GREENHOUSE TOMATOES

Although greenhouse tomato production is in its infancy in the Yuma area, the greenhouse production of vegetable transplants and, in some regard, herbs has been ongoing in the region for years. Currently greenhouse grown tomatoes occupies a specialty market in the area.

Although greenhouse tomatoes still constitute a minority share of the U.S. fresh tomato market, their influence is growing in retail channels, which represents about half of U.S. tomato consumption. The greenhouse tomato industry has established itself as an important part of the North American fresh tomato industry. According to the U.S. Department of Agriculture, around 37 percent of all fresh tomatoes sold in U.S. retail stores are greenhouse produced, compared with negligible amounts in the early 1990s.

In a consumer society that appreciates differentiation and variety, greenhouse tomatoes can be seen as one more development in this trend in regards to tomato offerings, which has also seen a growth in the variety of in field-grown tomatoes. These improved varieties, as well as the positive health benefits associated with eating tomatoes have helped to contribute to a 30 percent rise in U.S. consumption of fresh tomatoes since the mid 1980s, with estimated 2009 annual per capita consumption levels around 19.4 pounds.

A “hot house” is simply another name for “greenhouse.” The idea of growing plants in environmentally controlled areas has existed since at least Roman times. The first modern greenhouses were built in Italy in the 1500s and soon expanded to the Netherlands and England.

In the 1880s, the tomato started gaining popularity. The primary reason for this was the invention of pizza around Naples in the late 1880’s. The first pizza was made with three ingredients: tomato sauce, basil, and mozzarella cheese. It was also in the late 1800s that the classification of the tomato changed. Before this time, it was classified as a fruit to avoid taxation, but after a U.S. Supreme Court ruling it became classified as a vegetable and was taxed accordingly. Since before the Civil War, the tomato has become a staple in kitchens throughout the world. Americans consume over 12 million tons of tomatoes each year.

Arizona based, Eurofresh, Inc. is a year-round producer of hydroponically grown, pesticide-free, premium greenhouse tomatoes. Founded in 1990, Eurofresh has one of the most experienced management teams in the industry and is a leader in hydroponic greenhouse tomato market. The company currently produces beefsteak tomatoes and tomatoes-on-the-vine which are sold directly to supermarkets as well as wholesale distributors.

There is often confusion over whether the tomato is a fruit or vegetable. Even though the tomato is a fruit, it is usually treated like a vegetable by chefs. Legally, it is classified as a vegetable. The reason the tomato is considered a fruit is because it contains seeds. Vegetables do not contain seeds. Because of their seeds, cucumbers and squash are fruits as well.

The closed environment of a greenhouse has its own unique requirements, compared with outdoor production. Pests and diseases, and extremes of heat and humidity, have to be controlled, and irrigation is necessary to provide water.
Tomatoes are the leading greenhouse vegetable crop in the United States and Canada. In the U.S., the total acreage in greenhouse tomato production increased by 50 percent between 1996 and 2009.

Greenhouse tomatoes bring the highest price from December through April, when it is too cool for local field-grown tomatoes. Typically, plants are set in September and grow through the winter and spring until late June.

Tomatoes have been grown in greenhouses for nearly 100 years. For this reason, there are many techniques for growing tomatoes in a greenhouse and there is more written about greenhouse tomatoes than any other greenhouse crop. Additionally, hydroponics was developed for greenhouse tomato production, so there can be many complicated steps to the production of tomato fruit in a greenhouse. There is no single best way to grow greenhouse tomatoes, many ways are successful.

Greenhouse grown tomato plants must be tied or clipped to a string or twine suspended from a strong overhead cable. This starts as soon as they are about 10 inches high and continues throughout production. A separate support system must be built inside the greenhouse from pipe, etc. to support the crop. Each plant may weigh 10 to 15 pounds when it is loaded with fruit so the support system is quite strong. Actively growing tomatoes will have to be clipped to the support string or twined around the string every 6-10 days.

Tomato flowers must be pollinated in order to get fruit set and fruit development. Traditionally, flower clusters are shaken manually with a tomato flower pollinator as soon as the yellow petals open. Pollination must be done every day, seven days a week. Bumblebees are available from insect companies for pollination as well.

Tomato plants in a greenhouse are pruned to a single stem. All lateral branches or suckers are removed when they are one to three inches long. This allows for maximum air circulation and simplifies pest control problems.

Temperature plays a key role in the production of quality fruit. Optimum daytime temperatures should be maintained between 70 degrees to 80 degrees F, and cooling is provided when temperatures within the greenhouse exceed 80 degrees F. Air movement is also important in tomato production. Circulation maintains a constant level of humidity and helps reduce potential problems from plant diseases.

Greenhouse tomatoes are trained to a single stem by removing all side shoots as they develop in the axils of the leaves. These side shoots or suckers should be removed weekly by breaking them off or rubbing them out when quite small.

Normally tomatoes are harvested 3 times a week and when possible, the fruit should be harvested as they approach full-red color. The nearer tomatoes approach full ripens on the vines, the heavier and more flavorful they become. When left on the vine to ripen, an average of 20 percent increase in weight of the fruit which occurs between the time that the first trace of color is apparent on the fruit and the time the fruit is fully colored.
The idea of growing plants in environmentally controlled areas has existed since Roman times. The Roman emperor Tiberius ate a cucumber-like vegetable daily. The Roman gardeners used artificial methods (similar to the greenhouse system) of growing to have it available for his table every day of the year. Cucumbers were planted in wheeled carts which were put in the sun daily, then taken inside to keep them warm at night. The cucumbers were stored under frames or in cucumber houses glazed with either oiled cloth known as "specularia" or with sheets of selenite (a.k.a. lapis specularis), according to the description by Pliny the Elder.

The first modern greenhouses were built in Italy in the thirteenth century to house the exotic plants that explorers brought back from the tropics. They were originally called giardini botanici (botanical gardens). The concept of greenhouses soon spread to the Netherlands and then England, along with the plants. Some of these early attempts required enormous amounts of work to enclose and had serious problems with providing adequate and balanced heat.

Greenhouse structures adapted in the 1960s were constructed of wide sheets of polyethylene film mounted on aluminum extrusions, special galvanized steel tubing, or even just lengths of steel or PVC water pipe.

Polyethylene film durability increased greatly when more effective inhibitors were developed and added in the 1970s. These UV inhibitors extended the usable life of the film from one or two years up to 3 and eventually 4 or more years. Today, greenhouses have two or more bays connected by a common wall, or row of support posts. Heating inputs were reduced as the ratio of floor area to roof area was increased substantially.

Kurt Nolte is an area agriculture agent with the Yuma County Cooperative Extension. He can be reached at 928-726-3904.