COLORADO STATE UNIVERSITY EXTENSION

WESTERN COLORADO IPM INTERNSHIP
HOTCHKISS, CO – DELTA COUNTY

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WESTERN COLORADO RESEARCH CENTER
COLORADO STATE UNIVERSITY

Location

The Western Colorado Research Center - Rogers Mesa- (WCRC-RM) is a 100% certified organic research center based in Hotchkiss, CO. The site currently manages multiple fields for crop variety trials and experimentation including vineyards, pastures, and a greenhouse dedicated for such research and food production. Today, the center's research focuses on preventing fruit damage from common pest, disease, and the cultivation of beneficial crop varieties in the region that all fit within their overall mission of agricultural sustainability.

Internship Activities

- Collected Codling moth samples in the field.
- Identified and recorded insect orders under the microscope.
- Used a macro camera to capture close-up images of insects.
- Soil preparation and fertilization.
- Transplanting squash trial plants.
- Weeding and greenhouse maintenance.
- Met and spoke with local farmers.
- Attended organic growing workshops and lectures hosted at WCRC-RM.

Figure 1. Cameo Apple Experimental Rows at WCRC-RM.

Figure 2. Codling moth found on outside of netted row.

Project Focus

Apple farming has long been a key part of Colorado's agricultural economy. However, pest control, especially managing the Codling Moth (*Cydia pomonella*) of the order Lepidoptera remains a major challenge for growers, particularly those using organic methods. Researchers at WCRC-RM are exploring exclusionary netting as a potential solution. This project focuses on how netting affects insect populations, including both harmful pests and beneficial such as pollinators.

Methods & Preliminary Findings

The study was conducted in an experimental orchard at WCRC-RM, using five rows of mature *Cameo* apple trees. Two rows were covered with netting after flowering, while three rows were left un-netted for the full season.

Insect populations were monitored using aroma traps placed in each row and sticky traps placed in one netted and one un-netted row. Each row had 4 traps evenly spaced out for a total of 8 traps every week. These sticky traps were used to passively monitor insect populations and were checked on and collected on a weekly basis throughout the summer. Insects on each trap were identified to the order level under a microscope, and that data was aggregated into a data sheet.

Figure 3. AM-Multigrad Sticky Trap used within un-netted row.

Results

Nets proved effective at excluding most larger insects within the Lepidoptera, Trichoptera, and Neuroptera orders, one of which includes the Codling Moth.

In Graphs 1 & 2, we can see that the overall abundance of each of the observed insect orders were significantly lower within the netted rows. Notably, the netting seemed to exclude nearly all insects within the Lepidoptera order, which included our main subject, the Codling Moth. Our results suggest that most insect species that were physically larger than the pores within the netting were excluded including larger species of bees, wasps, and true flies. However, many pollinator as well as the natural predators of such pest species important for Cameo apple production were able to get inside the netting, an example being the common Fairy Wasp.

Figure 4. Beneficial predator and Mayfly capture in un-netted row.

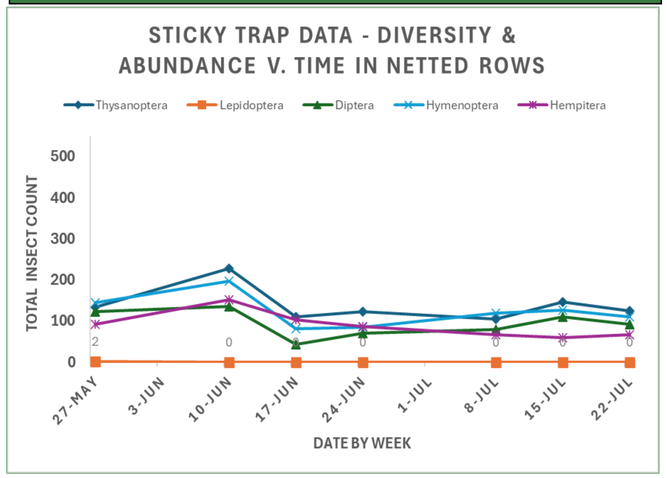
Figure 5. Grasshopper Nymph found in un-netted row.

Discussion

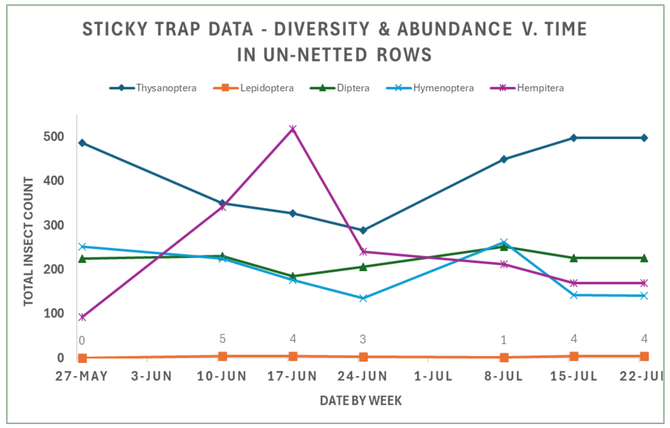
This study along with previous studies done at WCRC-RM have demonstrated the effectiveness of exclusion netting with regard to controlling Codling Moth damage in these orchards. These results support its use as an effective integrated pest management strategy. The use of aroma and sticky traps revealed that while netting helped control pest, it didn't appear to significantly impact the abundance of beneficial insects of smaller size.

However, further research is needed to ensure that this practice is environmentally sustainable. Balancing the reduction in damage from pest while not hindering the pollination from beneficial insects is crucial for maintaining orchard health. Overall, this study may provide a foundation for future research into sustainable pest management practices that protect both crops and beneficial insect populations.

Figures & Tables



Graph 1. Details total insect abundance counts for each of the main insect orders found for our netted row throughout the summer.



Graph 2. Details total insect abundance counts for each of the main insect orders found for our un-netted row throughout the summer.

Next Steps

The next steps in this research will be doing a statistical breakdown of all insect order data from all three years of the project.

Additional research projects will be conducted for other crop types, such as squash, to alleviate the damage from squash bugs in Western Colorado.

Selected References

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