THRIPS MANAGEMENT IN ONIONS: EVALUATING WEEKLY, CONTROL, AND THRESHOLD-BASED APPROACHES

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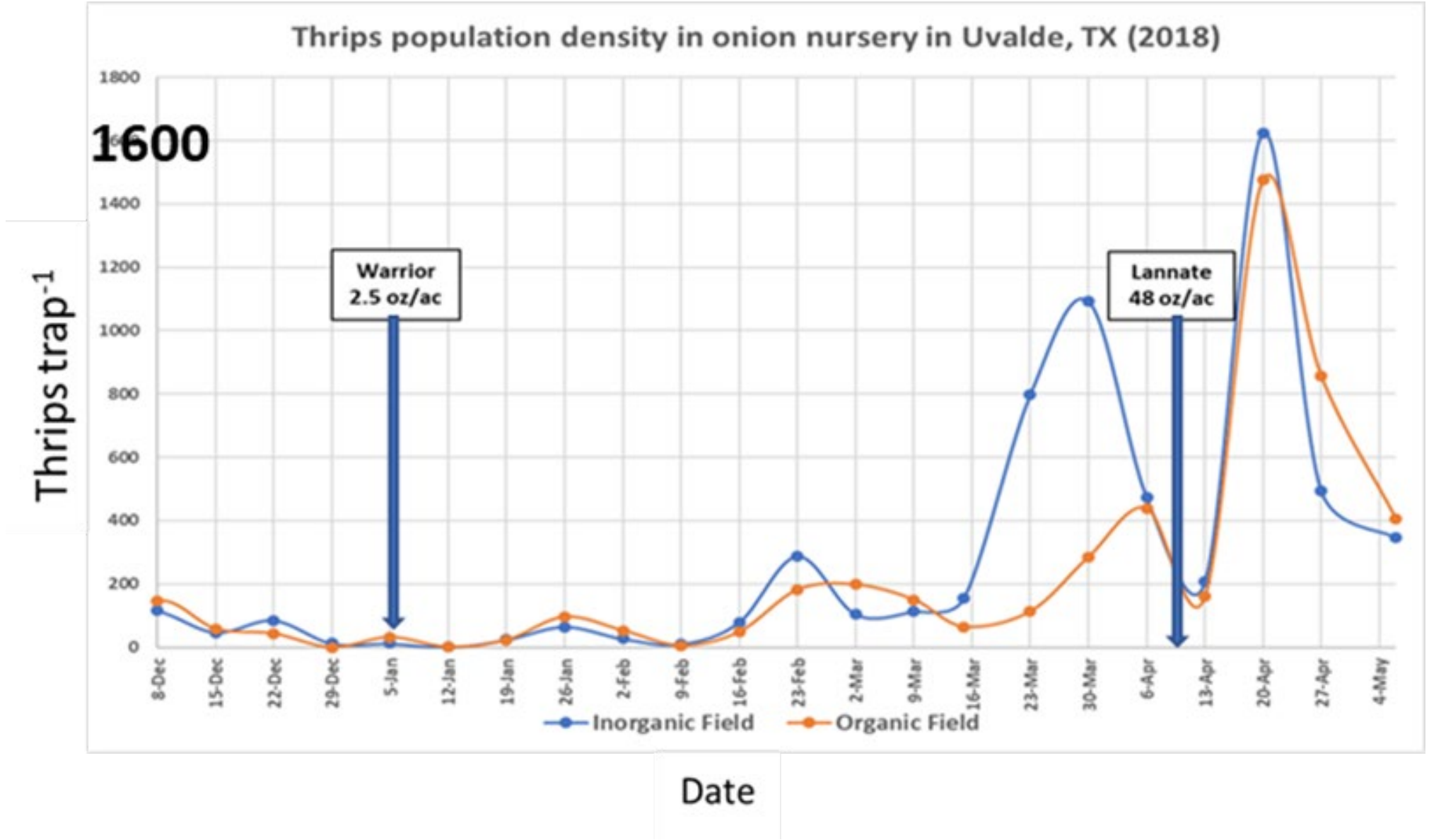
NOA-NARC

CHALLENGES OF ONION THRIPS INFESTATION

- Onion thrips pose a major threat to growers, since their feeding leads to severe damage of foliage
- Onion thrips can transmit viruses and bacteria resulting in reduced marketable yield and quality of onions.
- Direct injury and disease transmission necessitates strong, adaptable management strategies


Thrips population density in onion nursery in Uvalde, TX (2018)
Thrips trap-1
1600
1800
1400
1200
1000
800
600
400
200
0
Warrior
2.5 oz/ac
Lannate
48 oz/ac
8-Dec
15-Dec
22-Dec
29-Dec
5-Jan
12-Jan
19-Jan
26-Jan
2-Feb
9-Feb
16-Feb
23-Feb
2-Mar
9-Mar
16-Mar
23-Mar
30-Mar
6-Apr
13-Apr
20-Apr
27-Apr
4-May
Inorganic Field
Organic Field
Date

INTEGRATED PEST MANAGEMENT (IPM)

- IPM combines biological, physical, cultural, and chemical methods for sustainable pest management.
- Can reduce insecticide dependency while maintaining crop yields effectively.
- Enhances pollinator activity and promotes ecosystem stability for long-term farm health.

