Side-Grafting Starter Kit Instruction Manual

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Grafting desirable fruiting varieties to vigorous, disease-resistant rootstocks has become a cost-effective method for growers to overcome many disease and production-related issues. Grafting can improve production, overall crop health, and vigor; reduce or eliminate the need for pesticide use; lengthen harvest duration; and significantly increase net income. The entire process from sowing of rootstock and scion varieties to final transplanting of grafted plants into greenhouse soil or soilless medium normally takes 6–8 weeks.

The major advantage of side grafting is that this method is more forgiving of differing stem diameters than top grafting. This being said, getting a perfect match is not necessary, but the closer the two stems are to the same size, the better your chance of success. The disadvantage of side grafting is that it is more time-consuming to complete an individual graft and requires more materials than top grafting. If you are going to be grafting a large number of plants, top grafting may be advantageous, unless you already have plants whose stems don't match.

Kit Contents:

- Spare Blades for the Miter-Cut Grafting Knife.
- Chapin 48-Oz. Hand Sprayer.
- (200) Spring-Loaded Side-Grafting Clips.
- (5) Large Clear Propagation Domes.
- (5) 72-Cell Plug Flats.
- (90) 3½" Square Pots.
- (5) Lightweight Mesh Trays.
- (5) Shallow White Leakproof Trays.

In addition to the kit contents, you will need: your preferred growing medium; seeds of a rootstock variety; seeds of a scion variety; and a disinfectant, such as Virkon® or a 1:10 bleach solution.



PLANTING:

Germination testing:

Do a germination test on each variety you plan to graft to observe the speed of germination and growth of the rootstock compared to the scion in your particular growing environment. Sometimes the rate of growth varies between rootstock and scion depending on growing conditions. The closer the diameters of the stems, the better chance you will have of a successful graft forming and healing.

Sow into the 72-cell plug flats 6–8 weeks before your desired transplant date. Grafted plants take 1–2 weeks longer to reach the transplant stage because they stop growing during the healing process. Over seed by at least 25% more than the number of plants you plan to transplant. Most rootstocks are interspecific crosses (the product of traditional plant breeding crossing a domesticated variety with a wild variety); this wide cross increases hybrid vigor but decreases germination percentage and uniformity.

If you test the varieties you will be growing for germination and growth rate, slower germinating or slow-growing varieties can be planted earlier, and faster growing varieties can be planted 1–2 days later so the diameter of the stalks match as closely as possible at grafting time and increase the chances of success. If this is not possible, most rootstock and scion varieties can be planted on the same day.

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Place the seeded flats into the leakproof trays to provide extra support for while moving the flats from one location to another. Additionally, the trays allow for bottom watering of the rootstock varieties both prior to and following grafting.

Maintain a steady 80°F/27°C temperature by using a germination chamber or heat mats with a soil probe. Water the flats, cover them to conserve moisture, and germination should begin to occur within 3–4 days. To avoid leggy seedlings, move the trays to an environment with the same temperature and good light as soon as germination begins.

Once the seeds have germinated, after about 10 days, reduce the temperature to 64–66°F/18–19°C to encourage a stocky growth habit. Make sure plants have plenty of direct light and keep close track of their progress because they are growing quickly and will exceed the optimal size to graft in a very short time.

GRAFTING:

Plants are ready to graft approximately 17–21 days after sowing. Larger seedlings are generally used for side grafting because it is easier to make the necessary incisions on a larger stem. With a larger seedling, there is also more surface area for the tissue from the separate plants to connect.

You will need to prepare a clean area, such as a work bench, with no direct sunlight to do the cutting. An indoor area works well because the climate is more controllable, but an area in a greenhouse that is shaded and not too hot, 70–74°F/21–23°C, will work. Do not graft near a fan or draft.

Practicing grafting:

If you have never grafted before, or need to get back in practice, the best way to succeed is to plant some old seeds and practice with expendable plants. That way if the grafts don't take, you can analyze your technique and make improvements without setback.

Hygiene:

Hygiene is very important during grafting because if you pick up a pathogen on your hands or equipment, you may transfer it to all of your plants. Do not smoke during grafting or near recently grafted plants due to risk of Tobacco Mosaic Virus. Wash your work area down with a disinfectant before grafting. Always start with new blades and grafting clips.

