

S-SARE Young Scholar Enhancement Internship in Sustainable Horticulture: Determining the level of protection against pest in vegetable crops grown under row cover and insect net during the summer in Virginia

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INTRODUCTION

The purpose of the S-SARE project LS16-268 is to strengthen the capacity of rural and urban farmers to grow vegetables sustainably by adopting row covers. The young scholar participated in this project and investigated rowcovers and insect nets as physical barriers against pest in vegetable crops during the summer. The intern identified and monitored pest and beneficial insects in Cole crops, Swiss chard, lettuce, and basil, and evaluated pests populations and the level of crop injury with and without rowcover. In addition, student assisted in evaluating the benefit of using rowcover on growth and yield of vegetable crops.

PURPOSE AND OBJECTIVES

The purpose of this young scholar enhancement project is for the intern to participate and gain experience in agricultural research and discovery of technologies that will improve agriculture sustainability (profitability, environmental stewardship, and social wellbeing). The young scholar participated in research activities to address the following objectives:

1. To demonstrate the improved growth and production of vegetable crops grown under row covers in comparison to open field by collecting data on growth, time to harvest, and yield.
2. To determine the level of protection of row covers and insect nets against pest, and the reduction in pesticides use by monitoring pest populations, injury, and losses.
3. To interact with farmers and extension faculty participating in the project when visiting on-farm studies.
4. To communicate the experiences to stakeholders and interested audience through poster presentation, field day and social media.

ACTIVITIES AND METHODS

Research and demonstration studies were conducted at the Eastern Shore Agricultural Research and Extension Center (AREC) - Virginia Tech in Painter, VA. The young scholar participated in field studies at the Eastern Shore AREC to investigate the benefits of using row covers and insect nets in the production of leafy vegetables to improve productivity and reduce pesticide use during the summer. Leafy vegetables included lettuce, Brussel sprouts, kale, Swiss chard, and basil, and were planted under plastic mulch with drip irrigation.

1. Identified pests and beneficial insect present in the crops under investigation.
2. Monitored pests populations in each plot to determine level of protection by rowcovers and insect nets.
3. Collected data and on pest injury level with and without rowcover.
4. Determined the level of produce loss/gain due to rowcover and insect net in comparison to open field.
5. Assisted in setting up research trials including fertilizing, setting plastic mulch, and irrigation system, planting, irrigating, weeding, harvesting, etc.
6. Assisted in collecting data on plant growth, leaf area, biomass, yield, quality, etc.
7. Created poster to submit at the SARE Administrative Council meeting.

RESEARCH RESULTS

- a. Rowcover on Brussel sprouts (Fig. 1A):
 - i. Rowcover enhanced growth and yield (data not presented)
 - ii. Rowcover reduced the population of insects infesting crop (data not presented)
- c. Identified pests:
 - 1) Salt Marsh Caterpillar – *Estigmene Acraea*
 - 2) Imported Cabbage Worm – *Pieris rapae* (Fig. 1B and 1C)
 - 3) Diamondback Moth – *Plutella xylostella*
- d. Row cover reduced the level of leaf injury (Figs. 1D and 1E)



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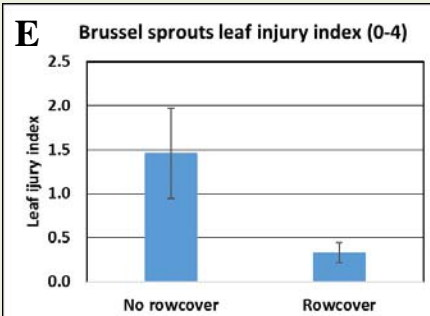
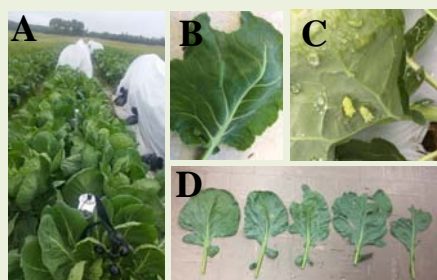


Figure 1. Rowcover on Brussel sprouts. Eastern Shore AREC, spring 2017

Crop prior to harvest (A)
Imported Cabbage Worm larvae (B) and pupae (C)
Feeding injury index (D): 0 to 4, right to left leaf, respectively
Leaf injury in Brussel sprout with and without rowcover (E)

RESEARCH RESULTS (Cont.)