BENEFITS FOR SUSTAINABLE AGRICULTURE

- Decrease reliance on chemical pesticides, promoting environmentally friendly farming practices.
- Help protect beneficial insects and organisms, such as natural predators, essential for a balanced ecosystem.
- Environmentally sustainable by safeguarding human health and conserving the environment through safer pest management.

OBJECTIVES OF THE STUDY

- **Compare Thrips Population Trends**

Monitor pest dynamics over time using weekly, threshold-based, and control treatments to evaluate thrips populations.

- **Assess Impact on Yield and Quality**

Evaluate how management strategies affect onion yield and bulb quality including size, weight, and firmness.

- **Comparing Chemical Applications**

Investigate which chemicals are more effective without losing control over thrips populations to promote sustainability.

EXPERIMENTAL SETUP AND ONION VARIETIES

- **Study Location and Duration**

Research was conducted over two growing seasons (22-23 and 23-24) at Texas A&M AgriLife Research Center in Uvalde, Texas.

- **Experimental Design**

A split-plot design with four replications was used, reversing main and subplots in the second year to ease insecticide application.

- **Onion Cultivars Tested**

Three commercial onion varieties were evaluated: Mata Hari (red), Hornet and Don Victor (yellow).

- **Agronomic and Weed Management**

Standard fungicide practices and herbicide applications were combined with hand weeding for weed control.

INSECTICIDE TREATMENTS AND DATA COLLECTION

- **Insecticides Applied**

Three insecticides were applied during the study: Agri-Mek (3.5 oz/A), Movento (5 oz/A), and Radiant (6 oz/A).

- **Insecticide Treatments Evaluated**

Three treatments tested: control, weekly sprays, and action threshold-based sprays with specific thrips thresholds.

- **Thrips Monitoring and Data Collection**

Weekly thrips counts on tagged plants collected alongside bulb size, yield, firmness, and soluble solids data.

- **Statistical Analysis Methods**

Data analyzed using two-way ANOVA, post hoc LSD tests, and correlations to evaluate treatment effects and relationships.

INSECTISIDE APPLICATIONS

Year 1

Weekly

- Agri-Mek (abamectin): 2 applications
- Movento (spirotetramat): 2 applications
- Radiant SC (spirotetramat): 2 applications

Action Threshold

- Agri-Mek (abamectin): 1 application
- Movento (spirotetramat): 1 application
- Radiant SC (spirotetramat): 1 application

