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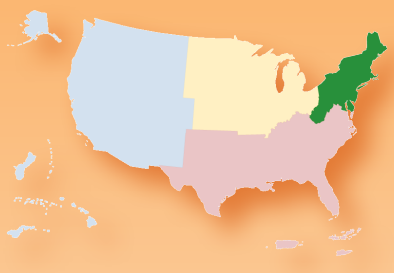

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Success Basics in High Tunnel Production: Three Maryland Case Studies

Project Summary

This three-year, SARE-funded study based in the Mid-Atlantic region involved five innovative farmers in building high tunnels to investigate best practices in high-tunnel construction, tomato production and factors influencing profitability. Project coordinators used a case study approach, hiring technicians to help construct, and produce in, the high tunnels. The technicians then observed how the different farmers used and profited from high-tunnel use.

Top Findings and Lessons Learned

The project team found three major factors that promoted profitability in high tunnel production:

- The cooperator's decision to plant supplemental crops in the high tunnel along the sides, thus providing additional income for the season.
- How each cooperator integrated their high tunnel management into overall farming system management, especially labor.
- The amount of time the cooperator spent in the high tunnel during the entire season—greater success came with daily attention to high tunnel management.

COVER PHOTO: Farmers can use high tunnels to grow a wide array of plants earlier or later in the season. In addition to growing fruits and vegetables, this grower used his high tunnel to store bedding plants in March and April. *Photo courtesy Bryan Butler*

Introduction

Forty-one high tunnels were built as a result of this project, which led to a wealth of information about best practices for high-tunnel construction and production.

In this study, good tunnel management was the key to success for the growers. Good management included spending time daily in the tunnels to identify and quickly resolve any problems, properly balancing tunnel and field work, and carefully monitoring irrigation systems and roll-up sides, which regulate air flow through the tunnel.

The SARE study also found that high-tunnel success hinges on market accessibility. This study focused on farmers who had access to urban markets and/or operated community supported agriculture operations (CSAs), but study coordinators say even rural producers can benefit from high tunnel production, as long as they have dependable market outlets.

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Precaution. When analyzing the economics of high tunnels, farmers should take into account the cost associated with labor, because the amount of time spent on management (i.e., monitoring temperature and scouting for pests) greatly affects success.

The Case Studies

Because harvesting methods and supplemental crops varied, project coordinators employed a case-study approach for the economic analysis of five SARE grower/cooperators' high tunnel enterprises.

The SARE team decided that growers should be able to pay off the high tunnel in their first season. So the economic benchmark for a successful high-tunnel growing season would be total gross sales from the high tunnel to meet the total cost of building a 21-foot-by-48-foot high tunnel, selected as the standard growing area for data collection. Tak-

Additional Resources

General Information

Minnesota High Tunnel Production Manual for Commercial Growers (2012).
www.extension.umn.edu/distribution/horticulture/M1218.html

Washington State University high tunnel resources.
http://mtvernon.wsu.edu/hightunnels/Content/cropTunnels.html

University of Wisconsin Extension/eOrganic eXtension High Tunnel Webinar (March 2010).
www.extension.org/pages/26091/high-tunnel-production-and-low-cost-tunnel-construction-webinar

Hightunnels.org website (2004).
www.hightunnels.org/

High Tunnel Tomato Production (2004). University of Missouri fact sheet.
http://extension.missouri.edu/explorepdf/manuals/m00170.pdf

Funding

USDA NRCS EQIP Seasonal High Tunnel Initiative.
www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/?&cid=stelprdb1046250

Construction

http://njsustainingfarms.rutgers.edu/hightunnels.html
Rutgers High Tunnel Project. Includes detailed pictures from building a high tunnel (http://aesop.rutgers.edu/~horteng/hightunnels.htm).

Budgeting

High Tunnel Production Budget Resources website.
http://extension.unh.edu/counties/grafton/Docs/WinterProd4.pdf

Production

Organic Control of White Mold in High Tunnels. This SARE-funded video presents information on high tunnel production in Kentucky; the disease cycle of S. sclerotiorum; and two organic control tactics compatible, solarization and biofumigation.
www.sare.org/Organic-Control-of-White-Mold-in-High-Tunnels

Recommended companies for high tunnel materials:

www.ledgewoodfarm.com/home.html

www.griffins.com/construction/index.asp

Summary of gross income from high-tunnel grown produce for the three years of the project

Producers can recoup tunnel costs in first year of use

SARE GROWER/ COOPERATOR FARMS	YEAR 1	YEAR 2	YEAR 3	3-YEAR INCOME FROM HIGH TUNNEL
Case Study 1	Planted spinach in late-summer; harvested 560 lbs $10/lb for $5,600, or $5.56 per square foot[1]	Planted tomatoes April 1; June 22-Nov. 25, harvested 6,532 lbs at $3/lb for $19,596 or $19.44 per square foot	Planted tomatoes April 3; June 22-Nov. 15, harvested 2,276 lbs at $3/lb for $6,828 or $6.77 per square foot	**$32,024** or **$31.77** per square foot
Case Study 2	Planted tomatoes April 15; July 22-Aug. 30, harvested 425lbs @ $3/lb for $1,275; also sold 300 lbs of beans for $1,500 for a total of $2,775	Planted tomatoes April 1; June 23-July 28, harvested 172 lbs @ $3/lb for $516; also sold 200lbs of kale for $600 for a total of $1,116	Planted tomatoes April 3; June 21-Oct. 5, harvested 1,387 lbs at $3/lb for $4,161	**$8,052** or **$7.99** per square foot
Case Study 3	Planted tomatoes April 1; June 9-Nov. 15, harvested 1,249 lbs @ $3/lb for $3,747	Planted tomatoes March 28; June 29-Aug. 29, harvested 878 lbs @ $3/lb for $2,634; also sold $712 in fall greens for total of $3,346	Planted tomatoes April 23; June 6-Oct. 15, harvested 908 lb @ $3/lb for $2,724; also sold $750 of chard from edges of tunnel for total of $3,474	**$10,567** or **$10.48** per square foot

[1]All square footage figures are based on the full dimensions of the high tunnel (21 feet by 48 feet), not the actual growing space used.

ing into account all building costs, including lumber, plastic, and end-wall construction, project coordinators determined the total cost for this size high tunnel was $3,000 during the active years of this project (2005-2007).

