Top-Grafting Starter Kit Instructions

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Top-grafting involves attaching the top of a desired variety (the scion) to the bottom of a more vigorous variety (the rootstock) and allowing the graft to heal, creating an individual plant with certain characteristics of both varieties. Grafting desirable fruiting varieties to vigorous, disease-resistant rootstocks is a cost-effective method for growers to overcome many diseases and production-related issues. Grafting can improve overall crop health, plant vigor, increase yields, lengthen harvest duration, and reduce or eliminate the need for pesticide use. On average, it takes 6–8 weeks to complete the entire process, from sowing of rootstock and scion varieties to transplanting of the grafted plants into the field or greenhouse.



To learn more, visit our Grafting Library at hensleyseeds.com

MATERIALS INCLUDED

- Miter-Cut Grafting Knife
- (200 each) 1.5mm, 2.2mm, and 2.8mm food-grade silicone Top-Grafting Clips with Cannels
  ***Note**: Grafting clip sizes are subject to change, depending upon availability.*
- (400) Grafting Support Stakes
- (5) 7" Clear Propagation Domes
- (10) 72-Cell Plug Flats
- (5) Shallow White Leakproof Trays
- Professional-grade Chapin 48-oz. Hand Sprayer

ADDITIONAL MATERIALS NEEDED

- Your preferred growing medium
- Seeds of a rootstock variety
- Seeds of a scion variety
- Disinfectant, such as a 1:10 bleach solution

When Purchasing Seed, Factor in the Extra Number of Seedlings You Will Need

Rootstock: Although seed vigor and germination of rootstock varieties has improved in recent years, rootstock varieties tend to emerge at lower percentages and less uniformly than scion seed. Most rootstocks are crosses between two different species, which increases hybrid vigor but decreases germination percentage and uniformity. For these reasons, you will want to seed 20% more rootstock seedlings than scion seedlings.

Scion: To ensure you have enough scion seedlings of the appropriate size and quality at grafting time, it is necessary to sow more scion seeds than the number of desired grafted plants.

Plants: The grafted plants may not have 100% survival rate, so be sure to graft more plants than are needed.

Germination Testing

Rates of germination and growth vary between rootstocks, scions, varieties, and even seed lots. Additionally, graft union tissue heals more readily when the stem diameters of the rootstock and scion are approximately equal, which is why we recommend performing a germination test on each variety you plan to graft.

To perform germination testing, sow 10 seeds of each rootstock and scion variety you intend to graft and grow them for 2–3 weeks.

As they grow, observe the germination and growth rate, and take note of environmental factors such as temperature, light, and humidity in case you need to adjustment or replicate conditions.

The information you collect will help you schedule the planting date of each variety to ensure that stem diameters are approximately equal.

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SEEDING

1. Using the information learned from germination testing, sow the rootstock and scion varieties into the 72-Cell Plug Flats 6–8 weeks before your desired transplant date.

   Tip: *Because growth is paused during the healing process, grafted plants take 1–2 weeks longer than nongrafted seedlings to reach transplant size.*

2. Water the freshly seeded flats, place them in the Leakproof Trays, and cover them with the Clear Propagation Domes.
3. Once seeded, maintain the flats at a consistent soil temperature of 85°F (29°C) using a heat mat with a thermostat.

PREPARING TO GRAFT

1. Plants will be ready to graft approximately 17–21 days after sowing. An easy way to tell if your plants are the right size is to place a grafting clip on the stem of a seedling. When it fits snugly, it is time.
2. Bottom-water your seedlings thoroughly 8–12 hours before grafting.

   Tip: *Roots that are too wet will draw too much moisture up the cut stem, dislodging the scion and reducing the number of successful grafts. If rootstocks are dry during grafting, stop and water them, then resume grafting the following day.*

3. To avoid transferring pathogens to your plants, sanitize your work area, tools, and Top-Grafting Clips with a disinfectant.

