

Evaluation of grafted tomato plants for heat stress and disease resistance

Personnel

Project Leader: Rick Heflebower, Horticulture Extension Agent

Collaborators: Tamara Mitchell, Master Gardener

Backyard Garden Nursery, professional green house and staff

Advisor: Dan Drost, Vegetable Specialist

Justification

Backyard gardeners as well as market growers struggle with tomato short life. We attribute most of this to Curly Top virus. Curly top is a serious disease affecting all the south west growing areas of the United States. Pesticides and row covers have been shown to reduce the number of infected plants in a given season, but no varieties have been found that have adequate resistance to prevent infection. Recently, tomato rootstocks have been used to help prevent certain diseases, i.e. *Verticillium*, *Fusarium* and Crown rot. There is some indication that rootstocks may also increase vigor in the south east where it is hot and wet.

Objectives

Two rootstocks, 'Maxifort' and 'Beaufort' are commercially available. I would like to graft several popular varieties to these two rootstocks and look at their resistance to curly top and their ability to handle heat stress.

Procedures

Purchase 'Maxifort' and 'Beaufort' seeds from Johnny Select to be used as rootstocks. Purchase Celebrity, Goliath, Mountain Fresh, Shady Lady, and Phoenix seeds from Harris to be used as scion varieties.

Plant scion varieties in greenhouse 5-7 days ahead of rootstock varieties (Maxifort and Beaufort are more vigorous and require less growing time).

Build a small growing chamber inside a commercial greenhouse (with cooperation from "Backyard Garden Nursery") to allow for light reduction and misting after grafting. This would be a smaller enclosed area inside of existing green house where misters would be added and additional shade cloth.

Graft scion varieties on to rootstocks when seedlings are approximately 4 inches tall. Use "tubes" to secure graft, and place in growing chamber. After 4 days check for healing and begin to acclimate to green house. After another 3-4 days place back in green house to allow growing to full size.

After 6-7 weeks growing time mature grafted plants will be set in the field. Two locations have been selected; at Tamara Mitchell's near St. George (2,700 ft elevation) and the other at my home in New Harmony (5,000 ft. elevation). This gives us two very different growing conditions to test plants under.

Educational Outputs

I would develop a power point demonstrating how to graft tomatoes and the potential advantages of planting grafted tomato varieties. This could be accessed by other agents as well as Master Gardeners, commercial, and home growers.

Presentations will be given at The Western Region Agricultural Agents Meeting and the Utah Association of County Agricultural Agents Meetings in 2012.

Timeline

February- purchase seed, and "tubes" for making grafts. Construct growth chamber inside of greenhouse.

March 1- sow rootstock and scion tomato varieties

March 21 make grafts, March 25-30 place in growth chamber, April 1 return to green house.

April 15-20 plant mature grafted plants in the field at the St. George location. The process will be repeated beginning April 1 for the New Harmony location. Plant should be ready to set in the field around May 15-20. "Control plants" (ungrafted) of same varieties will also be included at both locations for comparison.

Evaluation

Plants will be evaluated using the following criteria; Size, bloom date, yield, mortality and cause of death.

Budget

Planting Supplies

Tomato Seed	\$40
Trays	\$15
Growing Media	\$50
Grafting tubes	\$10
Fertilizer	\$20
Control plants	\$60

Growth Chamber Materials

Wood (framing)	\$150
Clear Plastic	\$70
Shade Cloth	\$50
Irrigation tubing and misters	\$80

Travel

Airfare to National Meeting	\$300
Also meals \$100, hotel \$225	\$325
Handouts	\$80

Total \$1,250

References

Grafted Techniques for Greenhouse Tomatoes. University of Connecticut on line factsheet, <http://www.hort.uconn.edu/ipm/greenhs/htms/Tomgraft.htm>

New Introductions Debuting in 2012, Horticulture Magazine, pp 22.

Tomato Grafting for Disease Resistance and Increased Productivity, SARE Factsheet No. 12AGI2011.