

### Section III. Biological Control

#### BIOLOGICAL CONTROL OF SPIDER MITES IN RED RASPBERRY: HOST PLANT RESPONSES AND PREDATION BY *NEOSEIULUS FALLACIS* (GARMAN) (ACARI: PHYTOSEIIDAE).

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*Tetranychus urticae* Koch and *Eotetranychus carpini borealis* (Ewing) are foliar pests of red raspberry, *Rubus idaeus* L. and are preyed upon by the phytoseiid mite, *Neoseiulus fallacis* (Garman). Field studies conducted in Skagit and Whatcom counties in 1995-1997 showed that the two spider mites and the predator are common in red raspberry fields. Climatic requirement for each species plays major role in setting time of emergence from dormancy for the host plant, the phytophages and the predator. When the two phytophages overlap in space and time, interspecific competition as well as predator-mediated apparent competition are probably setting the dynamics occurring in mid-season. At the end of the season, prevalent climatic conditions are cooler, which is favorable for *E. carpini borealis* when *T. urticae* enters diapause.

Laboratory and greenhouse experiments showed that interspecific competition due to resource depletion may be the most important interaction when the two species occur on the same leaf. *E. carpini borealis* seems to be the weaker competitor. Host plant-mediated competition is probably weak in red raspberry system.

*N. fallacis* may use chemical cues to locate *T. urticae* and *E. carpini borealis*. The predator exhibited numerical and functional responses to *T. urticae*. However, the predatory activity occurred after the canes had undergone damage due to spider mite feeding. Efficacy of *N. fallacis* could be enhanced by introducing and conserving other predatory species that are more tolerant to environmental conditions prevailing during the periods of April to June when *E. carpini borealis* is active and escaping predation from *N. fallacis*.