Year 2

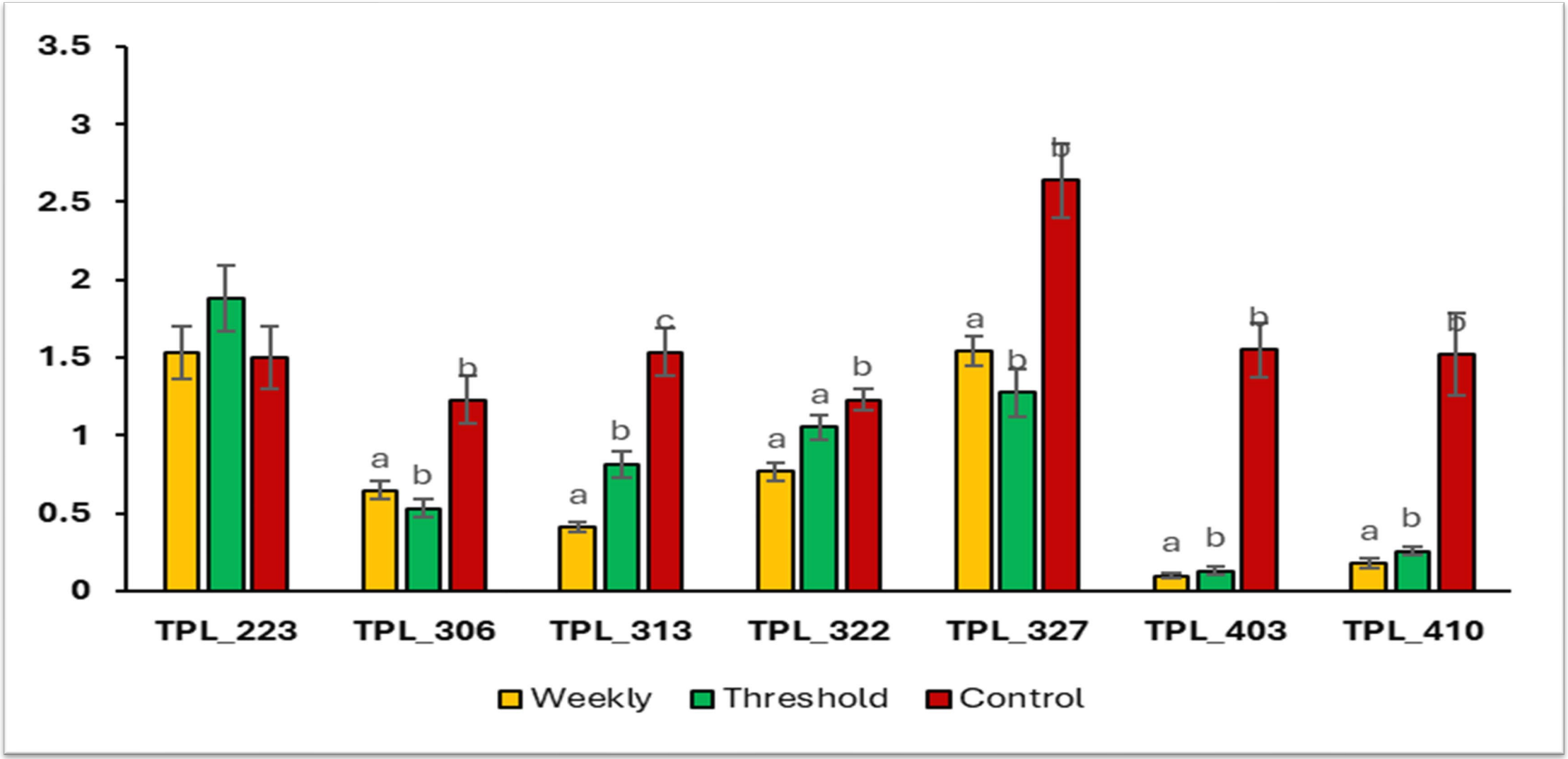
Weekly

- Agri-Mek (abamectin): 2 applications
- Movento (spirotetramat): 2 applications
- Radiant SC (spirotetramat): 2 applications

