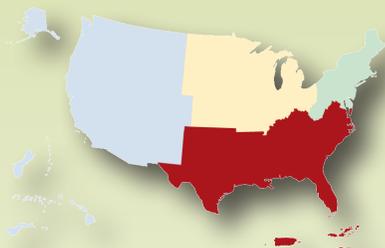


FARMER & RANCHER INNOVATIONS

Lessons learned from trials and demonstrations conducted primarily by farmers and ranchers



SARE FUNDING FOR THIS PROJECT

Project Number

FS08-224

Project Year

2008

SARE Region

South

Grant Type

Farmer/Rancher

Project Coordinator

Carol Garrett, Research Fellow

Auburn University

Tuskegee, AL

(334) 725-9272; garrecj@auburn.edu

For more information,

go to www.sare.org/project-reports and search by project number.

Written by SARE staff and reviewed by Extension specialists.



www.sare.org



Using Low Tunnels to Extend the Growing Season for Organic Strawberries in Alabama

Project Summary

This project was designed as a demonstration project to determine if the strawberry harvest season could be extended, potentially allowing farmers to get their strawberries to the market early for premium prices. Low-tunnel production can provide an opportunity for local organic growers to economically produce early berries, particularly if they do not have the resources for production in a greenhouse or high tunnel. The project coordinator compared raising strawberries using various combinations of matted rows, black plastic mulch and low tunnels. The three varieties tested were Allstar, Camarosa and Chandler.

This project took place in USDA Plant Hardiness Zone 8a.

Top Findings and Lessons Learned

- Black plastic mulch with a low tunnel produced the earliest fruit—about one to two weeks earlier than the matted row system. Black plastic without a low tunnel also produced early (see Table 1).
- Over the course of the season, the matted rows with and without low tunnels produced considerably more fruit than the black plastic mulch systems.
- The low tunnel systems, both with plastic mulch and matted rows, produced

TABLE 1. SUMMARY COMPARISON OF YIELDS BY SYSTEM AND VARIETY

	System Comparison		Variety Comparison	
	Earliest Fruit	Most Fruit	Earliest Fruit	Most Fruit
Best Performance 	Black plastic; low tunnel	Matted row; no low tunnel	Chandler	Chandler
	Black plastic; no low tunnel	Matted row; low tunnel	Camarosa	Camarosa
	Matted row; low tunnel	Black plastic; no low tunnel	Allstar	Allstar
	Matted row; no low tunnel	Black plastic; low tunnel		

less fruit over the season than the comparable open-air systems.

- The matted row systems, both with and without low tunnels, produced a much greater density of plants, and required more labor picking and weeding.
- Chandler produced the most fruit, followed by Camarosa. Allstar produced the least.
- Camarosa consistently produced a superior, high-quality berry: large, well-shaped, very tasty, and with fewer diseased berries.

Production Methods

The project coordinator simultaneously tested four different production methods and grew three different varieties. The methods were:

- Treatment 1: black plastic with a low tunnel
- Treatment 2: black plastic without a low tunnel
- Treatment 3: matted row without a low tunnel (the control)
- Treatment 4: matted row with a low tunnel

The three varieties were Allstar, Camarosa and Chandler, and each variety was grown using each of the four treatments in a single bed, for a total of 12 beds. Each bed was 4 feet by 75 feet; no beds were raised. Each production method was applied to each variety in a single bed. In treatments one and two, plants were planted in two rows with 12 inches between plants and rows. In treatments three and four, plants were planted in a single row with 12 to 14 inches separating them.

The low tunnels were constructed of 9-gauge, high-tensile fence wire, cut into 7-foot long pieces that were arched and stuck into the ground on either side of the bed. The wires were covered with a material called Dio-Betalon, which the project coordinator felt is superior to Agribon in that it is a

more durable material, transparent, has some frost prevention and heat preserving features that Agribon lacks, and is not easily blown off by strong winds. The sides and ends of the low tunnels were held down with bricks. The wires and bricks were placed approximately every 2 feet.

Spring 2009

- Matted row treatments: The six rows were fertilized with compost and rotted sawdust, and mulched with hay and pine straw. The strawberries were planted in single rows.
- Plastic mulch treatments: The six rows were planted in a summer cover crop of cowpeas and beans.

