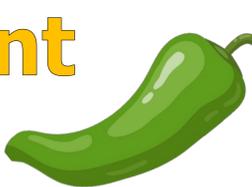


# Evaluating the impact of an **integrated pest management program** on **thrips control** and **beneficial insects**



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## Introduction

- Pepper is a high value commodity in the Midwest amounting a >\$20 million annually.
- Flower thrips threaten yield through feeding on fruit and transmitting viral pathogens.
- Thrips populations can be controlled with natural enemy populations like minute pirate bugs, lady beetles and lacewing larvae.
- Thrips are negatively impacted by reflective mulches and reduced fertility regimes. However, the impact of this approach on natural enemies is not well understood.

**Our objective is to determine the impact of mulch and fertility on:**

- 1) **Flower thrips densities**
- 2) **Natural enemy density**

## Materials & Methods

Plots consisted of 9 treatments arranged in a complete randomized block design with 4 replications and 25 plants/plot.

Black mulch	Silver mulch	Bare ground
Unfertilized (No fertilizer applied)	Unfertilized (No fertilizer applied)	Unfertilized (No fertilizer applied)
Sufficiency (Fertilizer applied per soil test recommendations)	Sufficiency (Fertilizer applied per soil test recommendations)	Sufficiency (Fertilizer applied per soil test recommendations)
High (Fertilizer applied 150% of soil test recommendations)	High (Fertilizer applied 150% of soil test recommendations)	High (Fertilizer applied 150% of soil test recommendations)

### Data collection

#### Visual thrips counts



Mature and immature thrips were counted on 2 flowers/plant on 10 plants/plot.

#### Natural enemy trapping

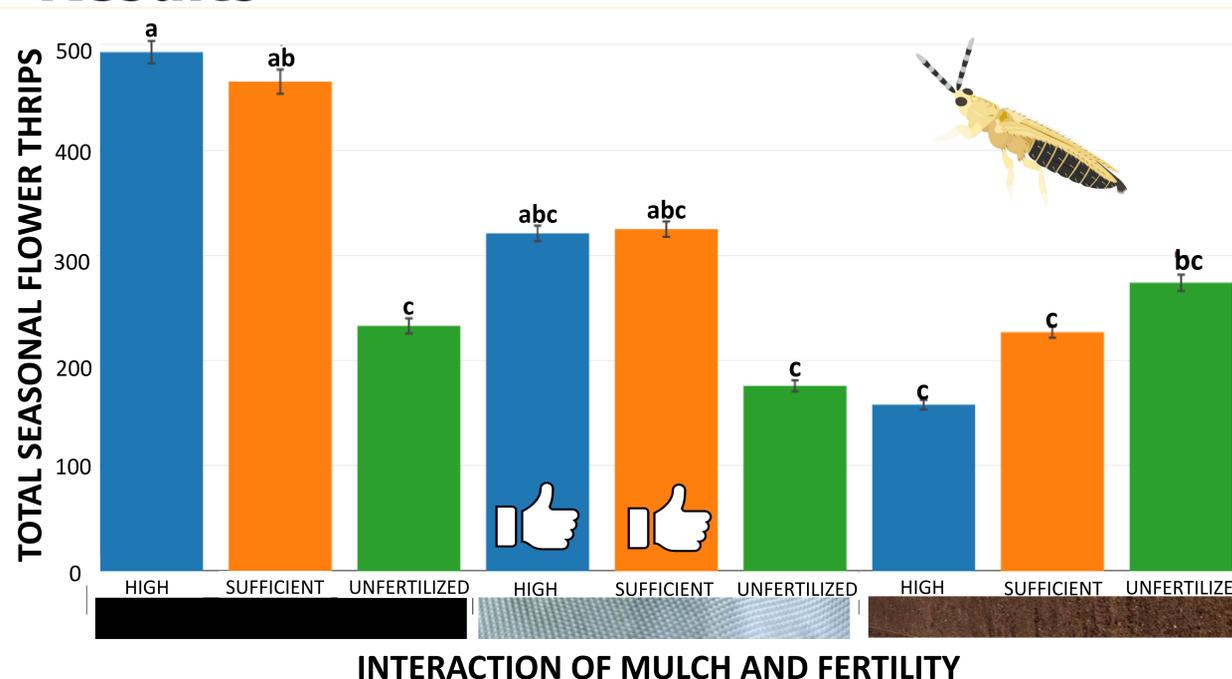


Yellow sticky cards were used as the trapping system and were replaced and collected weekly.

