

A study of density dependent damage by Western  
flower thrips, *Frankliniella occidentalis*  
(Thysanoptera: Thripidae) to strawberry.

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## ABSTRACT

Strawberry (*Fragaria spp.*) is an important fruit crop, intensively cultivated for its fresh aromatic red berries. Its high nutritional value and delicate flavor have led it to become a regular part of the diets of millions. The spontaneous occurrence of various pests on the crop and their control by chemical means hinder the present demand for pesticide-free produce. The Western flower thrips, *Frankliniella occidentalis* (Pergande) (Thysanoptera: Thripidae) (WFT) has been considered a key pest of strawberry in many parts of the world, including Israel. It has been thought to cause damage to both flowers and fruits of the strawberry. The nature and extent of damage, however, remain ambiguous.

The overall objective of this study was to elucidate the relationship between WFT density and damage to strawberry fruits and flowers, thus suggesting an economic injury level for WFT on strawberry at Israel. To determine density dependent WFT damage to strawberry flowers and fruit, two greenhouse experiments were conducted at the Hebrew University Faculty of Agriculture in Rehovot, Israel. Each experiment included five WFT density treatments (including the control) either with a mature flower or a pink fruit. A total of six replicates were conducted on different days. Damage to fruits and flowers was observed after four consecutive days of caging with the respective density treatments. Assessment of damage on flowers was done by measuring the height and width of the receptacle in order to calculate its size. An index of WFT damage to the fruit was developed for assessing the nature and extent of damage to the strawberry fruit.

Significant size reduction of the strawberry flower receptacle was detected at densities exceeding 10 WFT/flower. Similarly, significant fruit damage was detected above 10 WFT/fruit. The flower damage was characterized by dry and withered anthers and stigma. The damaged fruits exhibited surface bronzing, russeting, feeding punctures and silvering which made them unsuitable for export. However, fruits caged with 10 and 15 WFT were suitable for the local market, while those caged with 5 WFT were of export quality.

Two distinct strawberry growing periods are recognized per year, winter and spring. The winter produce is targeted for international markets because of its high off-season export value. Spring season yields are sold on the local markets because of its low value compared to the winter produce. The production of export quality fruits in the winter was found to be associated with low WFT occurrence. Studies show that the WFT population remains low during winter and increases with the onset of spring. Thus the two target markets require two sets of decision making tools.

In the present study two economic injury levels (EIL) were established on the basis of experimental results. Statistical data on annual strawberry production and marketing for 2002/03 published by the Extension Service of the Ministry of Agriculture were used for establishing EIL. The study indicated an EIL of 15 WFT/fruit/day for export quality strawberries, and 48 WFT/fruit/day for the local market. In practice, however, the latter never occurs in the field.

At lower WFT densities there may be slight damage to strawberry fruits and flowers. It would be desirable to employ augmentative biological control at lower economic thresholds than those set for chemical control.