

# **A Cost Assessment of Growing Greenhouse Tomatoes in North Carolina**

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The greenhouse tomato industry is experiencing rapid growth in the United States. Nearly 17% of all fresh tomatoes sold in U.S. retail stores are greenhouse grown. Though the price of greenhouse tomatoes is typically higher than field grown tomatoes, there has been some downward price pressure as the industry growth at times outpaces demand. In North Carolina direct marketing has found success for many small growers.

Greenhouse tomatoes are a crop that is primarily grown for two reasons: 1) to provide an out-of-season product for a premium price and/or 2) to overcome disease pressures and unpredictable weather events that exist in the field. Being largely protected from the weather that dictates field production, greenhouse tomatoes are generally more uniform and offer a steady production volume. Greenhouse tomatoes are recognized as a high-value crop, due in large part to the high costs of production. Experienced growers look for efficiencies that will lower their labor and heating costs, in particular.

Experienced growers are usually glad to offer advice to those considering greenhouse tomato production. Not only is there a learning curve for the unique production technique adopted by most growers (hydroponic growing systems utilizing lean and lower crop management), there is the need to find and establish a market.

This study surveyed several North Carolina greenhouse tomato growers to determine their actual costs for start-up and production. Costs vary depending on initial availability of resources and production practices. This report will take a closer look at the costs that will likely vary the most. The production volume and retail price was similar among the growers surveyed.

## **Facilities**

There are numerous greenhouse manufacturers who sell and construct new, standard or custom greenhouse facilities. For greenhouse tomatoes, growers look for a structure that is tall and has straight sidewalls to maximize their growing space. In many cases, growers are able to purchase a used structure, which are often moved and reassembled without hiring a contractor. Some retrofitting may be required, most often the addition of a cable-based support system for tying the tomatoes up. Former tobacco farmers often have a greenhouse structure available for use in a new enterprise.

The data collected for the accompanying budget averages the cost of 2 used greenhouses readied for tomato production and 2 quotes from manufacturers for the basic structural and equipment requirements.

Site preparation costs include grading, water and power hook-up. Hydroponic growers are fiercely aware of the importance of greenhouse sanitation. They lay a weed impermeable groundcover that serves as a “floor.” The “floor” can be swept clean as

needed and cleaned between seasons. A reliable water source is essential. In addition to a well, some growers install a storage tank for emergency water supply.

Most greenhouse owners also purchase a back-up generator in the event of power failure. Power failure is usually thought of as being detrimental in the winter, but without electricity to run the fans, it can be just as damaging in the summer. Various alarm systems, including some automated environmental control systems, are available to alert the grower when a power failure has occurred.

The degree of automation for the environmental control system depends largely on how much attention and time the grower will be able to devote to monitoring the greenhouse environment. Some small growers are content to manually adjust a basic thermostat, while others rely on multi-stage systems.

Environmental control systems can also be utilized for irrigation. The “Solar 3B” technology measures the light intensity in solar units. The sensor triggers irrigation according to a predetermined accumulation of solar units. This type of irrigation management is not time dependent. Most growers still depend on timers that they manually adjust according to the weather. In either approach, the goal is to maintain constant soil moisture. Plant nutrition is delivered through the irrigation system using an injector.

Horizontal airflow fans are essential for circulating the hot air out of the greenhouse and reducing humidity. Some growers utilize roll-up or drop-down sidewalls to further aid in ventilation. Evaporative cooling pads and multiple end wall fans are also cooling strategies to maintain the desirable growing temperature.

Some heat source should be available. Depending on the length of desired season and climate, the type of heater that best suits each growers needs may vary. In North Carolina, some growers work to extend the natural tomato growing season while others produce “off-season” fruit in the winter and early spring. Fueling a heater is expensive and must be weighed against the potential returns to determine how early to start the crop.

Several growers are moving toward a wood burning boiler to curb their heating expenses. These growers generally have a source of inexpensive wood and are able to heat a greenhouse through the night without disturbing anyone’s sleep to add fuel to the stove. Natural gas and propane are other fuels commonly used for heating.

