Mini Grant: Developing timely IPM responses to critical pest issues

Project Title: Surveying and identifying thrips species in vegetable crops throughout the mid-Atlantic region

This proposal will identify the temporal and spatial occurrence and damage potential of important thrips species found in vegetable crops in the mid-Atlantic region.

Objective and Rationale:

Objective 1: Survey thrips populations and identify to species and examine feeding damage to vegetable fields in eastern Virginia, Maryland, Delaware, SE Pennsylvania and SW New Jersey.

Thrips damage has steadily increased in vegetable fields throughout the mid-Atlantic over the last 5 years (Ingerson-Mahar 2002). This pest is known to cause certain fruit blemishes such as dimpling and possibly gold flecking (Childers 1997). Some species of thrips (*Frankliniella occidentalis, F. fusca* and *Thrips tabaci*) found in vegetable fields are reported to cause more severe damage than other thrips species (Moritz, et al. 2001). Some injury symptoms are attributed to these insects by mid-Atlantic growers with little demonstrative evidence as to a causal relationship (Childers 1997). Gold flecking on tomato fruit is often attributed to thrips feeding in the Mid-Atlantic States. In Florida and California, the two largest U. S. producers of fresh market and processing tomatoes, respectively, this symptom is not associated with thrips feeding. Differences in thrips species between these regions may be responsible for this discrepancy. *Frankliniella bispinosa* and *F. occidentalis* are most common in Florida and California respectively (Bryan and Smith 1989). While *F. tritici* is probably most common in the mid-Atlantic area there are several other thrips species that could inhabit vegetable fields such as *F. fusca* , tobacco thrips, *F. occidentalis*, and *Thrips tabaci*, onion thrips. To what extent these thrips are found in various vegetable fields of the mid-Atlantic is unknown.

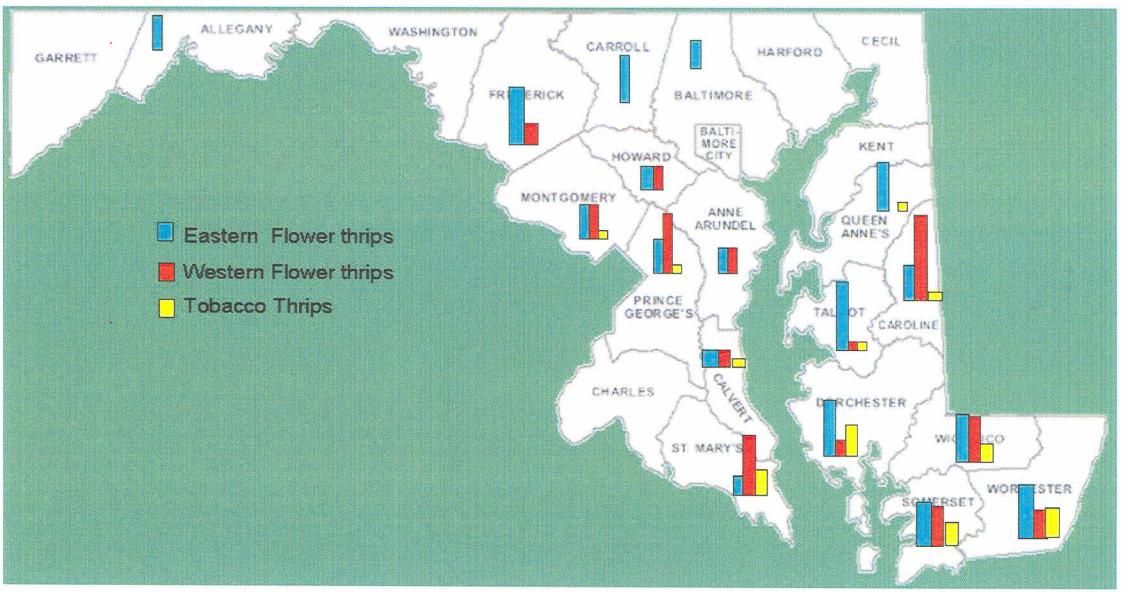
Thrips species are extremely difficult to differentiate from one another, with field identification being impossible (Moritz, et al. 2001). This may be why no surveys have been conducted to determine thrips species in vegetable fields in the Northeast. Knowing which species of thrips are most common in an area, when they are present and what crops they are most associated with would be an important result of this study that would help all vegetables growers and researchers in the NE. In addition we will correlate the thrips species most commonly associated with control failures and other managerial problems. Efficacy of pest management practices may differ depending on the species of thrips in a field, but without survey information this cannot be determined. By understanding which species is the cause of the damage and on what crops it is most prominent, "insurance" chemical applications to many vegetable fields could be reduced or eliminated by knowing the species most likely to be present on that crop at that time. Information on thrips species populations also relates to the occurrence of tomato spotted wilt virus, which is vectored by some thrips species but not others and at times has caused significant losses in mid-Atlantic vegetable fields (Dively 2003).