Summer 2009

- Matted row treatments: The strawberry plants were kept weeded, watered with drip irrigation, and side-dressed with compost manure and worm castings.

Fall 2009

- Matted row treatments: The daughter plants were thinned.
- Plastic mulch treatments: The rows were covered with black plastic mulch, and in the first week of October were planted with the daughters from the matted rows. They were planted in two rows with 12 inches between rows and between plants.
- All beds were fertilized with worm castings.

January 2010

- The low tunnels were applied to three of the matted rows and three of the black plastic rows.

Mid-April 2010

- The low tunnels were removed at this time—after the last frost—to promote pollination and for ease of picking.

The strawberry plants were supplied with fertilizer in the drip irrigation system twice during the season. The first time, Fertrell 4-1-1 liquid Plant Food from the Sea was used at the rate of 1 quart to 5 gallons of water, mixed and supplied to

Figure 1. Pounds of strawberries produced by variety during the season

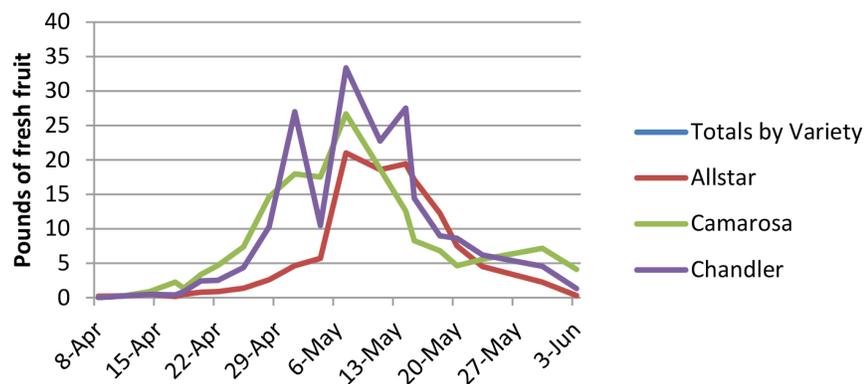
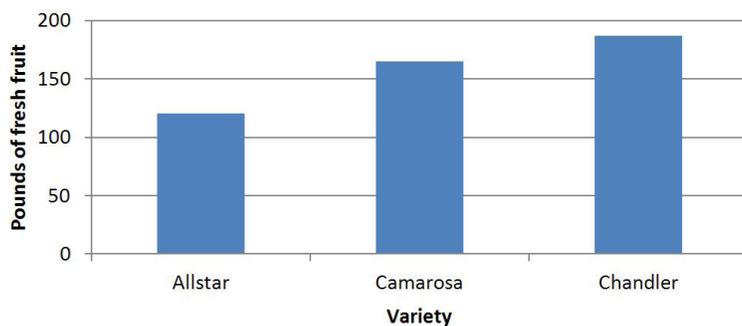


Figure 2. Total weight of fresh fruit by variety



the drip system with a siphon. The second application of liquid fertilizer was NatureSafe 8-5-5 pelleted fertilizer. A bag was placed in a pillow case and soaked in a barrel of water, which was used as liquid fertilizer.

For pest management, milky spore disease was applied to the growing area to control Japanese beetle grubs, and beneficial nematodes were also applied for more immediate control. The only disease that was encountered was grey mold, especially in the matted rows due to the plants being too crowded.

The project was to be repeated a second year with modifications, but time did not allow for it.

Results

Overall, the treatments with the low tunnels produced slightly less fruit than the open-air rows. Comparing the open-air rows, the matted rows produced much more fruit than the plastic mulch, though the quality of the fruit was often not as good in the matted rows as on plastic.

Among the varieties, Chandler produced the most fruit,

followed by Camarosa, and then Allstar. Chandler peaked in production a little sooner than Camarosa. Allstar peaked later in the season than the other two varieties (see Figures 1 and 2).

