" sprays of pesticides to control raspberry beetle and other pests and diseases without affecting fruit quality.

Objectives

- Develop methods to monitor raspberry beetle activity using white sticky traps.
- Examine relationships between the numbers of trapped raspberry beetles and subsequent larval damage to ripe fruit.
- Develop control thresholds based on numbers of trapped adult raspberry beetles.

Methods

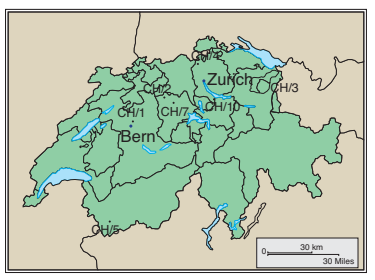
Monitoring adult raspberry beetle flight activity

Raspberry beetles were trapped on white, sticky plates (Rebell® bianco), suspended from supporting wires 50-70cm above ground in spaces between canes, and facing the alleys between rows.

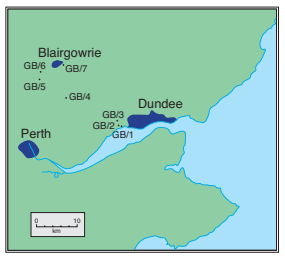
Four traps were placed at least 20m apart in insecticide-free areas in 5-11 plantations/country in late-April or early-May, and changed at weekly intervals for 6-10 weeks.

Trials were made in 1998 and 1999 in:

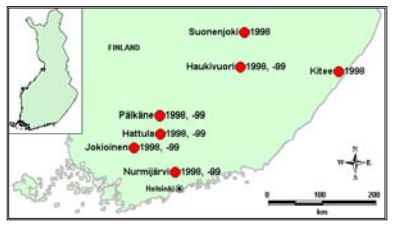
Switzerland several cultivars; IPM and organic plantations; 409 - 1060m elevation.



Scotland 2 cultivars (Glen Clova, Glen Ample); large plantations; main raspberry-growing area.



Finland cvs Ottawa, Muskoka and Preussen; widely separated central, eastern and southern areas.



Assessing larval feeding damage to ripe fruit

250 fruits or freshly exposed husks (receptacles)/replicate from 10m lengths of the trap row and two adjacent rows were examined shortly after harvests. Husks were inspected in the field, or collected and examined in the laboratory to check the accuracy of field assessments.

Results

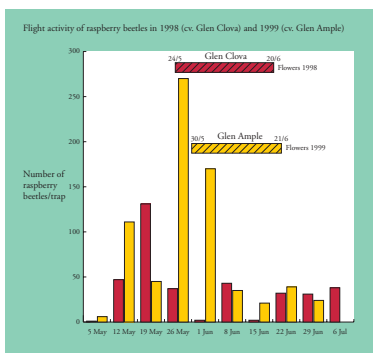
Raspberry beetle flight activity

In Switzerland, raspberry beetles were first trapped in late April; in Scotland, about 1-4wk later; in Finland, they were not caught until mid-May or early-June.

Dates when first raspberry beetles were caught on white sticky traps and the start of flowering in Switzerland, Scotland and Finland.

	Switzerland	Scotland	Finland
First raspberry beetles (wk ending)	23 April - 7 May	5 May - 27 May	15 May - 9 June
Start of flowering	13 May - 11 June	25 May - 3 June	13 June - 4 July

Raspberry beetles were usually trapped for at least 3wk before flowering started.



In Scotland and Finland, most were trapped before flowers opened.

Ranges of the total number of raspberry beetles/trap caught before and during flowering \in Switzerland, Scotland and Finland.

	Switzerland	Scotland	Finland
1998			
Before flowering	2 - 40	2 - 216	8 - 694
During flowering	4 - 102*	16 - 116	1 - 60
1999			
Before flowering	4 - 67	1 - 367	1 - 294
During flowering	1 - 100	3 - 289	1 - 6

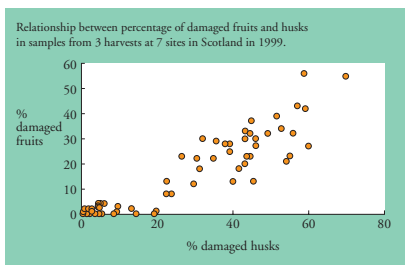
*Total numbers for Swiss sites in 1998 also include raspberry beetles trapped after flowering

Large numbers were caught during the flowering period in Switzerland and Scotland (>45% of the total number of trapped beetles, cf. <5% in Finland).

Damage assessments

Larvae were found far more often in husks than in the detached raspberries.

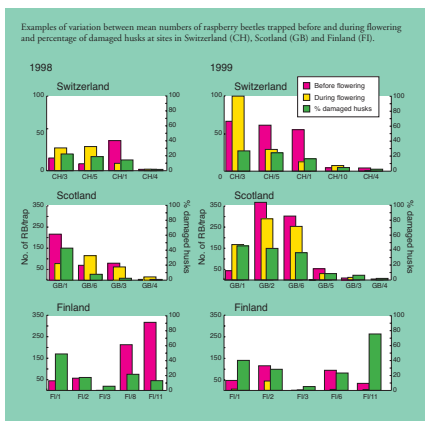
There was a close relationship between damage to the husks and damaged fruits ($r^2 = 0.928$).



Relationships between numbers of adult raspberry beetles and larval damage

Relationships for sites, years and countries were too variable to use the numbers of trapped raspberry beetles to *predict* fruit damage. Sites with fewer than 20 beetles/trap before and during flowering usually had less than 5% damaged husks (c. < 0.5% raspberries containing larvae).

In Finland, growers' assessments of damage to *saleable berries* in 1998 were unexpectedly low compared with the large numbers of raspberry beetles trapped at some sites (e.g. 1998, FI/11). In 1999, *all husks* were sampled. The most damage was found at site FI/11 in central Finland, where only small numbers of raspberry beetles were trapped. Beetles may have migrated from wild raspberries in the forests when the cultivars began to flower.



Conclusions

Damage assessments

- Inspecting damaged husks is an efficient indirect method to assess fruit damage.

Relationships between numbers of adult raspberry beetles and larval damage

- Trapping efficiency declines during flowering, when raspberry beetles are attracted to flowers, and white traps become obscured by dense foliage.
- In Finland, most raspberry beetles are trapped before flowering.
- In Scotland and Switzerland, large numbers are often trapped during flowering.
- Fruit damage is usually positively related to numbers of trapped adult raspberry beetles in Scotland and Switzerland, but not in Finland.

Control thresholds

- Insecticide control is unnecessary for fresh market raspberries in Switzerland and Scotland at sites where fewer than 5 raspberry beetles/trap are caught before flowering.
- Higher threshold (5-20 raspberry beetles/trap) for processed raspberries.

RACER

'Reduced Application of Chemicals in European Raspberry Production' (RACER) was a project involving raspberry producers in six European countries who joined with scientists to develop IPM methods for the major pests and diseases of this crop.

Acknowledgements

We thank the SME's and growers who provided sites for these studies, and Mr. J W McNicol (Biomathematics and Statistics Scotland) for statistical advice. The RACER project was funded by the European Commission (FAIR FA-S2-CT97-9038) and Bundesamt für Bildung und Wissenschaft in Switzerland.

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