Top-Grafting Starter Kit Instruction Manual

7212.999

955 Benton Ave., Winslow, ME 04901 • Phone: 1-877-564-6697 • Fax: 1-800-738-6314
Email: service@johnnyseeds.com • Web Site: Johnnyseeds.com

Top-grafting involves attaching the top of your desired variety (the scion) to the bottom of a more vigorous variety (the rootstock). 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 media normally takes 6–8 weeks.

Kit Contents:

- Miter-Cut Grafting Knife.
- Chapin 48 Oz. Hand Sprayer.
- (200) 2.0 mm Silicone Grafting Clips.
- (5) Large Clear Propagation Domes.
- (10) 72-Cell Plug Flats.
- (5) Shallow White Leakproof Trays.

In addition to the kit contents you will need: your preferred growing media; 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:

You may want to perform 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 stems of rootstock and scion need to be as close as possible to the same diameter for successful grafting.

Sow seed 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 a 1–2 days later so the diameter of the stalks match up at grafting time. If this is not possible, most rootstock and scion varieties can be planted on the same day.

Place the seeded flats into the leakproof trays to provide extra support for when you are 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 to achieve this. 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 will be ready to graft approximately 17–21 days after sowing. The best way to tell if your plants are the right size is to put a grafting clip on the stem of a seedling. When it fits snugly, it is time.

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.

Take a plant of the rootstock variety with stem diameter that matches your clips and sever the top with the Miter-Cut Grafting Knife just below the cotyledons. The knife will miter the stem to the proper angle, making every cut the same. Discard the top. Find a scion whose stem diameter matches the rootstock you cut, and sever the top below the cotyledons in the same manner, at a matching angle. Discard the scion's root ball.


A plant ready to graft.

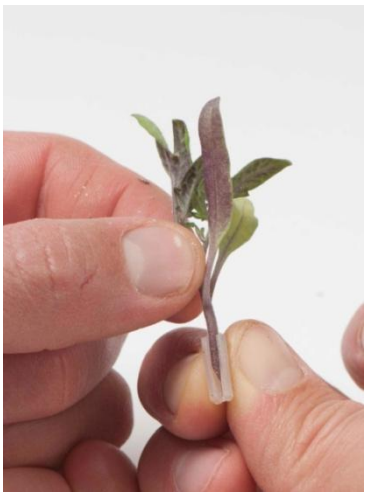

Cutting.


With the top severed.

At this point, some people like to cut all the leaves off the scion except the leaf at the growing point. This is to reduce respiration and the amount of leaf area for the healing plant to support. If you decide to defoliate the plants, you will also need some old-fashioned, double-edged razor blades, or a couple of spare blades of the grafting knife. Some people prefer not to defoliate, and it's certainly faster without this extra step. Experiment and see which method you prefer**,** but either method can work well. Defoliated plants can be easier to handle if the scion seedling is very leafy.

Place a grafting clip half way over one of the cut stems; then join to the other stem so the cuts match up. One advantage of the silicone clip is that you can see through it to make sure the cut surfaces match up. Air or dirt between the cut surfaces will prevent the graft from healing.

Once the grafting clip is in place, return the plant to the plug flat it grew in or place it in an unused flat.


Placing the scion in the clip.


Joining scion and rootstock.


Finished graft.

If the scion has grown larger than the rootstock, you can move up above the cotyledon on the scion to acquire a smaller, matching cut surface. Likewise, if the rootstock is larger than the scion, you can move up above the cotyledons on the rootstock for a smaller stem diameter. If you have to move up above the cotyledons on the rootstock, the rootstock may re-sprout from latent buds, which will have to be pruned off later.

Once you feel proficient at this, the fastest way to graft many plants is to have the plants graded by size, so you have whole flats of rootstocks and scions that match each other. Cut an entire flat of rootstocks and put grafting clips on all the rootstock stubs. Then cut an entire flat of scions, putting them in a small container of sterile water to keep them moist while you are cutting, and then attach all the tops to the prepared rootstocks at once. Change blades each time you begin a new session, or when they become dull.

If it is hotter or drier than ideal in your grafting environment, you may want to mist the plants with the spray bottle. Be gentle — a powerful spray can knock the tops of the grafted plants off. As soon as you are done grafting a tray, you can either mist the plants and the inside of the healing chamber with the spray bottle to raise the humidity, or use a cool mist humidifier to put humidity right into your chamber. A humidifier is preferred for healing chambers that are larger than a single dome because they can produce more mist than a spray bottle.

HEALING:

Once you have put the plants in the healing chamber, keep the vents on the dome closed for 3 days and maintain it at 80–95% humidity, at 80–82°F/26–27°C, and in the dark for 24 hours. After 24 hours, use soft light equivalent to 540–740 foot candles, which is equivalent to using a grow light with four T12 fluorescent grow tubes with two of the tubes removed (half power).

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.

On the fourth day, open the dome and check to see if the plants are still moist. The plants will not use much water during this time and should not need watering yet. Close the dome once you are done.

On the fifth day, make a small opening in the vents on the dome so that some of the humidity can start to escape, and check the plants frequently. If they wilt, close the vents back up, re-elevate the humidity, and try ventilating again the next day. If the plants did not wilt when ventilated on day five, make the vent opening a little larger on day six. Gradually increase ventilation until you can take the plastic dome off completely without the plants wilting.

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 you placed the flats in before grafting. 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.

Silicone clips will expand with the growth of the plant and eventually fall off by themselves.

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 10/28/2016 RC