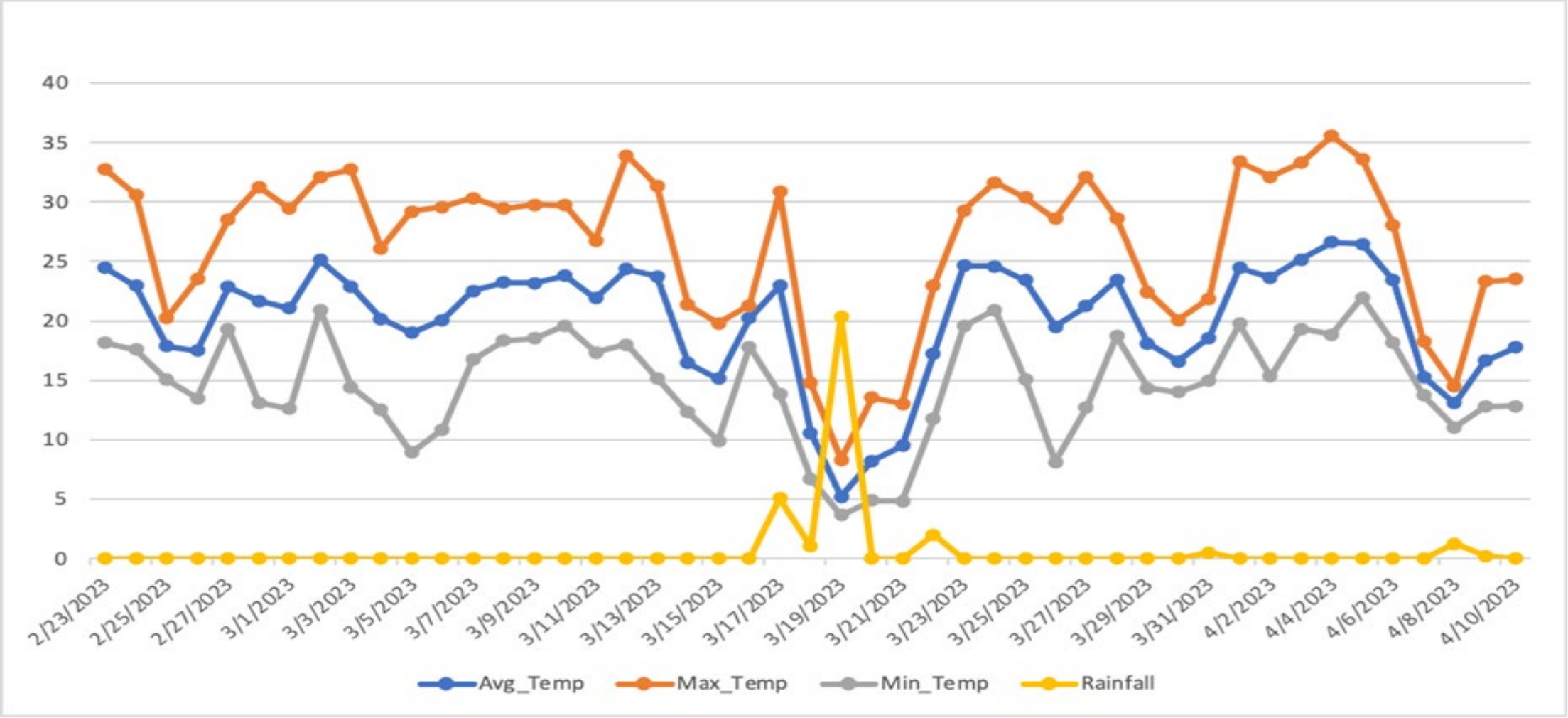
Action Threshold

- Agri-Mek (abamectin): 1 application
- Movento (spirotetramat): 2 applications
- Radiant SC (spirotetramat): 1 application

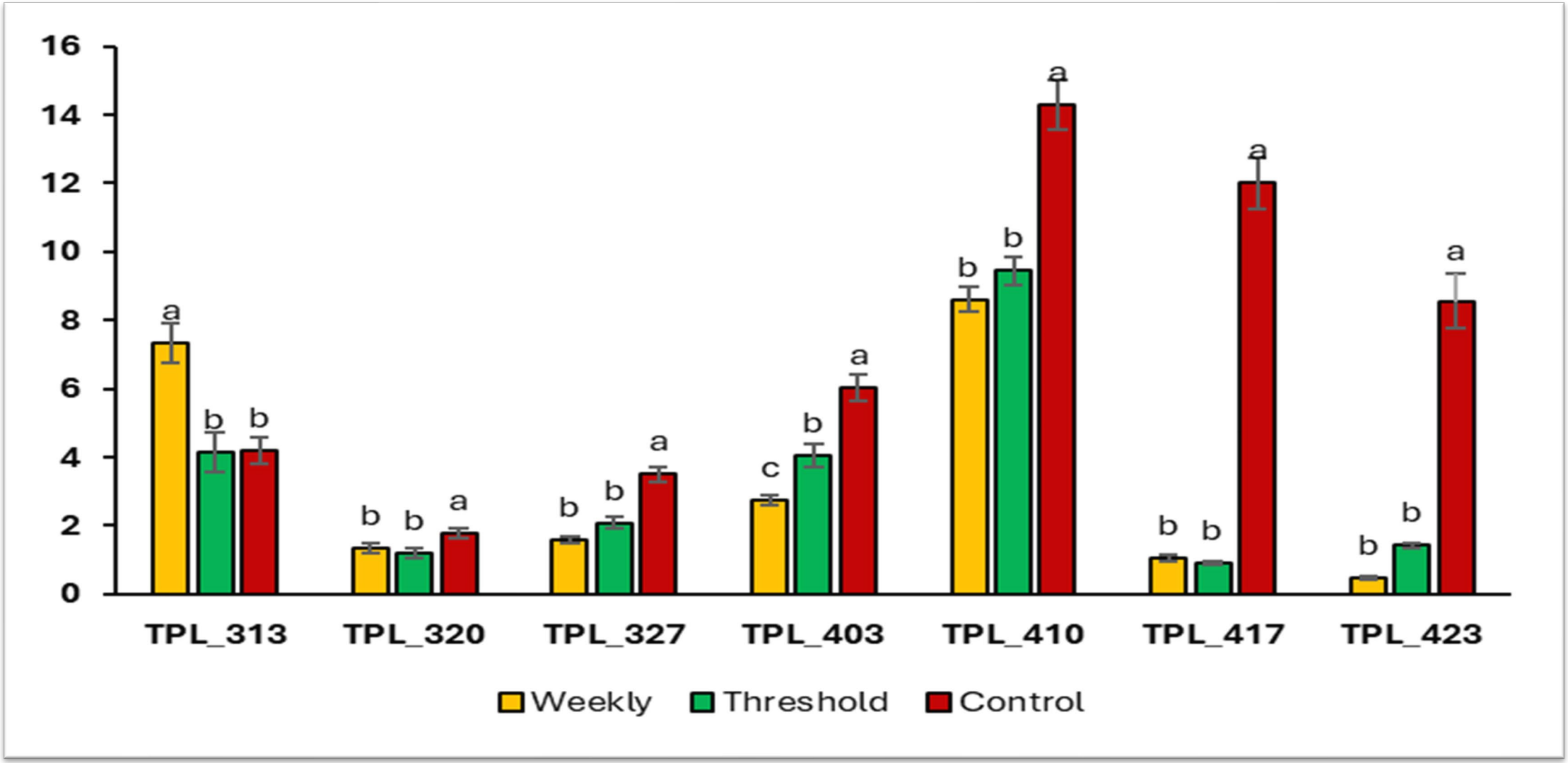
Average Thrips per Leaf By Treatment 2022-2023