Prepare the healing chamber that will protect the plants until the graft has taken and keep the newly grafted plants in a high-humidity, low-light environment so they do not respire too much and dry out before the vascular structure is reconnected. The clear propagation domes fit directly onto the 72-cell plug flats and the vents in the domes allow for ventilating the grafted plants while they are healing. If possible, set up the healing chambers in the grafting location to prevent the plants being moved while they are still fragile.

Give your plants a normal watering the day before, but not the day of grafting. Roots that are really wet will have too much moisture going up the stem, which can push the scion off and reduce the percentage of successful grafts. On the other hand, if you realize that the rootstocks are really dry as you are grafting them, stop grafting, water them, and resume grafting the next day because dry rootstocks will not survive.

First you will need to defoliate the plants. Defoliation will allow the plant to put more energy into healing after the graft has been made. Take a plant of your rootstock variety and a plant of your scion variety, both with stems of similar sizes. First with a spare blade of the Miter-Cut Grafting Knife, remove the lower leaves of each plant, then cut the top off of the rootstock variety.

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Selecting a rootstock and scion of similar size



Defoliating



Result of defoliation

Still with the spare blade, make an upward cut ⅔ of the way through the stem near the top of the rootstock. Then make a downward incision on the scion variety at approximately the same height, ⅔ of the way through the scion's stem. Fit the incisions together with the rootstock's stem inserted into the incision on the scion's stem and place a spring-loaded side-grafting clip over the incision locations. Place grafted plants in one of the 3½" square pots. They will need to be as close together as possible to place less stress on the plants as they heal. Fill in the pot with the growing medium of your choice.



Making the incision on the scion variety.



Lining up the incisions.



Fitting the incisions together.



Securing the plants together with a spring-loaded side-grafting clip.



Placing the grafted plants in the same pot.

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Place all of your pots into a lightweight mesh tray, then place this tray into a shallow white leakproof tray. By doing this you will be able to bottom water with the shallow white leakproof tray, but still be able to remove all of the 3½" square pots at once to prevent them from getting over-saturated with water.
At this time you will leave the plants connected, so there are 2 sets of roots and only the canopy of the scion connected at the graft union. Place a large clear propagation dome over the top to serve as the healing chamber. Spray the interior of the dome and the plants with the handheld sprayer and move them to your healing chamber, which will achieve the light, temperature, and humidity requirements of healing plants.

HEALING:
Keep the vents on the dome closed and maintain the healing chamber at 80–95% humidity and at a temperature of 80–82°F/26–27°C. Indirect sunlight (light shining in a window of the same room, as long as it does not fall directly on the plants) or artificial lighting is fine. Direct sunlight or strong indirect sunlight may cause the healing chamber to heat up excessively, or cause the grafted plants to lean towards the light, pulling the graft apart. Check the plants from the outside of the dome. If they are wilting, raise the humidity level and reclose the chamber.

WEANING:
After 3 days in the healing chamber, remove the domes and prepare to sever the scion variety's root system in steps. It is done in this manner to wean the grafted plant off of the second root system and prevent shocking the plant. Before cutting, attach the plants to a stake to help stabilize them and keep them upright. Then take a spare knife blade and cut only part way through the scion variety's stem. Replace the dome of the healing chamber and wait 2 more days before cutting the rest of the way through the stem.


A partial cut after healing for 3 days


Fully cut 2 days after that

Once the scion root system has been severed, you may put the plants back in normal greenhouse conditions. It is a good idea to reintroduce the grafted plants to the greenhouse in the evening or on a cloudy day, to give them a chance to re-acclimate to growing conditions. If they wilt, put the domes back on and give them a little more recovery time before reintroducing to the greenhouse.

The key is to gradually bring the grafted plants to normal greenhouse temperature and humidity, but return to the previous conditions if they start to wilt. High-humidity conditions cannot be maintained indefinitely, or the scion may grow adventitious roots of its own and not fuse with the rootstock.

If flats need to be watered during the healing process, use bottom watering in the leakproof trays. Top watering before the plants are healed may knock the tops off. Eventually, the seedlings will be strong enough to top water again. After the plants have re-acclimated to greenhouse conditions for a few days they are ready for normal handling.

At transplanting, make sure the graft union is above the soil line, or the scion variety may root into the ground and negate the benefits of the rootstock. Prune off any suckers that develop below the graft union, as these are from the rootstock. Otherwise, manage the plant as you would normally. REV 02/23/2017 RC, MN

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