

Evaluation of Insecticide Application Plan to Manage Thrips



for Sweet Onions in Texas

Subas Malla*, Filomena Hernandez, and Bed Prakash Bhatta
Texas A&M AgriLife Research & Extension Center, Uvalde, TX 78801

*Corresponding Author: PH: (830) 688-6139; Email: subas.malla@ag.tamu.edu

Introduction

- Short-day sweet onions are primarily grown in the Rio Grande Valley and Winter Garden regions of Texas.
- Some growers are using pyrethroids to control thrips at the beginning of the season.
- Pyrethroid kills many natural enemies of thrips which allows thrips to increase population in the absence of natural predators.
- Thrips developing resistance to pyrethroids and organophosphates was reported (Allen et al., 2005).
- Research has shown that an action threshold-based insecticide program would be more effective than a weekly-based program (Leach et al., 2019).

Objectives

- Evaluate standard and action threshold-based insecticide programs to manage thrips
- Assess an insecticide program with pyrethroid in the later period

Materials and Methods

- The trial was direct seeded at the Uvalde Center on October 15, 2022.
- The experiment was laid out in split-plot design with four replications. The main plot was variety with three levels ('Hornet', 'Mata Hari', and 'Don Victor'), and the sub-plot was chemical application plan with three levels (threshold based on 1 thrips leaf¹, weekly, and control). We selected three products based on different modes of action (abamectin [Agri-Mek SC], spirotetramat [Movento], and spinetoram [Radiant SC]).
- Each variety was planted on four rows of 3.3 ft. width but only two center rows were used for insect counting and harvest. Hence, the plot size was two rows of 10 ft in length (10 x 6.7 sq. ft.).
- Insects were counted on 10 tagged plants each week from February 23, 2023 to April 10, 2023. Chemical application plan included Agri-Mek SC followed by Movento and Radiant SC. Each insecticide was sprayed for two subsequent times.
- Standard agronomic and fungicide practices were followed.
- At harvest, bulbs were weighed and graded. Bulb of each tagged plant was harvested, weighed, and measured for height and width.
- Data were analyzed using R software ("Agricolae" package). Outer two replications were removed due to a high coefficient of variation. Only two replications were used for data analysis and reporting.



FIGURE 1. A. Direct seeding of onion for the trial on October 15, 2022. B. Late bulbing stage of onion on April 14, 2023.

Results and Discussion

Table 1. Analysis of variance for split plot design with variety (main plot with 3 levels), chemical application plan (subplot with 3 levels) and replication (2 levels) on thrips per leaf (TPL) on different dates (four-digit date represents mm-dd format) at Uvalde during 2022-23 season.

	TPL_0223	TPL_0306	TPL_0313	TPL_0322	TPL_0327	TPL_0403	TPL_0410
Replication	NS	NS	NS	*	NS	NS	NS
Variety	NS	*	NS	**	**	NS	NS
Chemical application plan	NS	**	***	NS	***	***	***
Variety X Chemical application plan	NS	NS	*	NS	NS	NS	NS

NS = not significant; *, **, *** Significant at $p \leq 0.05$, 0.01, and 0.001, respectively.

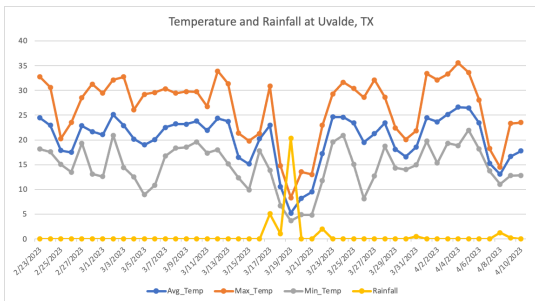


Figure 2. Temperature and rainfall from 2/23/2023 to 4/10/2023 at Uvalde Center.

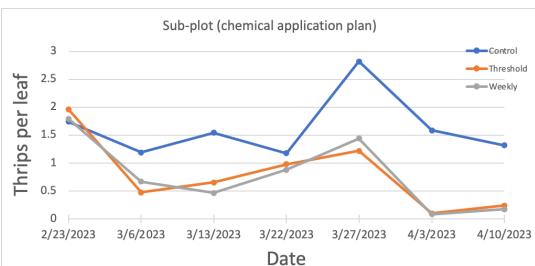


Figure 3. Thrips per leaf for chemical application plan factor at different dates.

- The chemical application plan factor was not significant for TPL_0223 and TPL_0322. Thrips counted on TPL_0223 was done before the insecticide application. The non-significance for the trait showed that there was no need to treat the trait as a covariance. Thrips population was not significant on 3/22/2023 was due to rain events between 3/17/2023 to 3/19/2023 (Figure 2).
- The chemical application plan factor was highly significant for all traits except two traits mentioned above. The weekly and threshold methods were significantly different from the control, whereas weekly and threshold methods were not significantly different from each other (Figure 3).

Table 2. Analysis of variance for split plot design with variety (main plot with 3 levels), chemical application plan (subplot with 3 levels) and replication (2 levels) on size, yield, firmness, percent single center (SC), and total soluble solid (TSS) at Uvalde during 2022-23 season.

Replication	Bulb (proportion based on wt.)			Yield (lbs ac ⁻¹)	Firmness (lbf)	SC (%)	TSS (°Brix)
	Small	Medium	Large				
Variety	*	NS	*	NS	NS	NS	**
Chemical application plan	NS	NS	*	NS	NS	NS	NS
Variety X Chemical application plan	NS	NS	*	NS	NS	NS	NS

NS = not significant; *, **, *** Significant at $p \leq 0.05$, 0.01, and 0.001, respectively.

Table 3. Mean separation for variety x chemical application plan interaction for proportion of large bulb size.

Variety X Chemical application plan	Large bulb	
Hornet:Control	37.2	b [†]
Hornet:Threshold	46.3	ab
Hornet:Weekly	48.7	a
Mata Hari:Control	13.9	c
Mata Hari:Threshold	10.5	c
Mata Hari:Weekly	10.9	c
Don Victor:Control	43.9	ab
Don Victor:Threshold	48.1	ab
Don Victor:Weekly	44.6	ab

[†]Letters indicate least significance difference between treatments at $p \leq 0.05$.

- The threshold method needed only three application of insecticides, whereas the weekly method used six applications of insecticides. There were 50% reduction in labor cost as well as pesticide cost when the threshold method was used.
- The results of analysis of variance for yield and its parameters are shown on Table 2. There was significant difference for variety and chemical application plan interaction for the proportion of large bulb weight.
- Mean separation for variety and treatment interaction showed that Mata Hari with all treatments significantly reduced the proportion large bulbs (Table 3).
- Although predatory thrips were not counted at the trial, they were observed more in the control treatment plots.

Conclusion

- The threshold based chemical application method performed better in managing thrips and reducing the number of insecticide applications.
- Optimizing the insecticide application via threshold method might reduce adverse effect on the beneficial predatory thrips population.

References

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Acknowledgements

- Funding provided by Texas Department of Agriculture - Specialty Crop Block Grant (GSC202245).