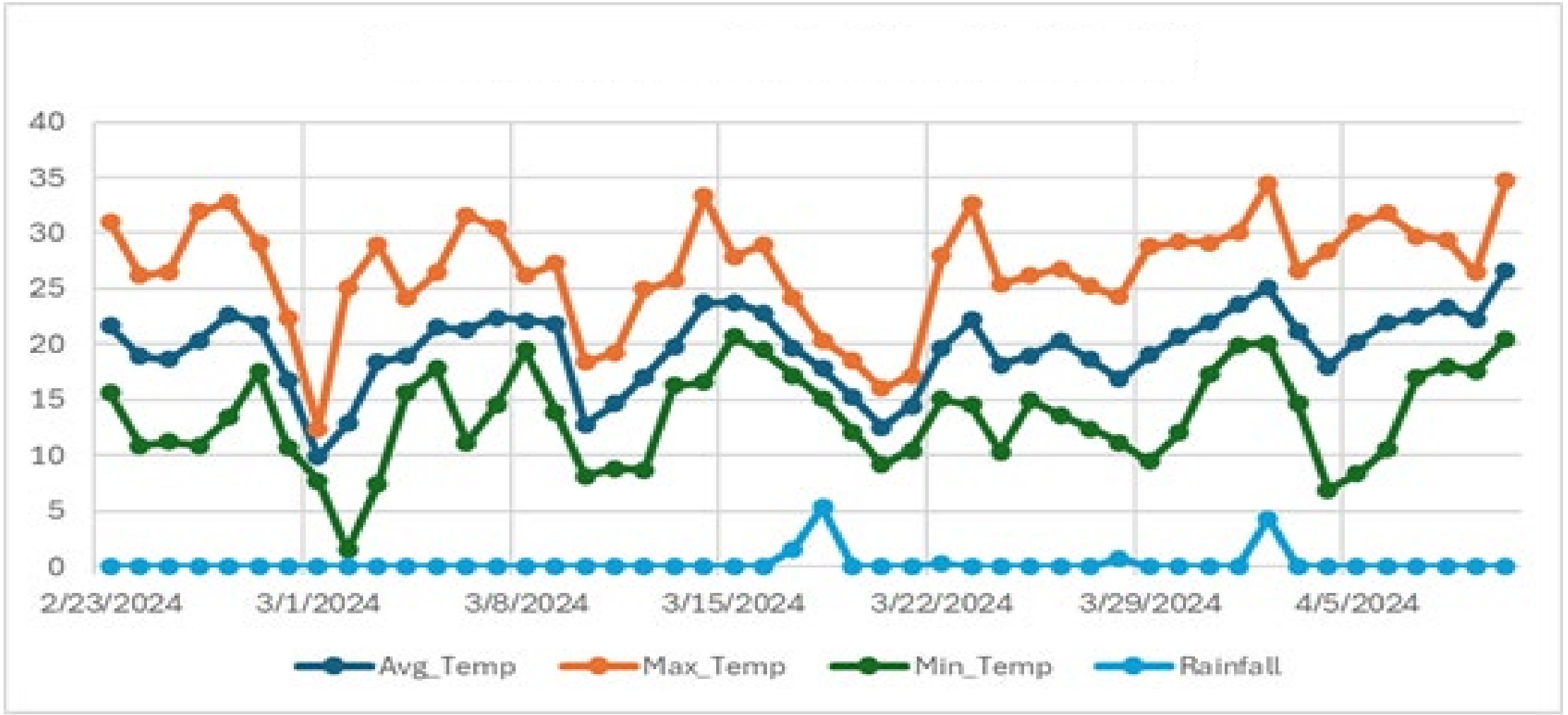
Temperature and Rainfall 2/23/23 – 4/10/23