- a. Insect netting on lettuce, Swiss chard and kale:
 - i. Insect netting reduced the incidence and injury of insects in the crops.
 - ii. Insects identified:
 - 1) Yellow Striped Armyworm – *Spodoptera Ornithogalli*
 - 2) Harlequin cabbage Bug – *Murgantia histrionica*
 - 3) Whiteflies – Aleyrodidae
 - 4) Aphids – Aphididae
- b. Row cover on basil (Fig. 3A)
 - i. Rowcover enhanced growth and yield (data not presented)
 - ii. Insects identified:
 - 1) Japanese Beetle – *Popilla japonica* (Fig. 3B)
 - 2) Brown Marmorated Stink Bug – *Halyomorpha halys*
 - 3) Spotted Cucumber beetle – *Diabrotica undecimpunctata*
 - c. Rowcover reduced the population of insect infesting the crop (Fig. 3C)



Figure 2. Insect netting on lettuce, Swiss chard and kale. Eastern Shore AREC, summer 2017
Chloe and Kristen setting the insect net over hoops (A)
Harlequin Cabbage Bug feeding on Swiss chard through the net on foliage touching the net (B)

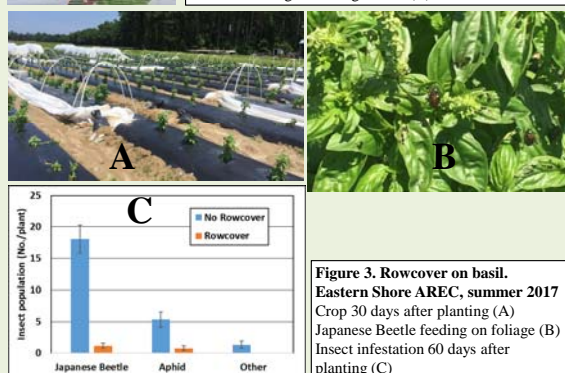


Figure 3. Rowcover on basil. Eastern Shore AREC, summer 2017
Crop 30 days after planting (A)
Japanese Beetle feeding on foliage (B)
Insect infestation 60 days after planting (C)

KNOWLEDGE AND SKILLS LEARNED

1. Learned much about recognizing and determining insect species. With close observations, learned how to identify a multitude of beetles, caterpillars, worms, moths, etc. through distinct traits including size and markings.
2. Learned to recognize the different types of damage associated with assorted insects, and methods of prevention (Figs. 1B, 1C, 2B, and 3B)
3. Learned about collecting and data and comparing treatments (Figs. 1E and 3C).
4. This experience have been positive and has sparked a new interest in the way I see "bugs" individually versus collectively. This knowledge will benefit me in my future gardening life and potentially agricultural career.

SUMMARY

Chloe Custis participated in the young scholar enhancement project and gained experience in research and discovery of technologies that will improve agriculture sustainability. As part of the S-SARE LS16-268 project, she participated in investigating the usefulness of using rowcovers and insect nets in vegetable crops during the summer. Her role was to evaluate pest infestation and injury of vegetable crops grown under rowcover and insect net in comparison to open field. She also assisted in evaluating differences in crop growth and yield due to using rowcovers and insect netting. The young scholar completed the internship by creating the poster for the SARE Administrative Council meeting and at the Southern Sustainable Ag. Working Group. The student will also have the opportunity to present her work to farmers and extension personnel attending the field day at the Eastern Shore AREC in Sept. 13, 2017. This experience will undeniably immerse the young scholar into research and social activities that will heighten her interest in sustainable/organic agriculture.