

SUCCESSFUL ADOPTION OF ACTION THRESHOLD-BASED INSECTICIDE PROGRAMS FOR THRIPS MANAGEMENT IN ONION

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ABSTRACT: Onion thrips (*Thrips tabaci*) is one of the most significant insect pests of onion, which is a high-value and intensively grown crop. Previous research has shown that onion thrips can be effectively managed in onion using insecticides applied following an action threshold of one thrips per leaf. However, recent survey results revealed only 50% of New York onion growers are using action thresholds. In a three-year case study, Cornell Entomologists and Cornell Cooperative Extension Vegetable Specialists deployed an onion thrips scouting program, in which growers received weekly data on onion thrips densities in their fields, and a corresponding recommendation based on the action threshold. From 2015 to 2017, there was a 46% increase in grower adoption of the action threshold (56% to 82%). Onion growers who used action thresholds successfully controlled onion thrips infestations, and made between 2-4 fewer insecticide applications compared with those growers who did not use action thresholds. Cost savings from using the action threshold recommendations averaged \$42/acre. In the exit survey, growers' risk aversion to skip applications and their satisfaction with a weekly insecticide program were the primary reasons they did not follow action threshold recommendations. In contrast, growers who regularly used action thresholds cited concerns about insecticide resistance as the primary reason for adopting thresholds. This case study serves as evidence that intensive interactions between growers and extension/university researchers has the potential to increase the adoption of integrated pest management tactics in high-value commodities.

INTRODUCTION

- Onion thrips (*Thrips tabaci*) is a significant pest of onion (Fig. 1)(Diaz-Montano et al 2011), and onion thrips control is a priority for growers within the Great Lakes region (Fournier et al 1995).
- Insecticide use is the primary method to control thrips; however, reliance on insecticides may lead to insecticide resistance (Shelton et al 2006; MacIntyre-Allen et al 2005; Martin et al 2003). Using an action threshold of 1 thrips per leaf, growers can maximize thrips control while minimizing production costs and slowing the onset of insecticide resistance (Nault and Huseth 2016; Hoffmann et al 1995).
- In 2014, only 42% of New York onion growers claimed to use action thresholds when applying insecticides for managing thrips infestations (Nault unpublished 2014).



Figure 1: Adult onion thrips (*Thrips tabaci*).

OBJECTIVES

- Increase grower adoption of threshold-based insecticide programs
- Evaluate thrips densities, number of insecticide applications, and cost of insecticide programs in a threshold-based insecticide program
- Evaluate grower perceptions of using the action threshold after participating in scouting program

MATERIALS AND METHODS

To increase the adoption of action threshold-based insecticide programs, an intensive program was implemented to enable growers to evaluate these insecticide programs on their farms. Onion growers from four major onion producing areas in New York participated in the program and received weekly scouting information from Cornell Cooperative Extension. Scouts were assigned a location within the state (see Fig. 2), where he or she randomly sampled onion fields for onion thrips and provided growers with a recommendation. Pesticide application records were compared with weekly thrips density data to determine whether the grower used the action threshold. **Growers were considered to “follow” the program if 50% or greater insecticide applications were made based on the action threshold of 1 thrips per leaf, and growers who “did not follow” the program either made 50% or more of the insecticide applications when the onion thrips density was below the action threshold.** All 17 participating growers completed an exit survey.

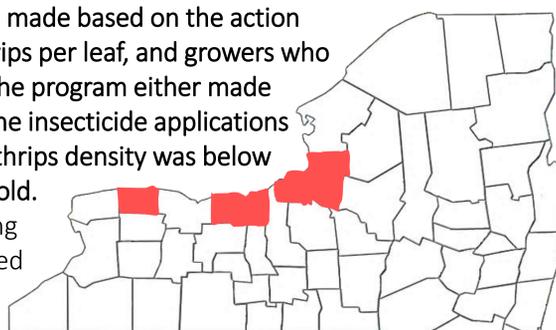


Figure 2: Between 14-17 growers from the 4 major onion producing counties (highlighted) in New York participated in the action threshold based insecticide program.



Figure 3: Percent of insecticide applications made using the action threshold of one thrips per leaf. Between 14 and 17 growers participated in the action-threshold scouting program, which provided weekly scouting data and thrips management recommendations. Insecticide applications were compared to insecticide spray records to determine grower compliance. $P=0.0067$, $F_{2,41}=9.98$

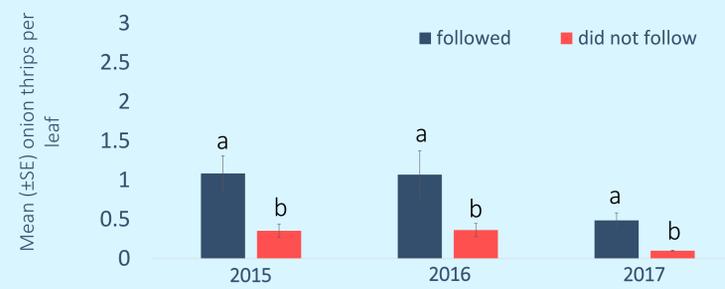


Figure 4: Mean (\pm SE) seasonal onion thrips per leaf managed by growers who ‘followed’ or ‘did not follow’ the action threshold. Growers ‘followed’ when 50% or greater of insecticide applications were made using the action threshold, and ‘did not follow’ if less than 50% were applied at the threshold. $P=0.0003$, $F_{1,41}=16.17$

