



# How to Graft Tomatoes

Grafting of Tomatoes for Soil-Based Production in Greenhouses and High Tunnels

## INTRODUCTION

As soil based production continues in tunnels and greenhouses, risk of root-zone diseases, insects, nematodes and soil nutrient deficiencies increase. Grafting, the combination of two separate cultivars into one plant, is one management approach to these challenges.

Grafting in our studies has significantly increased tomato yields. Labor, greenhouse time and materials however increase the cost of grafted transplants. Therefore to be profitable with this technique, a high graft survival rate is required. Key steps for success in the grafting process follow.

## GRAFTING

Choose a commercial rootstock and your own preferred scion (top portion). Seed rootstock 2-3 days before scion. Seed an extra 25-50% of rootstock seed to be sure to have plenty to choose from when looking at stem diameter. The actual amount needed will depend on if one or two growing points are developed from each grafted plant. Start seeds in open flats then transplant to cells to ensure uniformity. At the 2-true leaf stage, it's time to graft (about 4-5 weeks after seeding).

Line up the rootstock and scions at the point on the stem with the best diameter match above the cotyledons. Using a sterile razor, at approximately a 45° angle, cut through both stems at the same time to ensure that the cut is true across both plants.

Join the bottom portion of the rootstock with the top portion of the scion using a silicon grafting clip. Double check there is no gap at the graft union. Now you have your new plant.

Mist the plant with water to reduce the transpiration stress on the new plant. It is crucial to keep the foliage moist until the graft union has healed.

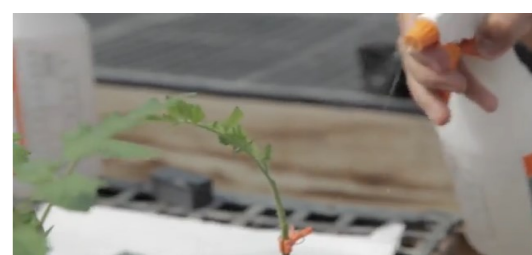
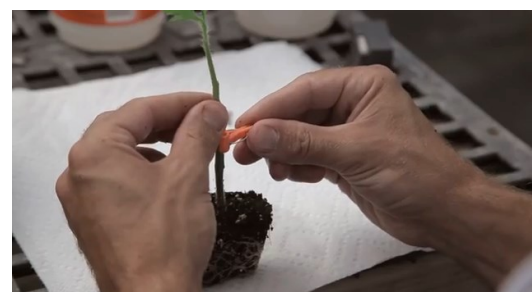
Your plant is now ready to go in the healing chamber. It is best to work in small batches of 4-6 plants that go immediately into the chamber to avoid stress. Be sure not to jostle the plants as air gaps can develop at the graft union.

### Common Rootstocks:

- Maxifort
- Beaufort
- Colosus

### Common Scions:

- Panzer
- Geronimo
- Rebelski



GRAFTING



## HEALING

### HEALING

Mist grafted plants again and immediately place them in a completely darkened healing chamber. Maintain 100% relative humidity and temperature of 75-80°F.



After 3 days in a darkened healing chamber, acclimate the grafted plants by gradually introducing ambient light and reducing relative humidity. For example, on the fourth day after grafting, the doors to the healing chamber could be opened for several hours then closed to allow the plants to recover. Each day increase exposure to ambient light and humidity. Some wilting is normal.

Mist the plants at the first sign of wilting. Aim for complete healing by day 8-10 post graft.

## GROWING

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Prepare tunnel/greenhouse soil with a high fertility demand in mind. Soil test with a sharp eye for P, K, Mg, Ca and pH levels. Apply the above in addition to N. This is particularly important in organic settings where nearly 100% of the required N should be applied pre-plant.



Transplant grafted plants as soon as the graft is completely healed. Keep the graft well above the soil line as scion roots may develop otherwise. Scion roots would defeat the purpose of grafting as the scion will not have the same disease resistance and vigor of the rootstock. It is equally important to prune out any rootstock shoot growth. These shoots compete with the scion for plant nutrient and will not produce desirable fruit.



Prune to either 1 or 2 growing points on indeterminate varieties. Our studies show that 2 growing points is effective at managing excess rootstock vigor. If pruning to two leaders, each should be given 5 sq ft growing space.

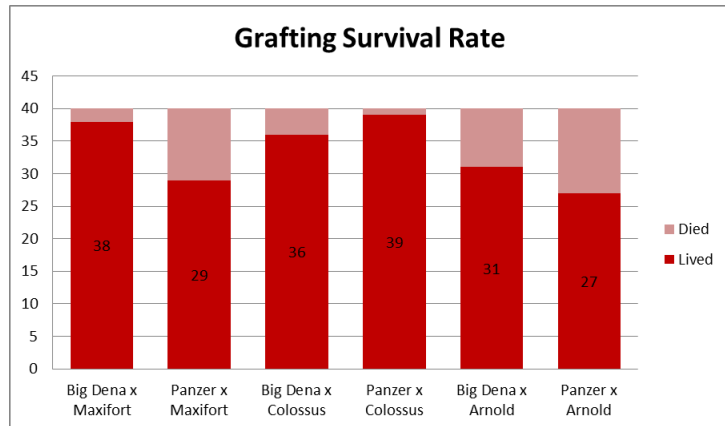
Plants can be pinched (topped) to develop two equally strong growing points, or allowed one sucker as a secondary growing point. Each growing point should be trellised separately.



## CONCLUSIONS

Economics of grafting are favorable based on several years of Cornell Vegetable Program research. For example, the estimated cost of a Maxifort (a common rootstock) X Panzer (a popular scion) is \$1.50/plant versus an ungrafted Panzer at \$0.36/plant. With a mean increase of 4.7 pounds per plant, the break-even price required is \$0.24 per pound.

Our limited experience with determinate varieties has re-directed us to indeterminate varieties. The indeterminate production system allows for more pruning which harnesses the rootstock vigor. Left unchecked, as in determinate production, excess foliage can actually increase disease incidence.



**Chart 1. Survival rates out of 40 plants per six rootstock/scion combinations in a Cornell Vegetable Program research trial. There are many other combinations that could be made.**

**Table 1. Yield measures of two tomato varieties ungrafted and grafted to three different rootstocks.**

	Mean Fruit Weight (lbs)	Total Fruit per Plant	Mean Plant Yield (lbs)
<b>Big Dena (ungrafted)</b>	0.64 bc	38.31 c	24.54 cd
<b>Big Dena x Maxifort</b>	0.70 a	43.69 ab	30.60 a
<b>Big Dena x Colossus</b>	0.68 ab	39.69 bc	26.80 bcd
<b>Big Dena x Arnold</b>	0.72 a	37.56 c	26.85 bc
<b>Panzer (ungrafted)</b>	0.55 e	44.58 a	24.42 d
<b>Panzer x Maxifort</b>	0.62 cd	47.19 a	29.16 ab
<b>Panzer x Colossus</b>	0.60 cde	47.00 a	28.11 b
<b>Panzer x Arnold</b>	0.58 de	47.88 a	27.61 b
<b>p-Value</b>	<b>0.0000</b>	<b>0.0001</b>	<b>0.0003</b>

\*Means with different letters (grouping) differ significantly according to Fishers's Protected LSD (P<0.05).

## SOURCES FOR GRAFTING SUPPLIES

Harris Seed Company • Hydro-gardens.com • Johnny's Selected Seeds

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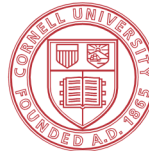
Graphic design by Angela Parr.

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