

Section 5
Biological & Cultural Controls

BIOLOGICAL CONTROL OF SPIDER MITES ON HOPS: FOUR
FACTORS OF IMPORTANCE.

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Biological control of Two-spotted Spider Mite, *Tetranychus urticae* Koch, by phytoseiid predatory mites on hops has been under investigation for several years. We have found that *Neoseiulus fallacis* and *Metaseiulus occidentalis* are the most effective predators in western Oregon. However, spider mites are not always reduced to commercially acceptable levels. Four factors were identified which could influence the outcome of biocontrol: the predator species, when in the season predators are released, how high on the plant they are released, and how two cultural practices, stripping and hilling (both of which remove leaves from the base of the plant), affect biocontrol. We conducted four small-plot controlled experiments to determine the importance of these factors.

We found that *N. fallacis* and *M. occidentalis* when combined on the same plant provided the best control, followed by *N. fallacis* released alone, while *M. occidentalis* alone provided no control. This was a very cool and wet year, conditions under which *M. occidentalis* performs poorly. In other, warmer years we have indications that *M. occidentalis* performs nearly as well as *N. fallacis*.

Releasing multiple times through the season provided superior control to releasing once or never; in fact releasing once was better than controls only at the end of the season. We found no differences with regard to height of release until the last date, when releasing at the base only resulted in significantly lower spider mite numbers than releasing at points along the entire height of the plant. Finally, stripping and hilling when applied together resulted in the highest numbers of spider mites, while stripping alone was only slightly higher than controls and hilling alone was not detrimental.

These results are dependant on how the predators and prey disperse up the rapidly growing hop plant, which is in turn dependant on the initial relative densities and the spring weather.