In terms of season extension, the treatment of the matted row without the low tunnel was considered the control. The first berries were harvested from this treatment on April 20, but not until April 25 did production exceed one pound—three pounds were harvested that day. This system peaked on May 7 with a little more than 30 pounds (see Figures 3 and 4). Results from the other treatments were:

- **Black plastic with a low tunnel:** produced a pound of berries on April 14 and peaked at three pounds on April 20, the greatest amount harvested on a single date for this treatment.
- **Black plastic without a low tunnel:** produced a pound of berries by April 17 and peaked April 28 with 4.6 pounds.
- **Matted row with a low tunnel:** produced a pound of berries by April 22 and peaked on May 7 with 43.75 pounds of berries.

The matted row systems—which produced considerably more fruit during the season—contained many more plants than the black plastic rows, which accounted for the significant yield difference. Even though the matted rows were thinned and the black plastic rows were planted at a higher density, the matted rows were not thinned to match the density of the black plastic rows, and over the course of the season grew denser.

The crowded plants produced more culls than the black plastic rows, but also many more marketable berries. It was very time consuming searching for the berries, picking them, and discarding culls in the matted row system. The matted rows also required a lot of weeding during the season. The plastic mulch treatments required new plants, but these were supplied by the matted rows.

Potential Strategies

The results of this project suggest that strawberries can be harvested early by planting on black plastic mulch and by using low tunnels. Growers can get berries to market one to two weeks earlier using these methods. However, the matted row system produced many more berries than the black plastic mulch over the course of the season. Another ad-

vantage of the black plastic mulch system is that it requires less labor for weeding. By having a combination of these two treatments, a grower can extend the season, produce more berries, and have a source of plants for future plantings.

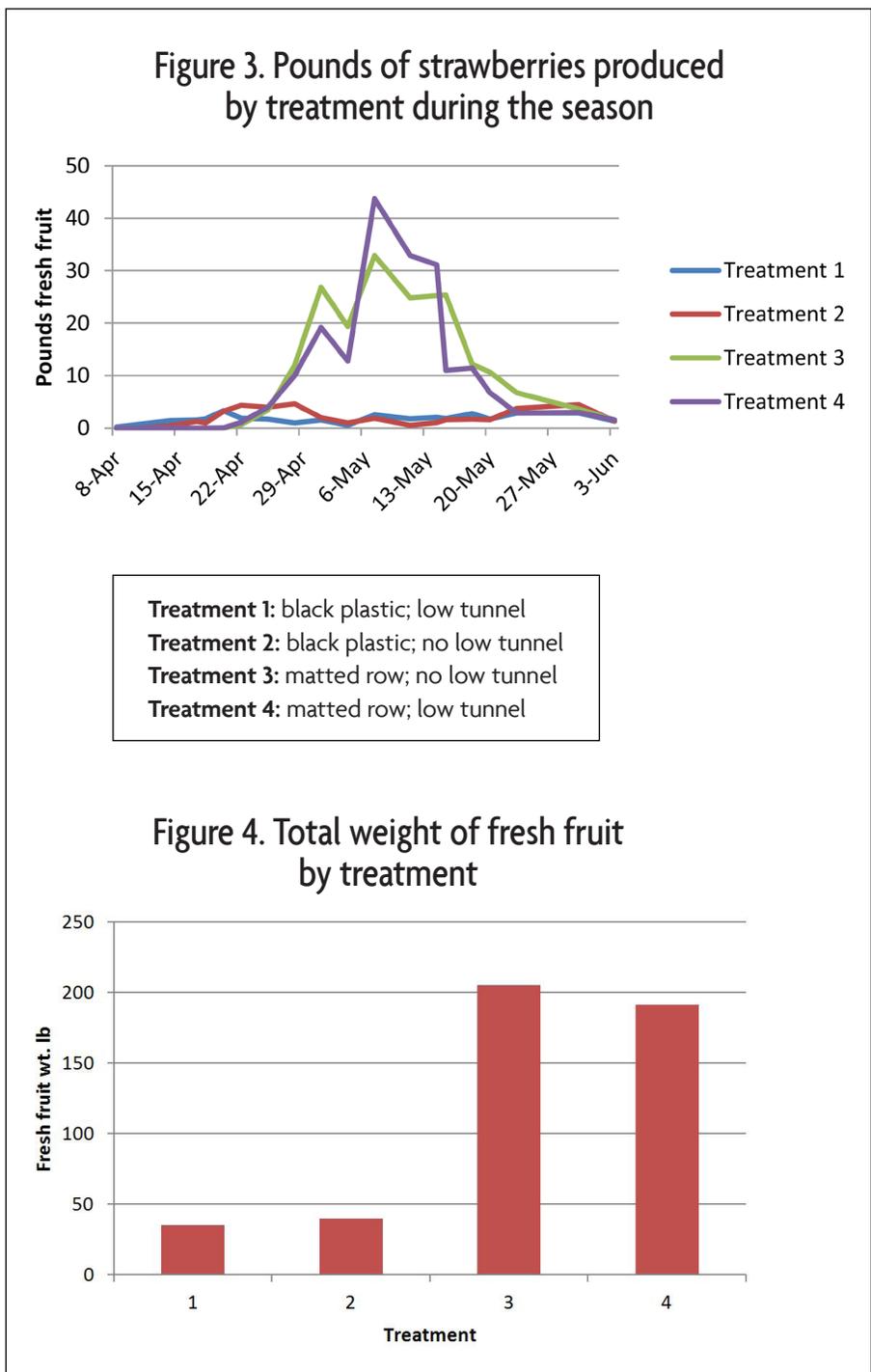
Low tunnels produced berries about one week earlier on black plastic mulch—so they allowed for the earliest possible production—but over the course of the season the low tunnel treatments produced fewer berries than the open-air treatments. One factor may have been pollinator exclusion, so growers interested in using low tunnels may need to consider removing them during the day when temperatures are warm enough.

