

Abstract

Sweet pepper (*Capsicum annuum*) is a major crop in the Arava valley, where it is grown in screen- or glasshouses covering an area of nearly 1700 hectares. 60% of this area is under biological control and IPM (Integrated Pest Management). In this study, the key pest of sweet pepper, the Western flower thrips *Frankliniella occidentalis* (WFT), and its most important natural enemies, *Orius* spp. (Heteroptera: Anthocoridae) were monitored both during the course of the pepper season, and out of season. This research is meant to provide a preliminary basis for a further regional management study of cultivated land and surrounding natural areas, with the goal of reducing the pest population at the source of infestation, prior to invasion of greenhouses, and encouraging and conserving natural enemy populations.

Research conducted in the 1990's showed that the species *Orius albidipennis* exists naturally in the Arava, and migrates from uncultivated land to ornamentals and crop plants. However, the identity of the plant species on which it occurs, the extent of its establishment in cultivated fields, and the nature of its interactions with the commercially grown, extensively released predator *Orius laevigatus* were not clear from the results of this study.

In order to evaluate the importance of ornamental plants and wild vegetation to WFT populations both during and between growing seasons, and in order to identify plant species which support populations of *O. albidipennis*, an entomofaunal survey was conducted on ornamental and wild plants commonly found in the vicinity of cultivated areas in the Arava. The depth of migration by *O. albidipennis* into cultivated fields, and the extent to which WFT and *O. laevigatus* populations became established, were estimated by monitoring populations on pepper flowers where either biological or chemical control was employed.

WFT was found on all of the plant species surveyed in this study. The potential for a continuous presence of thrips was evident on both ornamental and wild plants. From spring until fall, when no agricultural crops are grown, large numbers of WFT were found on the wild plants *Ochradenus baccatus* and *Solanum* sp, and on the ornamentals *Lantana* sp, *Senna corymbosa*, *Leucophyllum frutescens*, *Calliandra* sp. and *Eremophila macdonnellii*; the large thrips populations supported by these species during the summer

can invade peppers in the fall. Although summer WFT populations were larger on ornamentals than on wild plants, the agricultural significance of this situation remains unclear because of the different reproductive potential of WFT on different plants and the distance of the various plants from the pepper crop.

In samples collected from February until August, the native bug *O. albidipennis* was present as a small but persistent population on *Lantana* sp. and *Salsola* sp. In May, when pepper plants were removed from the fields, large numbers of *O. albidipennis* were found on both wild and ornamental plants, while *O. laevigatus* was found in large numbers in May on wild plants, but not on ornamentals. A few individuals of *O. laevigatus* were observed on wild and ornamental plants until June.

The establishment of the commercial species *O. laevigatus* as a biological control agent in the fall (September – October) was satisfactory in spite of this species' sensitivity to high temperatures. The period of establishment corresponded to a time of significant increase in the WFT population, which was suppressed at the end of October. In contrast, chemical control was only partially effective against WFT during the same period. *O. laevigatus* was found in greenhouses where chemical control was used; this behavior may have resulted from intense competition for thrips as food in neighboring biologically-treated greenhouses, where *Orius* populations were very high. In the spring, when pepper plants bloom once again, an additional release of *O. laevigatus* proved unnecessary, as WFT populations suppressed in the fall remained low through the spring months.

O. albidipennis was found in all of the greenhouses and screen houses surveyed. More were found in chemically-treated screen houses covered with 25 mesh netting than in similar structures where biological control was used. This difference was particularly marked in April, during the first growing season, and again in November of the second growing season. The differences in the population density of the local species in peppers treated chemically or biologically may be linked to the presence of the commercial species *O. laevigatus*, which was released as a biological control agent.

**Populations of Western Flower Thrips and their *Orius*
spp predators on sweet pepper, ornamental plants and
wilds vegetation in the Arava Valley**

Thesis

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