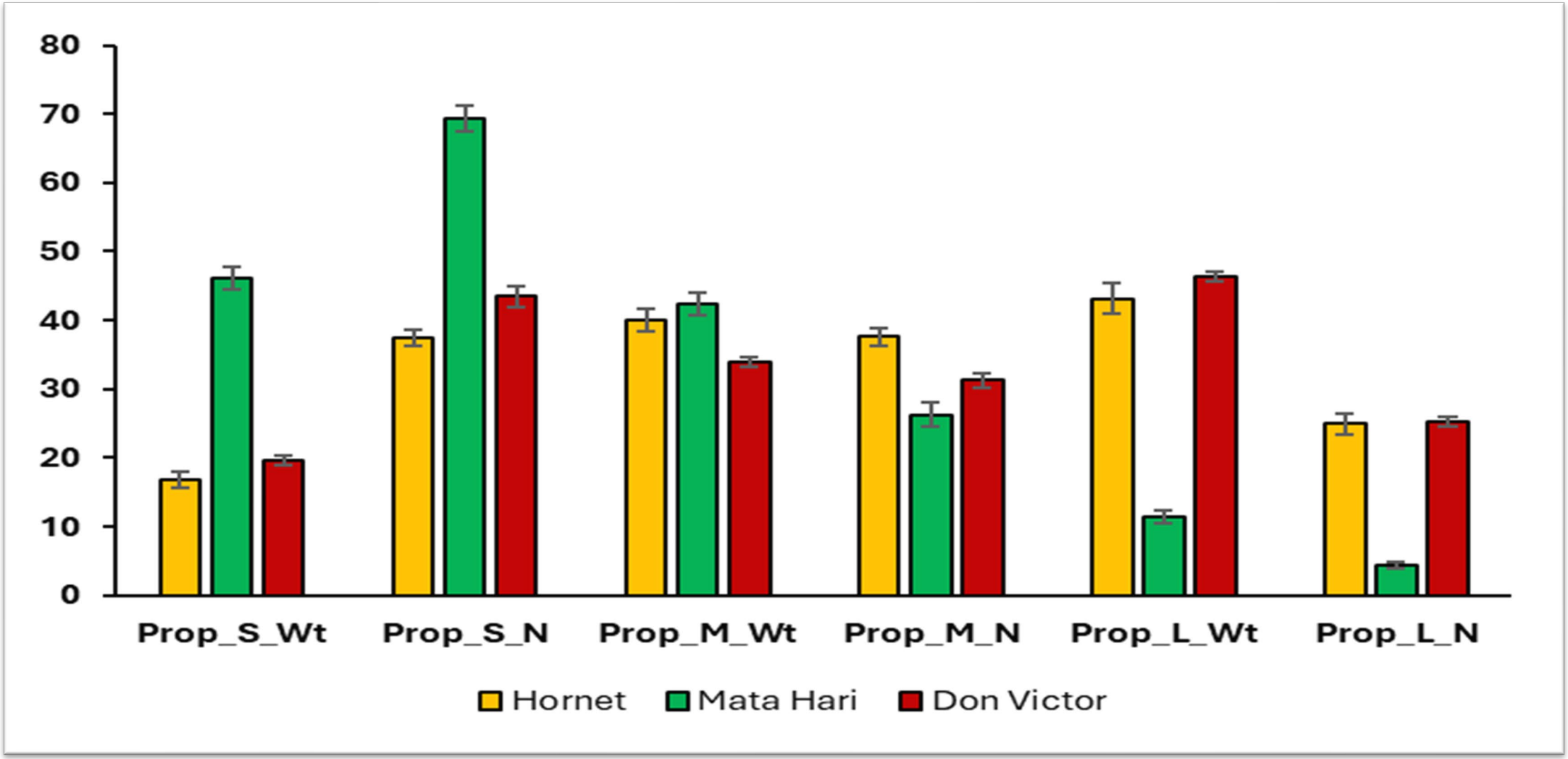
Average Thrips per Leaf By Treatment 2023-2024



