

# A S-SARE Young Scholar Enhancement Internship: Extending the Market Season with High Tunnel Technology for Sustainable Organic Fruit Production; an Internship and Apprenticeship for Sustainable Horticulture

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Olivia Caillouet, undergraduate student intern

## Introduction

This S-SARE project (LS12-250) aims to develop environmentally and economically sustainable organic berry production systems combining high tunnel and field production to provide season extension and expanded production.

The Young Scholar Program allowed a student intern to manage two experiments on the effects of shade on primocane blackberry growth, flowering, and yield in field and controlled conditions. Shade was used as a management tool to delay flowering and to improve fruit quality in a high temperature and high solar-radiation environment. The student participated in the overall S-SARE Project learning production and management techniques for berry production in the Southern Region.

## Internship Purpose and Objectives

*The goal of the young scholar project was to provide an experiential environment for learning sustainable organic crop management, research operations, experimentation, and communicating information.*

### Internship Objectives

1. To participate in the research of organic management of primocane blackberries and raspberries for extended autumn production, and florican blackberries and blueberries for advanced spring production in high tunnel and field production systems, including data collection and sampling, data entry, and data assessments
2. To assist in the routine management of organic blackberries, raspberries, and blueberries, including management of water, competitive vegetation, temperature, nutrition, irrigation, and pests
3. To conduct research studies on the timing and intensity of shade on the potential for delayed flowering and fruiting of primocane blackberries
4. To communicate to diverse audiences of stake holders and client groups about summer research experiences
5. To use this research as the basis for an Honors Thesis as well as a Sustainability Minor Capstone Project
6. To participate in sustainable fruit production workshops



Young scholar, Olivia Caillouet harvests Natchez blackberries.



PrimeArk-45® blackberry field shade study.



PrimeArk-45® blackberry greenhouse shade study.

## Process

1. Participating in a research project on organic high tunnel berries.
  - Experimental design, data collection, data entry physiological assessments, and fruit quality assessments.
2. Assisting in the routine organic management of berries.
  - Nutrition, irrigation, weeding, integrated pest management;
  - Cane management; thinning, trellising, pruning
3. Conducting two research projects; one in the field and the other in the greenhouse on the timing and intensity of shade on the potential for delayed flowering and fruiting of primocane blackberries:

### Field Study

- Thinning, pruning, and tipping canes
- Assigning experimental units and installing shade treatments
- Applying two shade treatments (30% and 50% cloth) on three dates at ~15 day intervals
- Marking canes for data collection
- Collecting gas exchange data: CO<sub>2</sub> assimilation, stomatal conductance, evapotranspiration; leaf temperature, leaf chlorophyll content (SPAD) and soil moisture
- Collecting growth data on selected canes: cane diameter, shoot length, number of nodes, number of lateral branches, number of flower clusters, and stage of flower development
- Harvesting berries and measuring berry weight and soluble solids

### Greenhouse Study

- Training potted primocane blackberries to single shoot
- Applying shade treatments for two dates at ~ 30 day interval resulting in four treatments; 1) control (unshaded + unshaded), 2) unshaded + shaded, 3) shaded + shaded, and 4) shaded + unshaded
- Collecting gas exchange data on selected canes: CO<sub>2</sub> assimilation, stomatal conductance, evapotranspiration; leaf temperature, leaf chlorophyll content (SPAD), and soil moisture
- Collecting growth data on selected canes: cane diameter, shoot length, number of nodes, number of lateral branches, number of flower clusters, and stage of flower development

4. Communicating to diverse audiences about summer experiences
  - Preparing research project proposal
  - Writing regular posts on summer internship blog: <http://wordpress.uark.edu/occaillo/>
  - Presenting summer research experience at departmental seminar
  - Developing a poster for S-SARE Administrative Council Meeting

## Internship Observations & Lessons Learned

- Learned how to conduct a field and greenhouse experiment by using experimental plot design, replication, and randomization
- Developed knowledge about organic production management
- Learned horticultural management of blackberries, raspberries, and blueberries
- Experienced how to sustainably manage organically produced crops in high tunnels
- Learned how pruning, tipping, and shading strategies affect cane development and fruit formation in primocane blackberries and raspberries



Measurement of leaf gas exchange using CIRAS 3 CO<sub>2</sub> gas analyzer on PrimeArk-45® blackberry field shade study.



Measurement of leaf chlorophyll content using SPAD meter on PrimeArk-45® blackberry field shade study.



## Summary

High tunnels are a potential sustainable means of extending the cropping season and protecting high value crops from environmental damage and pests. High tunnels are a compliment to field production systems and contribute to economic sustainability. A problem of excessive heat and solar radiation limits primocane blackberry production in the southern region and shade may provide opportunities for introducing and expanding the crop in this region. The S-SARE young scholar internship provided an undergraduate student with an opportunity for the application of classroom learning and the development of hands-on skills in preparation for a career in sustainable agriculture.

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