## **Production System**

Healthy transplants are an important factor for vigorous tomato plants. Tomato seed are generally started in plug flats or rock wool blocks for easy separation and minimal root damage at time of transplant. Most growers are currently using the variety, “Trust” for greenhouse production.

Most growers use a sterile substrate to anchor the plants in a 5-gallon grow-bag or pot. Some growers use only perlite, others use a custom mix with multiple media types. An irrigation emitter is placed in each container for easy watering. Growers aim to provide a constant level of moisture for optimal plant health.

“Lean and lower” is the most common production technique for greenhouse tomatoes though there is some variability. The lean and lower practice involves intensive suckering to produce one or two vines that are clipped to a length of twine. The twine is unwound from a support hook lowering the vine. The hooks are moved along a horizontal support cable as the plant is continuously lowered as it grows. This method ensures that the ripest fruit is always lowered to a convenient level for harvesting.

Suckering and moving the vines does take a considerable amount of time and must be done regularly. Since the plants are lowered, the height of the greenhouse is not a limiting factor of production. Fruit pruning also encourages large-sized fruit, usually in a cluster of 3-4 tomatoes. Pruning and lowering are labor intensive practices. Experience leads to greater efficiency which can dramatically affect labor costs for these crop-specific tasks. As the season progresses and the plants become weighed down with tomatoes, it is essential to keep an eye on the support cables to ensure they can support the load.

Tomatoes can also be grown trellised, more like a home gardener would do. Some suckering would still be required; however, the branches would be secured to the trellis for support. The time for production using this method is somewhat limited by the height of the trellis and the ease of harvest may determine the height of the trellis.

### **Cultural challenges**

Growing under the cover of the greenhouse essentially eliminates the incidence of early blight and late blight—two disease concerns for field tomatoes.

Primary pest pressures come from white flies and aphids. Control measures rely heavily on scouting and the release of beneficial insects. Some OMRI approved insecticides are available. Greenhouse tomato growers typically avoid the use of conventional chemicals.

Purchased bumble bee hives are the primary source of pollination. Most growers would rather depend on the reliability of a hive they purchase and place in the greenhouse than hope for sufficient pollination from natural bee populations in the surrounding area.

### **Harvest and Marketing**

Harvest of vine-ripened tomatoes is required two to three times per week. Maximum production can yield 20 to 25 pounds of tomatoes per plant. Some additional part-time labor may be required for harvesting, sorting and marketing while the farmer continues to manage the crop growth.

Direct selling either at a Farmer’s Market or a roadside stand is the most common retail outlet, garnering the highest price. Prices in 2006 ranged from \$2.25 to \$2.75 per pound. Expenses associated with selling from a Farmers’ Market are usually minimal; however

selling from a roadside stand further reduces marketing expenses by eliminating the transportation costs. The majority of the marketing costs are linked to paying labor to operate the stand. Tomato growers spend little on traditional marketing. They rely on the taste of the product to be the selling force. Many tomato growers also grow other produce, allowing them to spread the costs (fee, fuel, time and signage) among all crops.

Some growers aim to have tomatoes ripe in time to coincide with strawberry sales. Strawberries are commonly marketed through roadside stands and pick-your-own operations. The availability of tomatoes to strawberry customers is a strategy to establish a customer base that will return to buy tomatoes even after the strawberry season is over.

Most growers do not grade their tomatoes or apply individual stickers. Some growers have found that it is better to give away small fruit or “seconds” to a food distribution organization rather than selling “seconds” for a lower price. Most growers pick the fruit at its prime and expect to sell it all prior to the next harvest. Customers looking for a deal will buy “seconds” while overlooking the quality product that will become “seconds” if not sold.

Most current growers believe the market is wide open with more demand than they can supply. However, growers caution that it is vital to locate a market for the crop prior to planting the first seed. Some growers choose to produce right under the demand to avoid excess produce. They recognize that most tomatoes are bought for their “firm, red appearance,” and they do not expect to sell second-quality product. They do anticipate that the taste of their firm, red tomatoes will bring in repeat customers who will further appreciate their farming efforts.