CASE STUDY 1

In one case study, a farmer/cooperator planted tomatoes in the tunnel, but they were destroyed by spray drift from the herbicide 2,4-D, which another farmer had sprayed on an adjacent field for no-till corn production. The cooperator was then too busy to replant tomatoes so he planted spinach in the high tunnel in late summer for a fall market mix and a winter farmers' market in Washington, D.C. In year one of the project, they harvested 560 pounds of spinach at $10 per pound, for a total income of $5,600, or $5.56 per square foot. (Note: All square footage figures are based on the full dimensions of the high tunnel—21 feet by 48 feet—not the actual growing space used.) Due to a mild fall and winter, the spinach yielded well and attendance at the farmers' market was high.

In the second year, this farmer planted tomatoes April 1 and harvested from June 22 until November 25, yielding 6,532 pounds at $3 per pound for a total income of $19,596, or $19.44 per square foot. During this growing season, this cooperator exhibited superb management in the high tunnel—pruning, staking and tying the plants, and controlling for pests and disease. The tomato varieties—Moskovich and Prudens—performed very well. Tomatoes were trellised up to a height of 8 feet.

In year three, this grower planted tomatoes on April 3 and harvested June 22 through November 15. A total of 2,276 pounds of tomatoes were harvested at $3 per pound, for a total income of $6,828, or $6.77 per square foot. This cooperator, who had one of the largest farms in the study, said that because of labor issues, less time was spent in the tunnel the third year.

Due to favorable weather, outstanding tomato yield and good management, this cooperator far exceeded the $3,000 economic benchmark each year of the study.

CASE STUDY 2

Another cooperator, a long-time certified organic producer selling at local farmers' markets and through a CSA began in year one by planting tomatoes in the high tunnel on April 15. Although these tomatoes tested positive for TSWV, they continued to grow and produce adequate yields for five weeks. Between July 22 and August 30, this cooperator harvested 425 pounds at $3 per pound, for a total of $1,275. After the tomatoes, the cooperator planted beans in the high tunnel and harvested 300 pounds at $5 per pound, for a total of $1,500, which brought total income for that year from high tunnel production to $2,775, or $2.75 per square foot.

In year two, the cooperator planted tomatoes April 1 and harvested June 23 to July 28. He only harvested 172 pounds, for a total income of $516—low yields were due to an uneven watering pattern, insect issues and interference of field work. The cooperator buried a new type of drip tape under the tomato plants and the watering pattern was very uneven, which led to stressed plants. He had to replant a portion of the tunnel on April 12.

The 2006 winter, year two of the project, was mild, and the summer heat began early, with insect issues arising early. Aphids, whiteflies, mites and tomato rust mites became a problem. The cooperator did use beneficial insects, but not in a timely or effective manner, and he consequently lost the tomato crop. As summer continued to bring hot and dry weather to the area, the high tunnel remained empty, since the cooperator had to deal with field production problems. During the coldest part of the winter, the cooperator rolled up the sides of the high tunnel to freeze out any over-wintering insects. In early spring of year two he harvested 200 pounds of kale at $3 per pound for an income of $600. Combined with tomato income, this brought year two's total to $1,116 for high tunnel production, or $1.11 per square foot.

The final year of the project brought this cooperator's best season, with no major management or production issues. The cooperator planted tomatoes April 3. From June 21 though October 5 he harvested 1,387 pounds at $3 per pound, for a total income of $4,161, or $4.13 per square foot.

This cooperator had the largest field production of all cooperators, a situation that best illustrated how balancing management and labor issues between field and high tunnel production can improve profitability in the high tunnel.

CASE STUDY 3

A third cooperator, a certified organic producer selling through a CSA and to restaurants and farmers markets, planted high-tunnel tomatoes on April 1 and harvested June 9 through November 15, for a total of 1,249 pounds and $3,747 profit, or $3.72 per square foot. This cooperator's tomatoes were diagnosed with TSWV but did not show signs until late in the season. He had good fertility and continued to fertilize the tomatoes throughout the season. The tomatoes were excellent quality and yielded three to four weeks earlier than field tomatoes.

In year two of the project, this cooperator planted tomatoes on March 28 and harvested June 29 through August 29. Insect issues were less of a problem for this grower because he was quick to respond and remained diligent in treating problems when they arose throughout the seasons. He shortened the tomato harvest this year because he wanted to grow greens in the tunnel, but still harvested 878 pounds of tomatoes at $3 per pound, for a total of $2,634. He also sold $712 of fall greens, for a total income in year two of $3,346, or $3.32 per square foot.

In the final year of the project, this cooperator planted tomatoes on April 23, and harvested between June 6 and October 15, yielding 908 pounds of tomatoes at $3 per pound, for $2,724. He also planted both edges of his tunnel in spring chard and harvested 250 pounds from April 23 to May 9 for $750, bringing his total high-tunnel income for that year to $3,474., or $3.45 per square foot

This cooperator found an additional use for tunnels in the spring, as they offered an excellent location to store transplants. Project coordinators felt that this cooperator was the most consistent in the study. His management was excellent throughout the project.

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