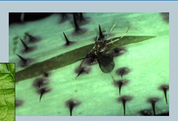
Reduced Application of Chemicals in European Raspberry Production (RACER)

Objectives

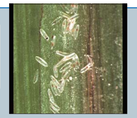
Monitor adult raspberry beetle flight with view to developing spray threshold.

Develop methods to manage and understand two-spotted spider mite population development in raspberry.



Improve raspberry cane midge population forecasting by transfer of existing technology.

Develop monitoring system to predict Otiorhynchid weevil activity in raspberry plantations.



Develop standardised procedure to identify and assess levels of post-harvest rot fungi in European raspberry plantations and evaluate current low-input fungicide treatments.

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Raspberry beetle monitoring threshold

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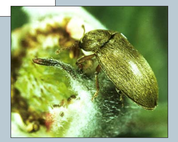
Raspberry beetle (*Byturus tomentosus*) - major pest in Northern and Central Europe.

Damages flowers and contaminates fruit.

Control - insecticides: pre- and in some countries, post- flowering.

Flight behaviours and dispersal - soon after emerging from soil, adults may fly to other roseaceous hosts (eg. hawthorn, rose, apple).

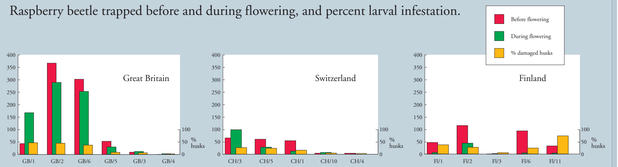


Adults return to raspberry/rubus to feed and oviposit.

Flying adults attracted to white traps (Rebell® bianco).

Monitoring - relationship established between adults caught on trap and subsequent larval damage to ripe fruit.

Raspberry beetle trapped before and during flowering, and percent larval infestation.



Threshold (provisional) 5 adult beetles per trap between emergence and first flowers.

Management of two-spotted spider mite

Two-spotted spider mite (*Tetranychus urtricae*). Important pest of raspberries in most parts of Europe and under protective cultivation.
Damages foliage and can cause premature defoliation.
Control: Largely by chemical means.
Deltamethrin - adverse effect on native predatory mites.
Biological/integrated control methods being developed.

Native predatory mites

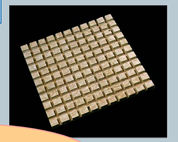
Finland - *Phytoseius macropilis*
Italy - *Amblyseius andersoni*
Switzerland - *Typhlodromus pyri/Euseius finlandicus*
Greece - *Phytoseius plumifer*
P. macropilis - Pollen alternative food source - can establish quickly but in 1999 little pollen - poor survival.
A. andersoni - also feeds on pollen and on yellow spider mite (*Eotetranychus carpini*)

Introduced predatory mites

Phytoseiulus persimilis.
Amblyseius cucumeris.
Amblyseius californicus.
Typhlodromus pyri.

Wingless weevils monitoring

Wingless (Otiorhynchid) weevils are now becoming important pests of raspberry in Europe
Adults and larvae damage plant growth.
Adults can contaminate fruit.
Control: very difficult, few effective insecticides, biocontrol unreliable.
Monitoring important to detect early establishment in plantation.
Nocturnal beating most effective, although wooden groove traps can detect weevils (results not reliable).



UK: Clay-coloured weevil (*Otiorhynchus singularis*).
Vine weevil (*O. sulcatus*).
Finland: Strawberry weevil (*O. ovatus* - low numbers).
Italy: Vine weevil (*O. sulcatus*).
O. armadillo.
O. apenninus.
O. globus.

Weevils recorded

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Raspberry cane midge

Raspberry cane midge (*Resseliella theobaldi*) is part of the disease complex 'midge blight'.
Kills overwintering canes.
Control - effective spraying to kill first generation midge eggs/larvae in spring.
Monitoring - see raspberry cane midge prediction service poster.
Degree days from 1 February to first eggs in different countries.

Finland	~200
Italy	260
Scotland	326
Switzerland	360
France	312

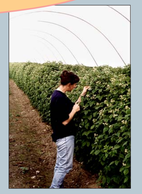
Post-harvest rot development of standardised sampling procedure

Post-harvest rots (grey mould (*Botrytis cinerea*) and other fungi) responsible for poor shelf-life and spoilage.
Control - intensive sprays with fungicides.
No standardised assessment available for soft fruit growers/packers.

Procedure: 80 fruits "incubated" at ca. 20-25°C and 10% infection level assessed.

Training/information dissemination

Growers seminars/workshops held in all participating countries.
Advisors/field officers attended workshop/participated in sampling.



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