

# Evaluation of Organic Insecticides for Harlequin Bug Management in Kale

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## Introduction

### Brassica productions in the Mid-Atlantic

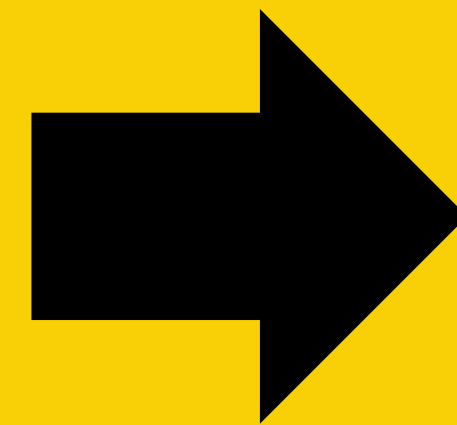
- Brassica crops such as kale, cabbage, broccoli, and collards are important vegetable crops grown throughout the Mid-Atlantic.
- Harlequin bug (*Murgantia histrionica*) is a key fall season pest of brassica crops and can cause significant feeding damage that reduces crop quality and marketability (Figure 1.).
- Both adults and nymphs feed on plant tissue using piercing-sucking mouthparts, causing discoloration, wilting, and plant stress.
- Harlequin bug populations often increase during late summer and fall brassica production.
- Management of this pest can be especially challenging in organic production systems because available insecticide options are limited.
- Many organically approved products are available, but there is limited field-based information comparing their effectiveness against harlequin bug life stages.



Fig. 1) Adult Harlequin bug on a kale leaf.

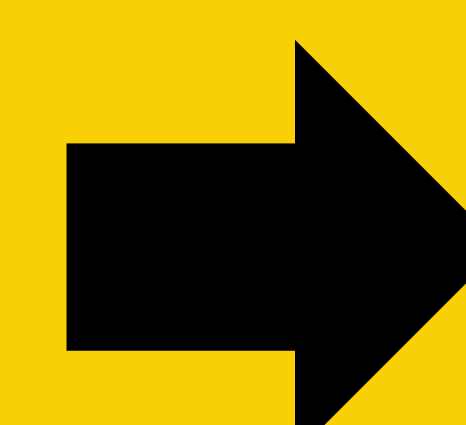
### Problem

Organic brassica growers have limited information on which approved insecticides provide the most effective control of harlequin bug adults, nymphs, and eggs under Mid-Atlantic field conditions.



### Hypothesis:

Organic insecticide treatments will differ in their effectiveness at reducing harlequin bug populations in kale.



### Research

Evaluate several common organic insecticides' effectiveness during fall season, Kale planting

## Methods and Field Work

- Field trials were conducted in fall 2025 at the University of Maryland, Lower Eastern Shore Research and Extension Center, Salisbury, MD.
- Kale plants were arranged in replicated plots using a randomized complete block design, with 12 plants per plot.
- Treatments included: Control (untreated), Neem Oil, Spinosad, and Pyganic.
- Six insecticide applications were made between Aug 29 and Sept 23. Visually, counts were done 3-4 days after application on six plants per plot (Fig. 2).
- Harlequin bug adults, nymphs, and eggs were recorded (Fig. 3).
- Data was analyzed using an ANOVA in JASP.



Fig. 2) Six plants per plot were inspected 3-4 days after each insecticide application, for all five stages of harlequin bugs and other insect pests.



Fig. 3) Kale with Harlequin bug nymphs along with feeding damage, which leads to kale discoloration.



Fig. 4.) Adult harlequin bug with deformed wings.

