

Hydroponic Tomato and Cucumber Production in Greenhouses at Tobacco Experiment Station in Greeneville 2003

Jim Wills, Gary Honea,, Darrell Mundy, Carl Sams, Allen Straw

Interpretative Summary

Two plastic greenhouses previously used for tobacco transplant production at the Tobacco Experiment Station at Greeneville were converted to systems for tomato production in early 2001. Heaters and fans were already installed. The year 2003 marked the fourth and fifth crops grown in the greenhouses. For the Spring crop one greenhouse consisted of only tomatoes. The Fall crop consisted of two side by side greenhouses, one with all tomatoes and the second with tomatoes and cucumbers. A trellis system had been installed to support crops in each house. For the Spring crop both houses were covered with single layers of 6 mil polyethylene plastic and had existing heating and cooling capability. In the Fall of 2003 two layers of plastic were installed on both greenhouses. None of the crops produced a profit.

Introduction

Many greenhouses in the East Tennessee area that have been used for tobacco transplant production in the past are standing idle. Many growers are searching for alternative crops to produce in these houses. This research was an attempt to grow some potentially high value crops in these houses to evaluate the market potential and the suitability of these houses for vegetable production. Two areas of concern were the relatively small size of the houses and using a single layer of polyethylene covers. Yield and quality of crops was a major focus of the research in both houses.

Methods and Materials

Spring 2003

On Feb 15, 2002, a crop of 344 "Trust" tomatoes were transplanted the 22' x 60' greenhouse. The tomatoes (344 plants) were transplanted into 3 gallon black plastic bags filled with perlite. Each plant was watered and fertigated with a spray stake inserted in the bag. The same fertigation system was used for both greenhouses. Harvesting started April 21 and continued until Aug 4.

Fall

The Fall crop consisting of tomatoes in the 22' x 60' greenhouse. A second crop in the 32' x 48' greenhouse was transplanted on Aug 29 and consisted of two double rows of tomatoes and three double rows of cucumbers. Harvest began on Nov 10 and continued until Jan 6, 2004. Both crops were fertigated with the same system and same rate of

nutrients which consisted of 3-15-28 soluble fertilizer, calcium nitrate, potassium nitrate, and magnesium sulfate. The pH of the city water source was 7.2 and was adjusted with nitric acid to a pH of 5.8 to 6.0.

Results and Discussion

The Spring crop produced 4896 marketable tomatoes. Total production costs including labor figured at \$6.25/hr, were \$3,879. Actual income was \$3,320 resulting in a net loss of \$559. Tomatoes were sold at approximately \$1 per pound for large tomatoes and \$.50 or \$.25 for small tomatoes sold locally. Production amounted to 14.2 lbs per plant. Production should be at around 14 - 20 lbs per plant in the Spring and 12 - 14 lbs per plant in the Fall. Our production, especially in the Fall, fell well short of the goal. Mite infestation in the crop was part of the problem, but matching fertilization rate to stage of maturity seems to be also part of the problem. The Fall production costs were \$3,041 for the greenhouse of only tomatoes while income was \$1,363 for a loss of \$1,678. Production costs for the mixed house of tomatoes and cucumbers was \$2,660 with an income of \$543 for tomatoes and \$706 for cucumbers for a net loss of \$1,111. Fall production could be profitable if production could be above the 14 lb/plant range and if tomatoes could be sold for an average of more than \$.81 per pound. This is assuming that the greenhouse, heater and fans are already available and that the cost of additional equipment needed is spread over 10 years at one crop per year.

Conclusions

Based on our yields and costs figures for the 2003 Spring and Fall crop, neither tomatoes nor tomatoes and cucumbers in a small greenhouse were profitable at the production rates obtained. If all marketable tomatoes could be sold at an average of \$1 per pound the break even production would be about 14.6 pounds per plant in the tomato only greenhouse. We averaged 14.2 lbs per plant in the Spring but some of our smaller marketable tomatoes were sold at less than \$1 per pound. The Fall crop only resulted in 4.3 pounds per plant for tomatoes and 8 pounds per plant for cucumbers. If production rates could be increased, especially in the Spring even a small house could feasibly be profitable. A double layer of plastic was added prior to the Fall crop in 2003. Compared to the previous Fall a 38 % reduction in propane costs were realized. Other money saving measures such as reusing perlite for two crops instead of one would save an additional \$120 per crop.

Copyright © 1999 by [The University of Tennessee](#). All rights reserved.

This research represents one season's data and does not constitute recommendations. After sufficient data is collected over the appropriate number of seasons, final recommendations will be made through research and extension publications.