.....
WANT TO DIG DEEPER?

For more educational resources on this and similar topics, visit SARE’s Season Extension Topic Room at www.sare.org/season-extension. Also explore SARE’s Learning Center at www.sare.org/learning-center.

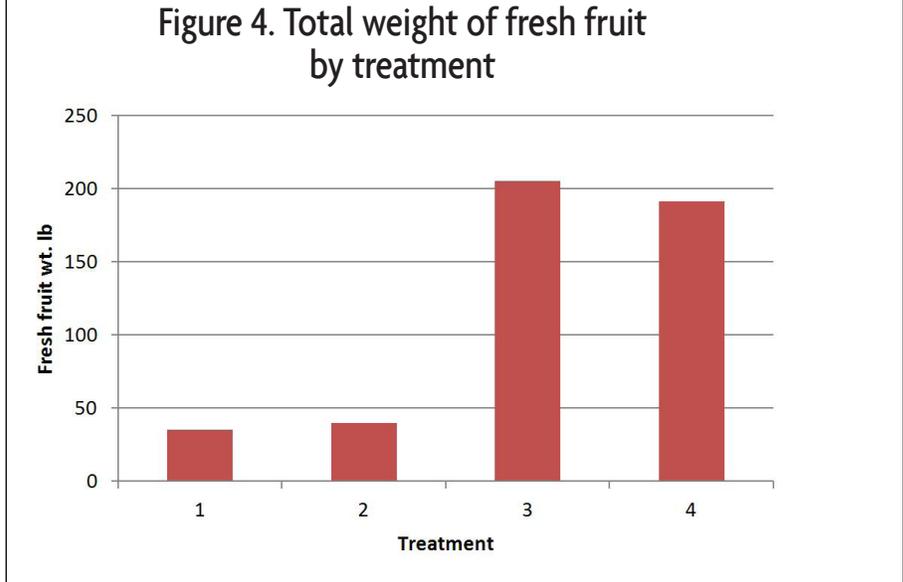
For more SARE-funded research on this and similar topics, visit SARE’s database of projects at www.sare.org/project-reports.

Figure 3. Pounds of strawberries produced by treatment during the season



Treatment 1: black plastic; low tunnel
Treatment 2: black plastic; no low tunnel
Treatment 3: matted row; no low tunnel
Treatment 4: matted row; low tunnel

Figure 4. Total weight of fresh fruit by treatment



.....
 This publication was developed by the Sustainable Agriculture Research and Education (SARE) program with funding from the National Institute of Food and Agriculture, USDA. Any opinions, findings, conclusions or recommendations expressed here do not necessarily reflect the view of the U.S. Department of Agriculture.