GRAFTING

1. Select a rootstock seedling with a stem diameter that matches the inside of your clip and cut off the top just below the cotyledons using the Miter-Cut Grafting Knife (see Figure 1). Discard the top.

   The Miter-Cut Grafting Knife will allow you to cut the stems at the proper angle, making every cut uniform.

2. Select a scion seedling with a stem diameter matching that of the rootstock you will be grafting it to and cut off the top below the cotyledons at a matching angle (see Figure 2). Discard the root ball.
3. Place a Top-Grafting Clip halfway over the cut scion stem (see Figure 3), then join it to a cut rootstock stem so the cuts match up (see Figure 4).

   Tip: *When the two stems are firmly connected a visible water seal should form around the union. Air or dirt trapped between the cut surfaces will deter the union tissue from healing.*

4. Gently slide the support stake down into the tube-shaped channel on the grafting clip and secure it by pushing the base down into the growing medium far enough to prevent the plant stem from shifting (see Figure 5).
5. As soon as you are done grafting a tray, mist the plants and the inside of the Clear Propagation Dome, which will function as a healing chamber.

   Tip: *To graft large numbers of plants quickly, grade your rootstocks and scions by size and group the seedlings in plug flats by similar stem diameters, so you have whole flats of rootstocks and scions that match each other. Next, cut an entire flat of rootstocks and place grafting clips on all the rootstock stubs. Then cut an entire flat of scions, placing their cut stems into a small container of sterile water to keep them moist while you are cutting. Attach all the tops to the prepared rootstocks and move to the next pair of trays.*



Figure 1. Cutting the top off the rootstock.



Figure 2. The rootstock ready for scion to be grafted.



Figure 3. Placing the grafting clip on the scion.



Figure 4. Securing the scion to the rootstock.



Figure 5. Newly grafted plants secured for the healing phase.

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HEALING

1. Keep the dome vents closed for 3 days and maintain an environment of 80–95% humidity at 70–80°F (21–26°C).
2. The plants must be kept in complete darkness for the first 24 hours after grafting. After 24 hours, gently prepare the plants by exposing them to soft, indirect sunlight or artificial lighting (equivalent to 540–740 foot-candles) for 2 days.

   Tip: *Direct sunlight or strong indirect sunlight may cause the healing chambers to heat up excessively.*
3. Check the plants without lifting the dome. If they appear to be wilting, raise the humidity level by misting them then immediately reclosing the chambers/domes.
4. On day 4, open each dome and check the growing medium to determine whether it is still moist. The plants will not use much water during this time and should not need to be watered yet. Keep trays covered with domes.
5. On day 5, make a small opening in the vents on the domes so that the humidity can begin to slowly evaporate, and check the plants frequently. If they wilt, close the vents, re-elevate the humidity, and try ventilating again the next day.
6. If the plants did not wilt when ventilated on day 5, open the vents a little more on day 6. Gradually increase ventilation until you can remove the plastic domes completely without the plants wilting.



Figure 6. The plug flat of top-grafted plants inside the healing chamber.

7. Gradually bring the grafted plants to normal greenhouse temperature and humidity but return to the previous conditions if they start to wilt.

   Tip: *High humidity conditions cannot be maintained indefinitely, or the scion could grow adventitious roots and not fuse with the rootstock.*
8. Bottom-water in the leakproof trays if the growing mix begins to dry out during the healing process.
9. As the plants grow, the silicone clips will expand and eventually fall off by themselves. After the plants have reacclimated to greenhouse conditions for a few days they are ready for normal handling.

TRANSPLANTING

1. When transplanting, make sure the plant's graft union lies above the soil line, or the scion variety could root into the ground and negate the benefits of the rootstock.
2. Prune off any suckers that develop below the graft union, as these derive from the rootstock.
3. Consider planting at wider spacing than you might use with nongrafted plants, permitting more leaders to grow per plant, and make other modifications in fertility and crop care to maximize the benefits and economics of your grafted tomatoes.

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