## Results

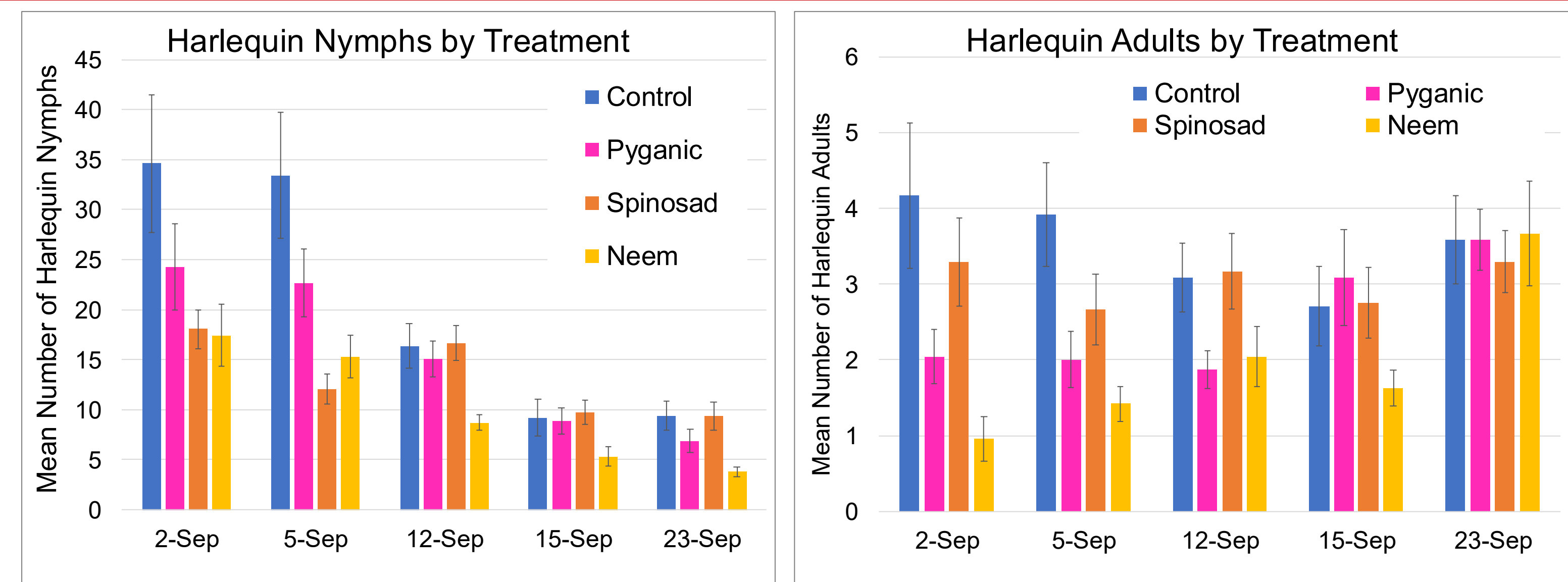


Fig. 4) Right graph displays the average harlequin nymphs observed per plant by treatment and the left graph displays the average harlequin bug adults observed per plant by treatment across 5 scouting dates.

- The Neem treatment was the only treatment that had significantly fewer harlequin nymphs compared to control treatments consistently throughout the trial ( $F(3, 460) = 12.06, p < 0.001$ ) (JASP).
- The Neem treatment also had significantly lower numbers of harlequin bug adults except for on Sept 23.
- Pyganic and Spinosad had significantly fewer numbers of harlequin bugs on some dates; however, this trend was not consistent throughout the sampling period of the trial.

### Observations:

- Adult harlequin bugs with deformed wings were found in the neem treatment on Sep. 15 and 23 (Fig 4).
- Neem oil treatment had decolorated kale leaves (Fig. 6). The oil likely stripped the wax layer from the plant's cuticle.

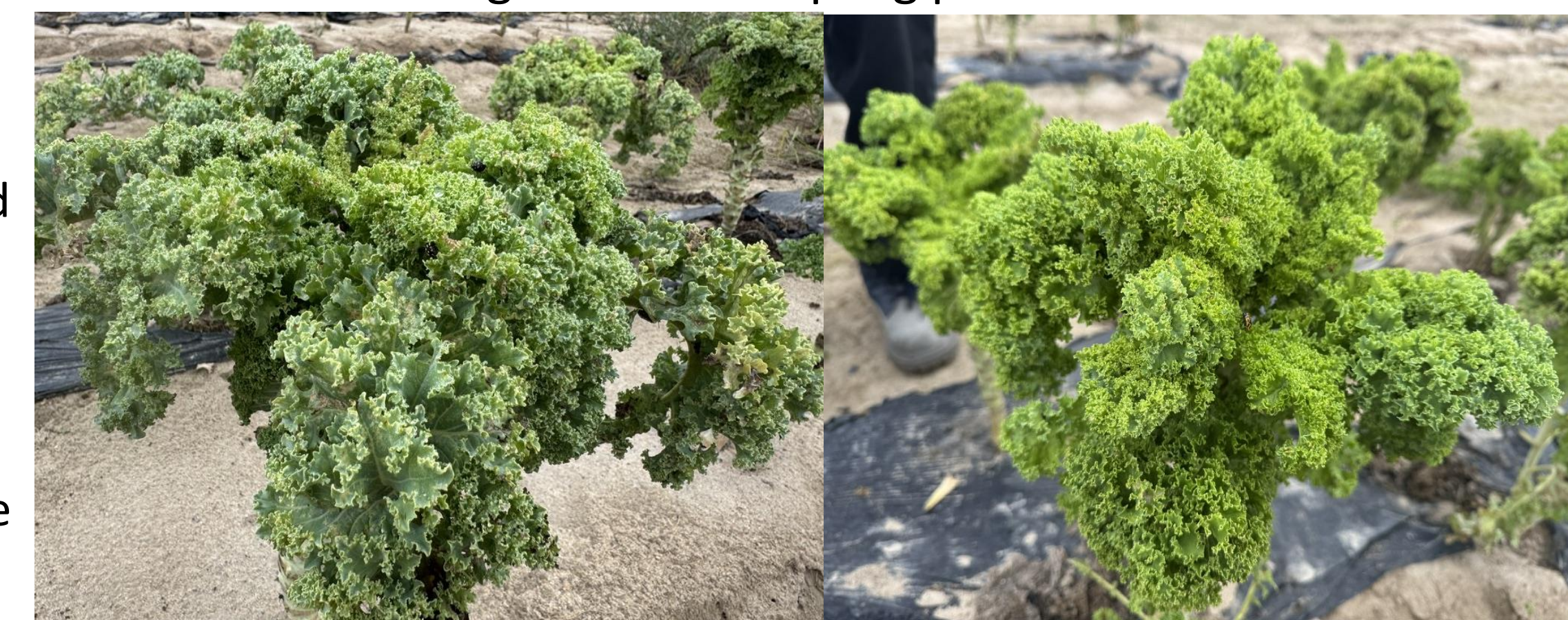


Fig. 6) Kale treated with Pyganic on right and Neem oil on the right.

## Future directions

- Second year of this trial will evaluate organic insecticide options and effective control of caterpillars on on spring Kale pests.
- Test reduced Neem rates or alternative formulations to minimize leaf injury.
- Expand trials to other brassica crops and additional growing seasons.

Funding for this project was provided by USDA - NIFA - EIP (Grant Number: 2021-70006-35473 and 2024-70006-43556)

## Conclusions

Neem consistently resulted in significantly fewer harlequin bug nymphs and adults compared to the untreated control, while Pyganic and Spinosad reduced pest abundance on some sampling dates, but did not provide consistent control throughout the trial. However, kale treated with Neem oil showed noticeable leaf discoloration via stripping the cuticle wax of the leaf, which impacted crop appearance. These results indicate that neem oil may be an effective organic management option for harlequin bug, but growers should consider potential plant injury.