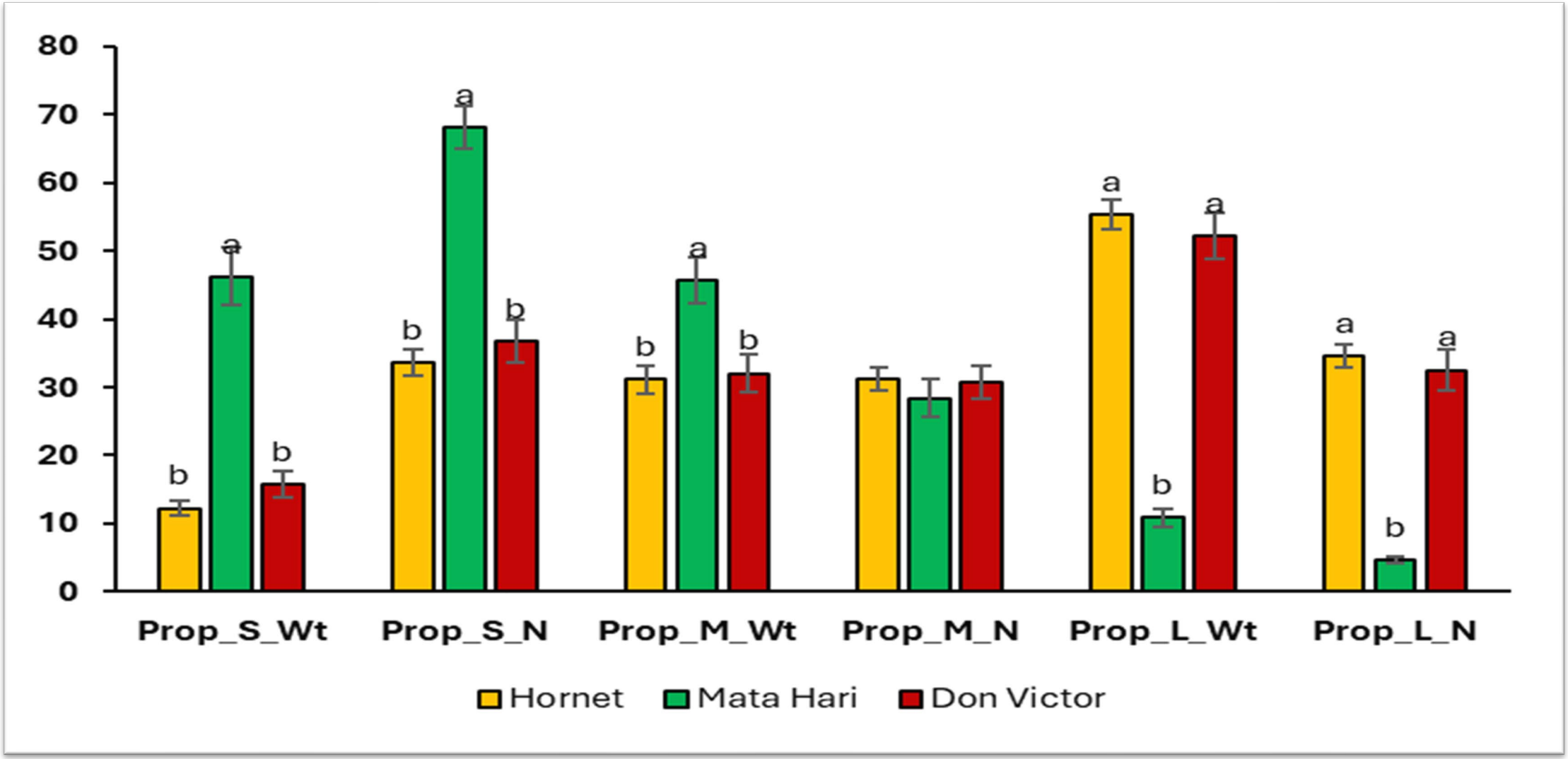
Temperature and Rainfall 2/23/24 – 4/05/24