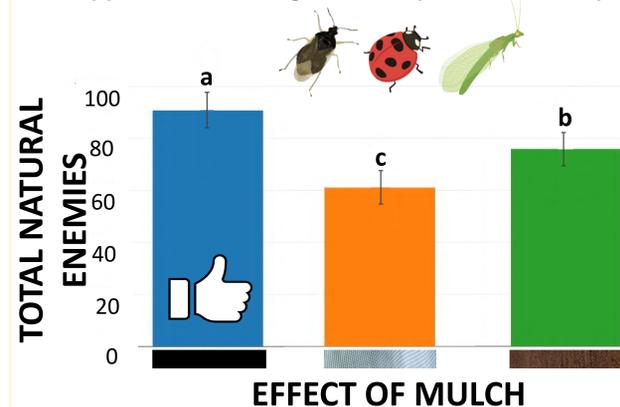
Data were analyzed using generalized linear mixed models and pair comparisons with LSMEANS.

**Abstract:** Pepper production in the Midwest is challenged by pests like thrips, prompting reliance on insecticides that escalate costs and resistance issues. Despite this, natural enemies offer a biological solution, yet are harmed by insecticide use and often disregarded. While IPM methods like reduced fertility and colored mulches offer alternatives, their joint impact on thrips control and natural enemy preservation is poorly understood, prompting research to fill this knowledge gap.

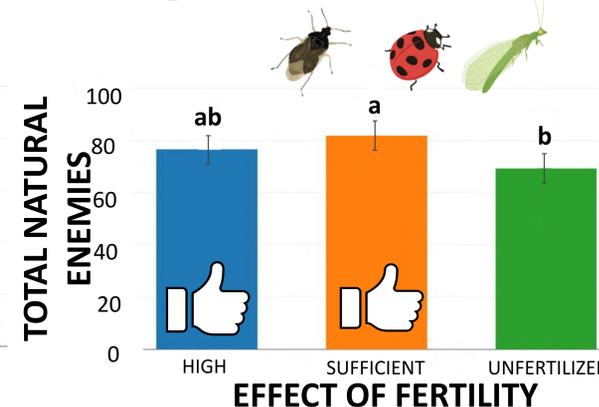
## Results



**Figure 1: Interaction of mulch and fertility and their effect on thrips density.** Conventional management approaches like black mulches and high fertility regimes seem to propitiate higher thrips densities compared to alternative approaches like silver-diamond reflective mulches paired with high or sufficient fertility regimes. The lowest thrips densities were found on bare soil paired with the different fertility regimes. Best management approaches with regards to thrips control are represented with a thumbs up icon.



**Figure 2: Effect of mulch on abundance of natural enemies.** Despite having a positive effect on thrips control, silver-diamond reflective mulch seems to negatively affect natural enemy abundance. Mulch type propitiating higher number of natural enemies is represented with a thumbs up icon.



**Figure 3: Effect of fertility on abundance of natural enemies.** Fertility seems to affect less the natural enemy abundance but even so, higher abundance is observed on high and sufficient fertility regimes. Fertility regimes propitiating higher numbers of natural enemies are represented with a thumbs up icon.

## Main takeaways

1. Thrips were most abundant on black mulch paired with either high or sufficient fertility rates. However, using silver-diamond reflective mulch along with high or sufficient fertility rates yielded promising thrips control (Fig. 1).

2. The most natural enemies were observed on black mulch, and the least on silver-diamond reflective mulch. This indicates that silver-diamond reflective mulch negatively impacts the colonization of natural enemies in pepper production (Fig. 2).

3. Fertility also has an impact on natural enemies, with the highest abundance observed on high and sufficient fertility rates. The least natural enemies were observed on unfertilized plots suggesting that fertility could be a limiting factor for both pests and beneficial insects (Fig. 3).

## Conclusions

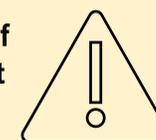
Integrated pest management programs are an excellent alternative management approach to prophylactic insecticide applications because:



Decreased insecticide cost = grower saves time and money.



Less chances of developing pest resistance to insecticides.



However, the impacts of cultural control tactics (like fertility regimes and mulch) on natural enemies need to be considered to maximize biological control.



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