Reports from several Mid-Atlantic States show that thrips damage in tomato is increasing. The generally accepted reason is based on the reduced use of organophosphate insecticides which in turn increase the secondary pests such as thrips (Ingerson-Mahr 2002). However there could be an alternative explanation. The insecticide use record shows that 1.5 applications of

organophosphates, 2.3 applications of carbamates and 3.1 applications of pyrethroids (total of 7 applications) are applied to the average acre of tomato in the mid–Atlantic (Gianessi and Marcelli 2000). This level of insecticide use would have a significant negative impact on natural enemy populations and allow some species of thrips (as secondary pests) to increase. Whether insecticide use or non use is causing the increase in thrips damage it is important to know what thrips species are present now to determine if there are any shifts in the population over time.

A limited survey was conducted by the PI over the course of the 2006 summer in tomato fields throughout the state of Maryland. County Educators and growers helped with the survey by sending in flowers from the crop. There were 21 different thrips species identified from vegetable fields. Of these 21 species three were found to make up 91% of the samples. Overall Eastern flower thrips (*Frankliniella tritici*) made up 66.5% of the thrips in samples. Western flower thrips (WFT) (*Frankliniella occidentalis*) are the next largest group of thrips in the survey consisting of 22.7% of the samples. In some areas of the state WFT consisted of a very low percentage of the thrips population while at a few sites WFT was a very high percentage of the population. The map below represents the percentage of the three main thrips species found in samples taken within that county. The farms that had the greatest levels of WFT also tended to: spray earlier and more often than the other sites, use pyrethroid insecticides more frequently, and grow a wide variety of vegetables. This survey unfortunately only encompassed one or two fields in most of the counties sampled and sampling was done at only one time during the season and on only one crop. The outcome of this preliminary survey shows there is widespread occurrence of western flower thrips throughout the Maryland vegetable growing area and that these populations may result in greater damage and potential pesticide resistance development on certain farms. A larger more comprehensive survey is needed not only in Maryland but in the surrounding states of Delaware, Eastern Virginia, Pennsylvania and New Jersey.

Relative abundance of three thrips species in Maryland 2006



Sampling will begin in March and proceed through October at four to six week intervals. Working with county educators, selected vegetable farms in eastern Virginia, Maryland, Delaware, southeastern Pennsylvania and SW New Jersey will be sampled. Vegetable and strawberry fields and the plants around them (weeds) will be sampled. Before flower initiation three leaves will be sampled from each of 25 plants in a field. Fields sampled will consist of strawberry, tomato, pepper, lima bean, cucumber and watermelon (these are the main vegetable/fruit crops affected by thrips in the mid-Atlantic). Once flowers appear, two flowers from each plant sampled will be placed in alcohol and brought back to the lab for identification of thrips species. Studies have shown that 95% of the thrips on flowering vegetables are found in the flower (Childers 1997, Bryan and Smith 1989). Extension educators in the various states as well as state specialists, growers and agricultural consultants will be asked to send samples of flowers from various crops over the course of the season.

Additional funds have been secured from the Maryland Vegetable Growers Association and Agricultural Companies to help conduct the survey.

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