



Agriculture & Horticulture
DEVELOPMENT BOARD



Grower Summary

SF 115

The identification of overwintering predatory mites in strawberry and cane fruit, and investigation of on-farm production.

Final Report 2011

Disclaimer

Whilst reports issued under the auspices of the HDC are prepared from the best available information, neither the authors nor the HDC can accept any responsibility for inaccuracy or liability for loss, damage or injury from the application of any concept or procedure discussed.

The results and conclusions in this report may be based on an investigation conducted over one year. Therefore, care must be taken with the interpretation of the results.

Use of pesticides

Only officially approved pesticides may be used in the UK. Approvals are normally granted only in relation to individual products and for specified uses. It is an offence to use non-approved products or to use approved products in a manner that does not comply with the statutory conditions of use, except where the crop or situation is the subject of an off-label extension of use.

Before using all pesticides check the approval status and conditions of use.

Read the label before use: use pesticides safely.

Further information

If you would like a copy of the full report, please email the HDC office (hdc@hdc.ahdb.org.uk), quoting your HDC number, alternatively contact the HDC at the address below.

HDC
Stoneleigh Park
Kenilworth
Warwickshire
CV8 2TL

Tel – 0247 669 2051

No part of this publication may be copied or reproduced in any form or by any means without prior written permission of the Horticultural Development Company.

HDC is a division of the Agriculture and Horticulture Development Board.

Headline

- The predatory mites *Neoseiulus californicus* (strawberry) and *Amblyseius andersoni* (strawberry and raspberry) can overwinter on crops in the open, surviving exposure to very low temperatures and conventional pesticide regimes.

Background and expected deliverables

Unheated strawberries and raspberries are commonly damaged by the two-spotted spider mite *Tetranychus urticae* (TSSM), especially summer-long everbearer strawberry and primocane raspberry crops. Acaricides are used for control, but dense crop canopies and restrictions on harvest intervals reduce their effectiveness, and there are concerns about resistance. Also, there is pressure from the multiple retailers to reduce pesticide residues, so that growers are becoming more interested in biological control programmes for TSSM.

The most popular predatory mite for TSSM control is *Phytoseiulus persimilis*, which is introduced during the summer months and can be very effective. However, this species only feeds on spider mites, has no cold tolerance and dies out when prey is scarce. Observations by ADAS consultants have indicated that predatory mites are present in early spring on some farms, at a time before *Phytoseiulus* have been introduced. The species involved have been unknown, but clearly could be of great importance in the overall control of spider mite.

The aim of this project therefore was to identify and quantify the predatory mites that occurred naturally on strawberry and raspberry in spring, having overwintered, and to determine the factors which might favour their existence.

Summary of the project and main conclusions

This project identified predatory mites in 51 out of a total of 55 samples collected from all the main fruit growing areas of England. The most common species overall, although found only on strawberry, was *Neoseiulus californicus*, which is regarded by Defra as a non-native species, with a licence for release only under protection. This mite was found in 49% of all samples. Clearly, *N. californicus* is capable of surviving UK winters, and has established itself widely in outdoor strawberries and also crops grown in Spanish tunnels. This information needs to be presented to Defra, so that the status of *N. californicus* can be reconsidered, with the eventual aim of permitting its release on outdoor crops. *N. californicus* was not found in any of the raspberry crops sampled; instead, the most common species on this crop was *Amblyseius andersoni*, (27% of all samples) which is a native species endemic to northern Europe. Both of these species of predatory mite can feed on many different types of prey, including TSSM, other small prey such as springtails, and even pollen when live prey is scarce. The only other predatory mite species identified was *Typhlodromus pyri* (11% of all samples), which is also a polyphagous species, best known on top fruit as the key predator of fruit tree red spider mite (*Panonychus ulmi*). The exact role of these predatory mite species in the soft fruit ecosystem is unknown, but this aspect deserves further investigation.

Records of insecticide use at each sampling site were obtained, and showed that the most common active ingredients used (in order of frequency) were: chlorpyrifos (e.g. Dursban WG); bifenthrin (e.g. Talstar 80 Flo); clofentezine (Apollo 50 SC); tebufenpyrad (Masai); abamectin (Dynamec); thiacloprid (Calypso); pymetrozine (Chess); and pirimicarb (e.g. Aphox). Not all of these actives were used at each site, but they show that both *N. californicus* and *A. andersoni* must have some degree of tolerance to some or all of these pesticides.

Financial benefits

High infestation levels of two-spotted spider mite or tarsonemid mite can result in a premature end to harvest of the crop. Pesticides are rarely effective at this stage due to the difficulty in achieving adequate spray coverage and the time required during

picking to meet necessary harvest intervals. Bio-control, starting at an early stage greatly reduces the risk of this problem. The introduction of predators needs to be managed carefully as considerations of temperature and pesticide use influence their effectiveness. A high level of over wintering predators would greatly assist establishment of a bio-control regime, if not replacing traditional introduction timings altogether.

Typical preventative biocontrol costs for strawberries

<i>Phytoseiulus persimilis</i> , one introduction @ 30,000 per ha	£120
<i>Amblyseius cucumeris</i> , 1-3 introduction @ 200,000 per ha	£40-120

Typical preventative bio-control costs for raspberries

<i>Phytoseiulus persimilis</i> , one introduction @ 30,000 per ha	£120
---	------

Early cessation of harvest could affect revenue as follows:

- One tonne of strawberries is worth £3,000, a total yield of 25 t/ha
- One tonne of raspberries is worth £7,000, a total yield of 12 - 20 t/ha

Action points for growers

- Growers should be aware of the presence of these mites.
- Regulatory changes for *N. californicus* would be needed to permit its addition to an outdoor biological control programme, to supplement the routine use of *Phytoseiulus persimilis*.
- In this manner, a more robust programme would be possible, with *N. californicus* and *A. andersoni* adding to the overall control of TSSM in the crop.