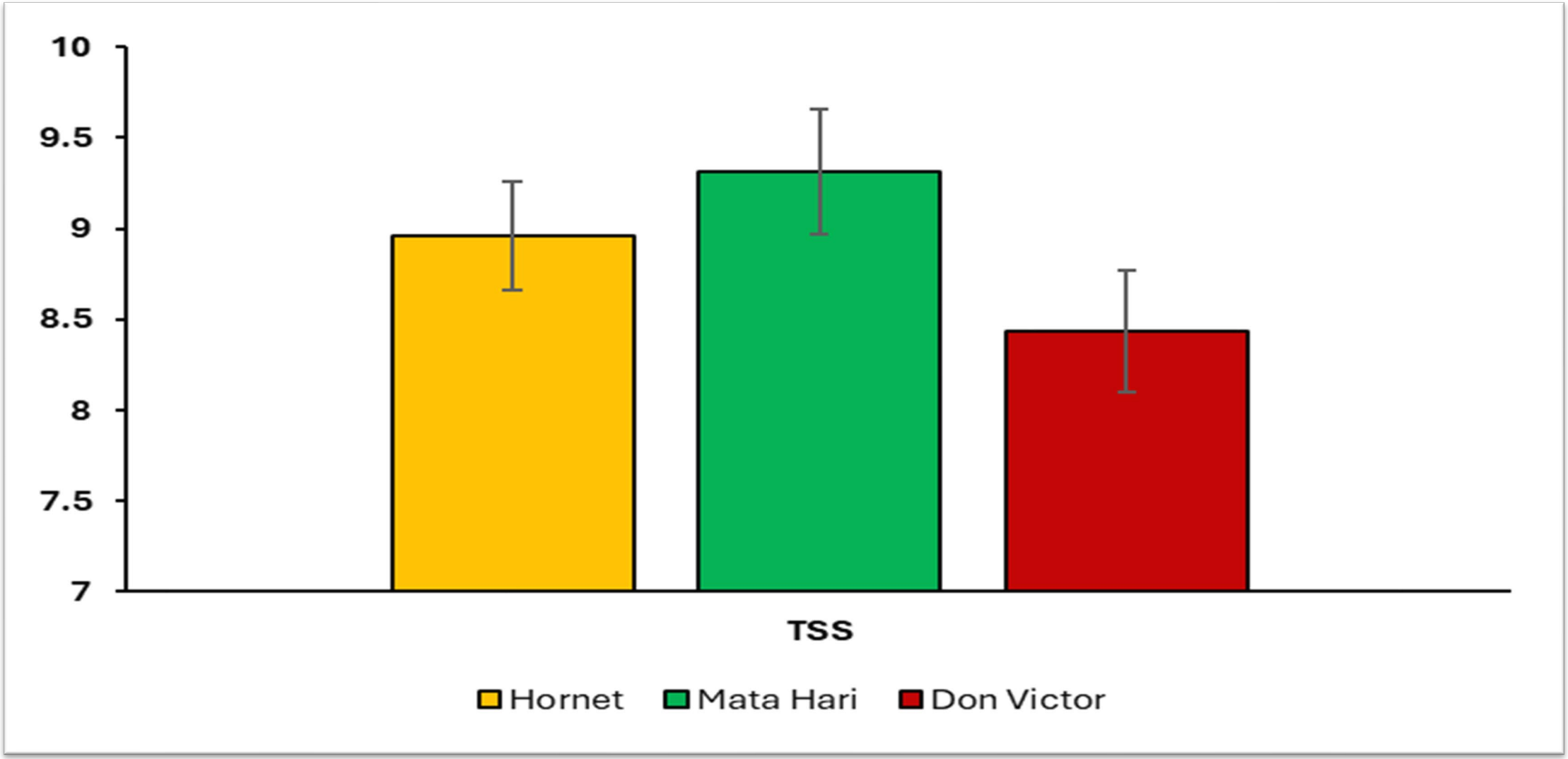
Proportional Weight and Number of Bulbs 2022-2023



Proportional Weight and Number of Bulbs 2023-2024



Total Soluble Solid by Variety 2023-2024



THRIPS POPULATION

- **Year One Thrips**

Thrips in untreated plots peaked at 3.6 per leaf, and with chemical treatments started ~2 thrips/leaf almost maintained the threshold (1 thrips/ leaf) throughout the season.

- **Year Two Thrips**

Thrips in untreated plots peaked at 14.3 per leaf, and with a higher starting thrips population of ~5 thrips/leaf it was more difficult to keep populations below the threshold (1 thrips/leaf) until the end of the season.

YIELD AND BULB QUALITY

- **Bulb Weight Variations**

Differences were found in small and large, but medium remained consistent across varieties.

- **Soluble Solids Content**

'Mata Hari' variety showed higher total soluble solids.

- **Yield Differences Over Years**

Yield was consistent across all treatments and years, but because damaged bulbs were not excluded, the measurements reflect total bulb yield rather than truly marketable yield.

Predatory thrips

2024

DISCUSSION AND IMPLICATIONS

- **Effectiveness of Threshold Programs**

Action threshold-based insecticide programs effectively reduced thrips populations similarly to weekly treatments but use fewer application of sprays

- **Sustainability and Resistance Delay**

Fewer applications could delay insecticide resistance development and promote environmental sustainability in crop production.

- **Broader Implications**

Findings support adopting integrated pest management and action thresholds to improve economic and environmental outcomes.

CONCLUSION

- To maintain 1 thrips/leaf threshold the insecticide program must start when thrips population are below 2 thrips/leaf.
- The action-based threshold insecticide program provided control comparable to the weekly insecticide program while reducing the number of chemical applications.
- Treatments did not show significant differences in the total bulb yield

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