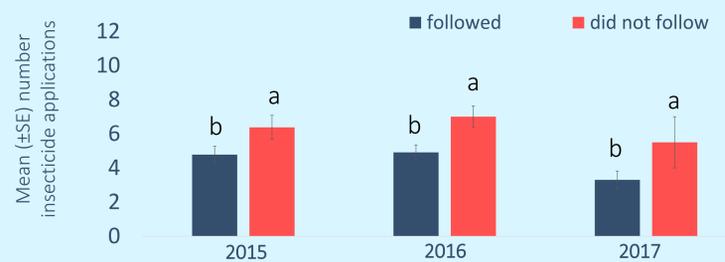


Figure 5: Mean (\pm SE) Number of insecticide applications made by growers who ‘followed’ or ‘did not follow’ the action threshold. Growers ‘followed’ when 50% or greater of insecticide applications were made using the action threshold, and ‘did not follow’ if less than 50% were applied at the threshold. $P=0.017$, $F_{1,41}=8.07$

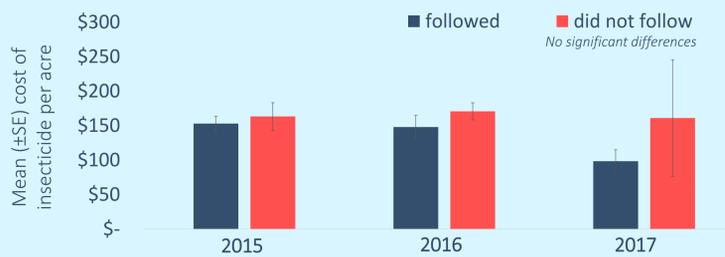


Figure 6: Mean cost of insecticide per acre by growers who ‘followed’ or ‘did not follow’ the action threshold. Growers ‘followed’ when 50% or greater of insecticide applications were made using the action threshold, and ‘did not follow’ if less than 50% were applied at the threshold. $P>0.05$.

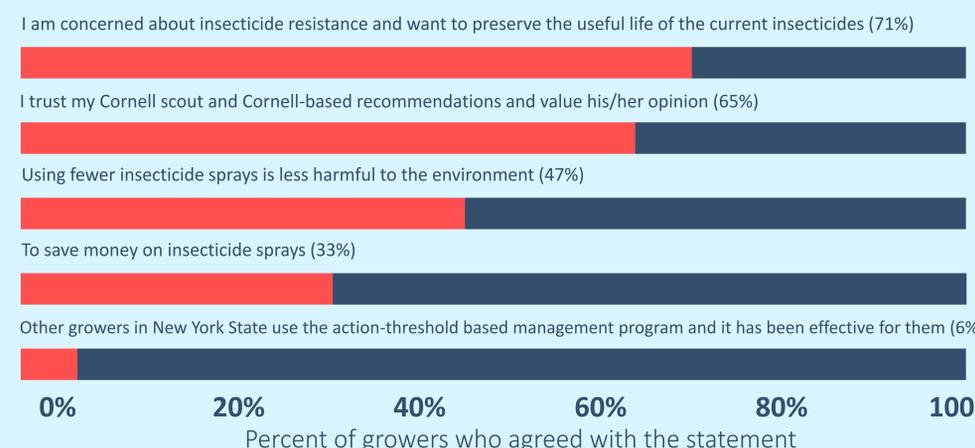


Figure 7: Survey results describing grower justifications for either using or forgoing the action threshold to manage onion thrips populations in New York.

RESULTS

- There was a 46% (56% to 82%) increase in the use of the action threshold from 2015 to 2017 (Fig. 3).
- Onion thrips populations were successfully managed below the economic injury level, 2.2 thrips per leaf (Fournier et al 1995)(Fig. 4).
- Growers who used the action threshold made significantly fewer insecticide applications, between 2-4 fewer insecticide applications (Fig. 5).
- Growers who used the action threshold saved \$42/acre compared to those growers who did not use an action threshold, although this was not statistically significant (Fig. 6).
- Growers tended to use action threshold as means to slow the onset of insecticide resistance (Fig 7).

CONCLUSIONS

- Growers who participated in the program increased their adoption of the action threshold by 46%, indicating that the program has been effective for increasing the adoption of integrated pest management tactics.
- The program was effective for controlling onion thrips, and growers who ‘followed’ the action threshold recommendations made fewer insecticide applications.
- Growers who used the action threshold did so to slow the onset of insecticide resistance, indicating that IPM programs should appeal to resistance management to increase adoption.

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