

Biological control of
***Polyphagotarsonemus latus* (Banks)**
(Acari: Tarsonemidae) by the
predaceous mite *Amblyseius swirskii*
(Athias-Henriot) (Acari:
Phytoseiidae)

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Abstract

The broad mite, *Polyphagotarsonemus latus* (Banks) (Acarina: Tarsonemidae), is a major pest of many crops in tropical and subtropical regions and in greenhouses worldwide. It damages plants and fruit by piercing and feeding on soft tissues. Damage by broad mites includes stunted plant growth and aborted blossoms. Fruit may become distorted and have silvery striping. Several pesticides are being used to control *P. latus* populations and there are several predator species known to feed on the pest.

The phytoseiid predatory mite, *Amblyseius swirskii* Athias-Henriot, is a true omnivore, a McMurtry-Croft Type III predator, able to feed on a wide range of prey and on plant pollen. It was originally found in citrus groves in Israel and laboratory research in Europe indicates it is able to effectively control *Bemisia tabaci* and *Frankliniella occidentalis*. However, its ability to control populations of *P. latus* is not clear.

The objective of this study was to determine the ability of *A. swirskii* to prey on *P. latus*. In a laboratory trial, I found that *A. swirskii* exhibits a Hollins Type II functional response to varying population sizes of *P. latus*. In the field, I compared pest density on peppers at two *A. swirskii* release rates (50 and 100 predatory mites/m²) with those treated with miticide and an untreated control. The release rate of 100 predatory mites/m² effectively suppressed the pest and was comparable to the chemical treatment. These results were reinforced in an additional trial conducted on the following year.

Since *A. swirskii* is an omnivorous predator, there arises the possibility of sustaining its prophylactic releases by the application of pollen to the plants. I therefore investigated the influence of pollen on the establishment of *A. swirskii* in the field and in greenhouses. An average amount of 0.01-0.02 grams of corn pollen per pepper plant was applied. In the field trial, no significant difference was found in broad mite numbers in pollen and non-pollen treatments. I re-examined the effect of pollen on population dynamics of *P. latus* and *A. swirskii* on sweet peppers in a controlled greenhouse. Results suggested that the predator had established itself better on pollen than on non-pollen treatments and the pest populations were slightly lower in the pollen sprayed treatments although no significant difference was found.

During this study, preliminary observations suggested behavioral differences between predators that were pre-fed pollen or live prey. In addition, the influence of the feeding history on their foraging and resting was recorded. Finally, I recorded the effect of predator feeding history on the chance of encountering prey or pollen. The interaction between feeding history and subsequent diet (pollen, broad mite or mixed) was tested. Results suggest that the feeding history affected mite behavior when offered mixed diet. Predatory mites drawn from either nutritional history in the mixed arena seemed to prefer to feed on the pre-treated diet. As a result, prey-fed mites exhibited a significantly longer feeding time on motiles in comparison to pollen-fed mites. Similar data were obtained as to the total time feeding on pollen grains, in which pollen-fed mites exhibited a significantly longer feeding time on pollen grains as compared to broad mite-fed mites.

Mites reared on pollen exhibit a shorter foraging behavior and rested more in comparison to mites reared on broad mites. As to the effect of feeding history on prey or pollen encounter rates, an apparent but not significant trend was found in food encounter rate; prey-fed mites encountered more prey or pollen.

The results indicate that 1) optimal broad mite control could be achieved by releasing 100 *A. swirskii* per m² and 2) suggest that *A. swirskii* should be fed on prey in order to increase its predation on pests in the field.

Yet, further research is needed on the effect of rearing diet on predator efficiency as a biological control agent.