High Tunnels and Grafting




May 4, 2007 High Tunnel Tours, Celebration and Appreciation Day

What's going on down there in Field C2?

High tunnels are an exciting new addition to the CEFS landscape!

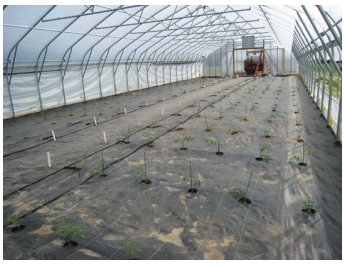
Two demonstration units were built on the Small Farm Unit in 2006 using funds from an Extension Small and Part-Time Farm grant and an Extension IPM grant. The two demonstration units were designed with slightly different features to emphasize cost savings vs. heat retention. Cool-season crops, including lettuce, broccoli and greens were successfully grown over winter, with the addition of warm season crops, like tomatoes, in the spring. Tomatoes survived early season frosts with the added protection of row covers.

Two large research units were constructed in the C2 field below the Small Farm Unit in a rush of activity this spring so that they could be ready for the 2007 research season. Original funding for tunnel construction came from a SR-SARE Research and Extension grant to Mary Peet and Frank Louws, although much-appreciated contributions in terms of guidance, labor, infrastructure and facilities, have been made by CEFS, Cherry Research Center, the O'Berry Center and NCA&T. The SR-SARE grant also supports the graduate studies of Cary Rivard, a Ph.D. student in Plant Pathology and Suzanne O'Connell, an M.S. student in Horticultural Science.

Why use high tunnels? These larger research units are part of a project to compare organic, high tunnel tomato yields, fruit quality, and nutrient uptake as well as susceptibility to disease, with those of adjacent field plots. The purpose of high tunnels is to give growers the ability to start crops earlier in the spring and grow them later in the fall. High tunnels give up to 5 degrees F frost protection, but row covers can be added in the tunnels to provide up to an additional 5 degree F of frost protection. Early crops will generally bring higher prices at local markets, and give growers an edge in attracting customers who may be loyal for the rest of the season as well. This season, tomatoes were planted March 20, April 3 and April 19 in the high tunnels. The comparison field crops

were planted April 19. Consistency in amount and quality and length of supply season are also important assets in most markets. Another advantage of tunnels is protecting crops from wind, rain and hail damage. Severe rainstorms in which several inches of rain fall in a day or even over the course of several hours, damage plants and can cause severe fruit cracking. High tunnels also offer protection from long periods of rainy weather and nighttime dew formation, conditions that encourage foliar diseases in field-grown crops.

Why graft tomatoes?



Another aspect of the research unit study is to compare the productivity, nutrient uptake and disease resistance of grafted and non-grafted tomatoes. Grafting is an area of research new to American vegetable growers, but widely practiced in Asia and the Mediterranean. Grafted tomato plants are also common in large commercial greenhouses. The purpose of grafting is to combine desirable traits from two different cultivars into a single plant. Usually the rootstock contributes resistance to soilborne diseases such as bacterial wilt, root knot nematodes, or specific races of Fusarium and verticillium wilt. A rootstock might also confer vigor, heat, cold or salinity tolerance or increased nutrient uptake efficiency. The scion, or top, contributes desirable fruit characteristics, such as size and flavor.

Grafting heirloom tomatoes is particularly promising because they often lack the disease resistances and vigor of modern hybrids. However, very little research has been conducted in the US on the actual field performance of grafted or self-grafted tomatoes and on the conditions where the added cost of grafted transplants (usually double) can be justified. For example, different training systems in which two stems are allowed to grow (double heading) may allow equal production in a given area from half the usual number of transplants.

In the main project, we will be looking at whether grafting improves the performance of Cherokee Purple, a popular heirloom tomato, which has consistently been a favorite of customers at the Carrboro Farmers' Market tomato tasting events. Grafted plants of Cherokee Purple will be exposed to 3 fertility levels to test the hypothesis that grafted plants have increased nutrient uptake efficiency. Each of these treatments will be replicated four times in the field and in the high tunnels and yield, disease resistance, and fruit quality characteristics measured. The tunnel replications will occur side-by-side within the two tunnels due to space and cost considerations, and the treatments in the field will follow the same design. For most of the treatments, grafted, self-grafted and non-grafted plants will be compared.

Other Grafting Studies at CEFS: How to train and what to graft together

Several smaller scale 'side' studies supporting the overall question of how grafting is best utilized in tomato production are being conducted. One of these studies is a comparison of various trellising styles. We also have small studies of additional rootstocks-scion combinations at the Small Farm Unit: D.Palmer, which confers Bacterial Wilt resistance and Big Power with the ability to make the plant less vegetative; and additional heirloom scions including Green Zebra, Yellow Brandywine, Pruden's Purple and German Johnson.

Thanks to all the hard workers who made this project possible!