Biological control of raspberry leaf and bud mite: effect of phytoseiid mites in tunnel and open field

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Introduction

Increasing cultivation of raspberry variety Glen Ample has increased the importance of the raspberry leaf bud mite (RLBM) (*Phyllocoptes gracilis*). Current control of RLBM in Scandinavia includes sprayings with sulphur or a mixture of rape seed oil and soap in late autumn and/or early spring. In summertime, both materials may cause injuries especially in tunnels. As a supplementary control method we studied the use of predatory mites in tunnels and open field raspberry.

Materials and methods

Experimental raspberry field at Jokioinen:

- Tunnel and open field blocks, four replicates
- Varieties Glen Ample (UK) and Maurin Makea (FI)
- Natural infestation of RLBM since 2011
- No pesticide, oil or sulphur sprayings against pests

Repeated introductions of predatory mites:

- 2012: *Neoseiulus cucumeris*, six times in loose material in cups
- 2013: *N. barkeri*, *N. cucumeris* and *Amblyseius swirskii*, four times in loose material in cups
- Leaf samples were taken every second or third week, counts of RLBM, phytoseiid mites and other arthropods

The release method of predatory mites.

Symptoms of RLBM and RLBV.

Results

In 2012 *N. cucumeris* releases controlled RLBM in tunnel by 40-50% both in Glen Ample and Maurin Makea. No control effect was noticed in the open field.

In 2013 *A. swirskii* was able to keep the fairly high initial population at an acceptable level until the late season. Also spider mites remained at low level in all treatments.

Natural phytoseiid species were present, and especially *Phytoseius macropilis* occurred in numbers in Glen Ample, showing preference for RLBM in tunnels.

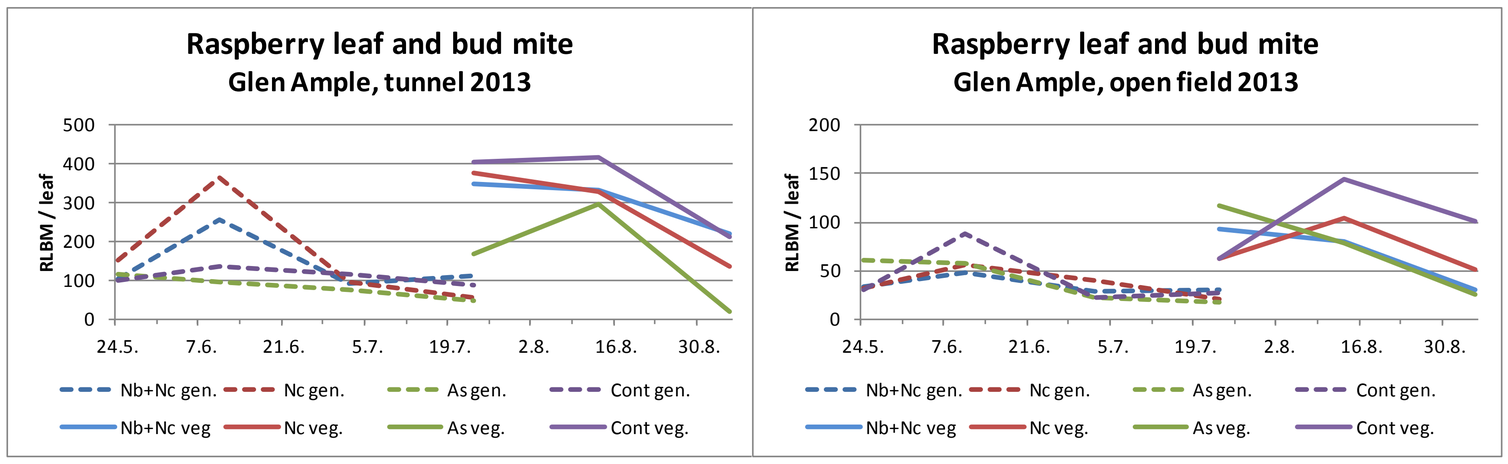

Fig. RLBM in leaf samples in Glen Ample in tunnel and open field in 2013.
gen = generative shoots, veg. = vegetative shoots
Treatments: Nb+Nc = *N. barkeri* + *N. cucumeris* Nc = *N. cucumeris*
As = *A. swirskii* Contr = untreated control

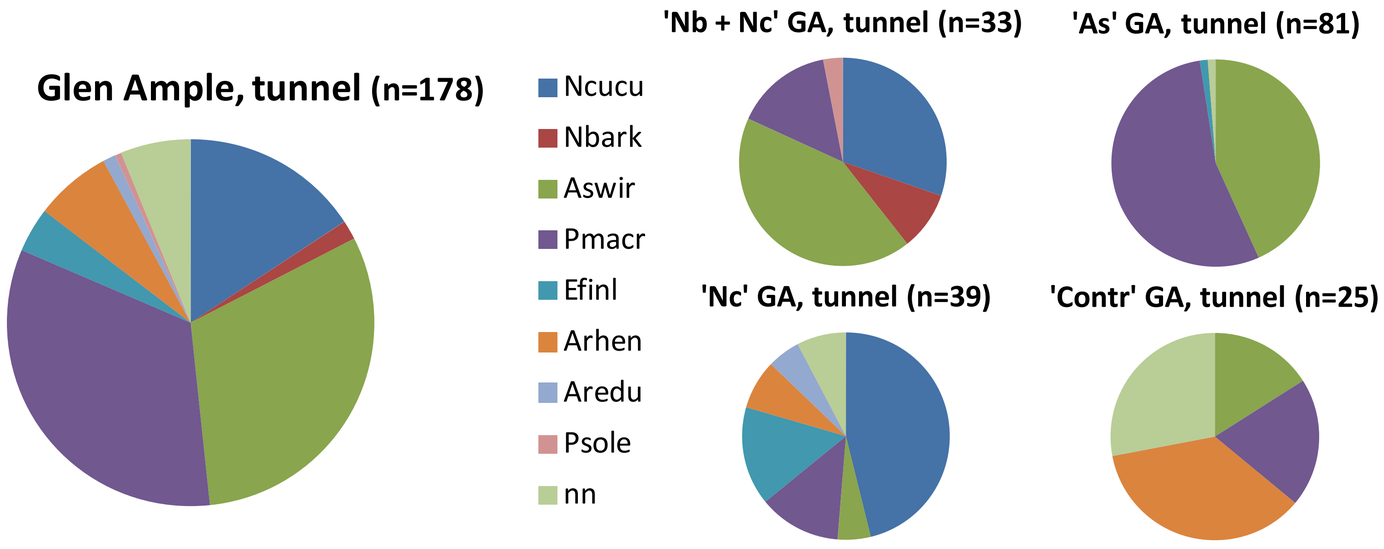

Fig. Predatory mite species in leaf samples of Glen Ample in tunnels in 2013.
Ncucu = *Neoseiulus cucumeris* Efinl = *Euseius finlandicus*
Nbark = *Neoseiulus barkeri* Arhen = *Anthoseius rhenanus*
Aswir = *Amblyseius swirskii* Aredu = *Amblyseius reductus*
Pmacr = *Phytoseius macropilis* Psole = *Paraseiulus soleiger*
nn = unidentified specimens

Conclusions

A.swirskii proved most potential phytoseiid mite to control RLBM in tunnel conditions. Biological control during the season and either turnip rape seed oil or sulphur sprayings outside the season form a rational integrated control scheme for RLBM in tunnels. *P. macropilis* is worth further research as a potential control agent of RLBM. Control of RLBM is particularly important as it is also a vector of Raspberry leaf blotch virus (RLBV).