

Research Update: The Economic Viability of Tomato Production Using Single- versus Double-Layer High Tunnels

Patricia Morris^a, Sanjun Gu^b, and Kenrett Jefferson-Moore^c®

^a*Graduate Research Assistant, Department of Agribusiness,
Applied Economics and Agriscience Education,
1601 E. Market Street, 145 Carver Hall, North Carolina A&T State University,
Greensboro, NC 27411, USA*

^b*Extension Specialist, Department of Agribusiness,
Applied Economics and Agriscience Education,
1601 E. Market Street, 145 Carver Hall, North Carolina A&T State University,
Greensboro, NC 27411, USA*

^c*Professor and Chair, Department of Agribusiness,
Applied Economics and Agriscience Education,
1601 E. Market Street, 145 Carver Hall, North Carolina A&T State University,
Greensboro, NC 27411, USA*

Extended Abstract

More than 70% of low-sale family farms are operating on a profit margin of less than 10%, which signals a critical concern for the economic sustainability of limited-resourced farms. It is also important to note that most low-income farmers combine off- and on-farm income. More than 80% of low-sale farmers work off the farm, as well as 62% of their spouses (Hoppe, 2015). High tunnels (akin to greenhouses) are versatile in production location, seasonality, quantity, quality, and length of cropping season, and appear to be promising for small-scale farmer economic viability (USDA, 2022). Research shows that single-layer (SL) high tunnels yield higher premiums, which can increase profits for small-scale farmers (Belasco et al., 2013; Foust-Meyer and O'Rourke, 2015). However, there is insufficient research on the usage of double-layer (DL) high tunnels. In this study, we explore the economic viability of using SL versus DL high tunnel production systems.

Tomato production is used as a case with consideration of North Carolina ranking ninth in the United States, producing 96 million pounds in 2018 (Connors, 2020). The objectives of this study

®Corresponding author:

Tel: (336) 285-4829
Email: jykenret@ncat.edu

are threefold: (i) to develop enterprise budgets of SL and DL high tunnels, (ii) to conduct a cost-benefit analysis of SL and DL high tunnels, and (iii) to provide recommendations on the economic viability of SL and DL high tunnel tomato production in the Piedmont region of North Carolina. The data for this study were gathered through a two-part approach—field research of tomato production using high tunnels and quantitative data collection using primary and secondary sources. The field research was conducted in the spring of 2021 and 2022 at the North Carolina A&T State University Research Farm. The economic data collection occurred during January to August of both years. During the field research period, the phenology of the plants, plant growth, and yield were all recorded. The economic data collected highlighted the labor work, including planting seeds, pruning, weeding, and harvest. Once harvested, the fruit was weighed into two groups: marketable or cull yields. Secondary data were obtained from the USDA National Agricultural Statistics Service and the North Carolina Department of Agriculture and Consumer Services weekly market prices of tomatoes between 2021 and 2022. Enterprise budgets were developed using the two approaches to be used to conduct a cost-benefit analysis for low-income, small-scale, and underrepresented farmers within the Southeastern Piedmont region of North Carolina.

The cost-benefit analysis compared the profit potential of organic and conventional SL- and DL-grown tomatoes under different high tunnel structures. The Net Present Value (NPV), the Internal Rate of Return (IRR), and the Payback Period (PBP) methods were utilized in the cost-benefit analysis to gain a better understanding of the economic viability of the high tunnels. Although the DL high tunnels had higher yields, the preliminary results revealed SL to be more economically viable due to higher and acceptable NPV and IRR and lower PBP. Limitations of the study included the variation of access to sunlight, the unpredictability of natural occurrences impacting the number of committed to labor, the availability of labor, and the accessibility to resources.

References

- Belasco, E., S. Galinato, T. Marsh, C. Miles, and R. Wallace. 2013. "High Tunnels Are My Crop Insurance: An Assessment of Risk Management Tools for Small-Scale Specialty Crop Producers." *Agricultural and Resource Economics Review* 42:403–418.
- Conners, K. (2020). "It Is the Season for Tomatoes." *Goldsboro Daily News*. Available online: <https://www.goldsborodailynews.com/2020/07/11/it-is-the-season-for-tomatoes/>.
- Foust-Meyer, N., and M. O'Rourke. 2015. "High Tunnels for Local Food Systems: Subsidies, Equity, and Profitability." *Journal of Agriculture, Food Systems, and Community Development* 1–12.
- Hoppe, R. (2015). *Profit Margin Increases with Farm Size*. Washington, DC: U.S. Department of Agriculture, Economic Research Service. Available online: <https://www.ers.usda.gov/amber-waves/2015/januaryfebruary/profit-margin-increases-with-farm-size/>.

U.S. Department of Agriculture. 2022. *High Tunnel Initiative*. Washington, DC: U.S. Department of Agriculture, Natural Resources Conservation Service. Available online: <https://www.nrcs.usda.gov/programs-initiatives/equip-high-tunnel-initiative>.