

Grafting Tomatoes

By Valerie Rose

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Grafting tomatoes for fun and hardiness; ancient method, new technique

Grafting vegetables? To me this is a new idea, but it's been practiced for over two millennia. (I have a lot of catching up to do.) The Asian pear tree in my yard has five varieties of the fruit grafted onto a pear tree trunk. But for grafting vegetables, the source of the rootstock is beheaded and attached to the top of another plant, called the scion. The grafted plant will produce the desired vegetable. It's the best of both worlds (or plants) combining simple tools and special cultivation techniques.

Research on vegetable grafting is taking place here in Skagit County, led by Dr. Carol Miles, vegetable scientist at the WSU Mount Vernon Northwestern Washington Research and Extension Center. Sacha Johnson is the WSU graduate student working on this important project. She said the roots of grafting reach back to ancient agriculture. "Vegetable grafting actually dates back to 5 A.D.," Johnson said. "Chinese texts from 5 A.D. were found describing grafting gourds. Similar gourd grafting techniques were described in Korea in the 1600s." Now fast forward to the last century. Johnson said, "Grafting really grew in popularity beginning in the 1920s, when Japanese watermelon farmers began grafting onto squash rootstock. This quickly spread to Korea (which was occupied by Japan at the time) and the rest of Asia."

At the same time vegetable grafting began in the U.S. Johnson said, "In the 1920s, extension agents in the southeastern U.S. experimented with grafting tomatoes and peppers onto weeds in the nightshade family, such as Jimsonweed. Jimsonweed is poisonous, and grafting was abandoned when researchers found toxic alkaloid accumulation in the tomato fruit of tomato plants grafted onto Jimsonweed rootstock. Tomato and eggplant grafting began to be used in commercial production in the 1950s in Asia, and now accounts for 80-90% of tomato and eggplant production in Asia. Commercial production has spread to central Asia and the Mediterranean region."

A Safe Alternative to Methyl Bromide

Researchers have found that grafting plants onto the right rootstock can be effective against fungal, bacterial, viral, and nematode diseases. Grafting is an environmentally safe alternative to fumigating the soil with methyl bromide, a widespread practice that kills both harmful pathogens and beneficial soil life. The use of methyl bromide is being phased out in developed countries, and the use of grafted vegetable starts is increasing. Johnson said this technique can be very helpful to Skagit farmers. "If growers have a soil-borne disease problem, grafting onto disease resistant rootstocks can provide an organic alternative to soil fumigation. Soil-borne diseases

become problematic in production systems with low rotation. This is common in high tunnel or hoop house structures. Tomatoes are commonly grown in hoop houses in the Skagit due to late blight problems, often with little or no rotation. Grafting vegetables onto vigorous rootstocks can increase yield, vigor and tolerance to environmental stresses such as soil temperature extremes and soil salinity.”

Vegetable grafting is primarily used for growing muskmelon, watermelon, cucumber, tomato, and eggplant. In areas of flooding or waterlogged soils, some growers use eggplant rootstock, which can survive for days under water! Tomatoes are currently the primary focus for northwest farmers. ”Here in the Skagit Valley, Hedlin Farms has done some tomato grafting in the past few years,” Johnson said. “Over 95% of hothouse tomato production in B.C. is grafted tomatoes. These hothouse tomato growers have difficulty regulating summer temperatures. They have found that grafted tomato plants tolerate heat stress much better than non-grafted tomato plants.”

Johnson said her research uses rootstock that is resistant to Verticillium wilt, a common problem for tomato growers in our damp climate. “We are working with 'Maxifort' and 'Beaufort', two widely used commercial rootstocks. These rootstocks have been bred for disease resistance and vigor.” Johnson is also investigating whether grafting can help northwest tomato growers increase yields in heirloom tomatoes. I certainly hope so – heirloom varieties are bred for flavor, not marathon travel. If grafting helps create more delicious heirloom tomatoes, we tomato gardeners can learn to graft an heirloom scion onto a hearty rootstock.



WSU graduate student Sacha Johnson and Research Technician Patti Kreider happily grafting tomato plants. **Photo by Matt Wallis.**



Graft cut for splice grafting technique; scion and rootstock are cut at matching 45 degree angles. **Photo by Sacha Johnson.**

Do Try This At Home

“Tomato grafting is actually really easy and tomato plants are amazingly forgiving,” Johnson said. ”It takes about seven days for the graft union to heal, that is, for the xylem vessels of the rootstock and scion to connect allowing water transport from the roots to the leaves. Because vegetables lose water easily, it is important to minimize transpiration (water loss from leaves) for the first seven days following grafting.” Plants lose moisture during photosynthesis, which requires light. By shading grafted plants in a structure called a healing chamber, and maintaining high relative humidity, the graft will heal and the plant can grow.

It sounds great - but I don't have a well-equipped research lab or a professional greenhouse. Can a home gardener really do this? Johnson thinks so. She said, "We did a study looking at different humidity environments on grafted eggplant, watermelon and tomato. We constructed three healing chambers. The first was covered in shade-cloth, plastic and a humidifier that misted plants for 20 seconds every 5 minutes. The second was shade-cloth and plastic that we misted every three days. The third was just shade cloth. We got 85% survival of tomato plants with just shade cloth. This is good proof that any home gardener could have success with grafting."

OK, I can handle shade cloth. Johnson said their website has information on grafting supplies, even how-to videos, at <http://vegetables.wsu.edu/graftingVegetables.html> . This year you may want to be adventurous and try grafting your favorite heirloom tomatoes. Now if only we could graft some perfect growing conditions onto the weather...!



Grafting clip is slipped onto rootstock, and scion is slipped into a grafting slip so the cut surfaces are in close contact. **Photo by Sacha Johnson.**



Cut surfaces of scion and rootstock are held tightly in contact by a grafting clip. **Photo by Sacha Johnson.**