



NAVCDP

NATIONAL AGRICULTURAL VALUE CHAIN
DEVELOPMENT PROJECT

GRAFTING IN TOMATO SEEDLINGS





Introduction

Grafting has been used as one of the methods to help in the control of soil borne pathogens attacking tomatoes. Tomato scions of desirable characteristics are selected on rootstocks that are resistant to soil borne diseases or that have desirable root systems. The result is a crop with better qualities than non-grafted in control of soil borne pathogens.

Grafted tomatoes sell at a high price per seedling owing to the technology and risks involved but the returns are worth the expense. Most people therefore prefer to graft their own tomatoes. However, the information on the techniques of grafting are not widespread among farmers and thus success rates are still low. To enhance the use of this method widely, it is necessary to disseminate key information further through training and outreach.

Raising healthy seedlings Scion (pre-graft)

- Follow the steps of seedling production
- Provide optimum conditions of growth for the tomato and rootstock seeds.
- Do not graft plants that show disease symptoms or are severely stressed during germination and early growth.
- Uniform seeds highly increase the efficiency of grafting.
- Rootstocks and scions should have similar stem diameters at the time of grafting.



Estimate the time needed for the scion and stock to grow at the required rates.

Raising healthy seedlings Rootstock (pre-graft)

- Plants at a younger stage are the best since they heal faster and require less stringent conditions for post-graft plant healing. However, tomatoes can be grafted at different stages of growth.

- Minimum recommended diameter for rootstock and scion is 1.5 millimeters.
- Grafting requires silicone grafting clips, which come in diameters from 1.5 to 3.0 millimetres. Clips are better than grafting tapes given the delicate nature of young tomato seedlings.
- Tomatoes need 2-3 weeks to reach a stem size of 1.5 to 2 millimetres after sowing. The best way to determine if the timing is right to graft is to put a grafting clip on the stem. If it fits tightly, the plants are ready to graft
- Grafting knives do great work but are expensive, the alternative is a razor blade. Sanitize when moving from one graft to another to avoid contamination.
- Splice grafting is the best technique, but V-shape cuts can also serve well.

STEPS OF GRAFTING

Grafting is done in several steps as soon as the seedling attain the required stage as outlined.

Step 1: Cut the Rootstock Stem

- With splice grafting, the first step is to cut the rootstock at the stem at a deep angle. The deep angle creates more

surface area on the cut than a flat cut would, which allows more cells from the cut surfaces of rootstocks and scions to fuse together.



Rootstock ready for grafting: Source [www. Shutterstock.com](http://www.Shutterstock.com)

- The rootstock may be cut either above or below the cotyledons. The advantage of cutting above the cotyledons creates more space between the graft union and soil. As such the grafted plants are less likely to develop adventitious roots from the scion. However, cutting the rootstock above the cotyledons can create the problem of rootstock regrowth.
- If the rootstock is cut below the cotyledons, it completely eliminates the sucker problem because that completely removes the rootstock's meristem tissue. Grafted seedling must be transplanted carefully to ensure that the

grafting union stays above the soil.

Step 2: Place a Grafting Clip on the Rootstock

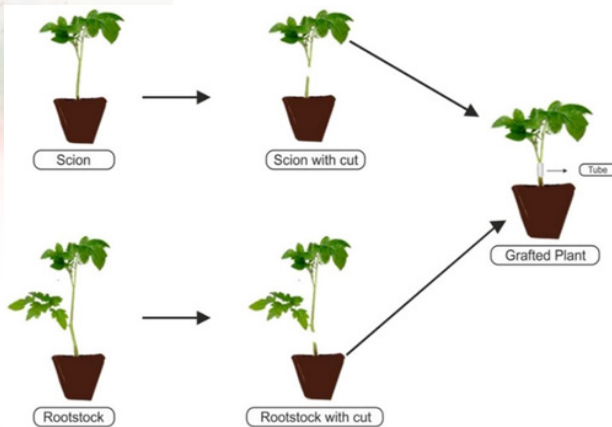
- After cutting the rootstock, a grafting clip is placed halfway over the cut stem. The grafting clip should be oriented along the side of the graft cut so that it holds the graft union securely.

Step 3: Cut the Scion Stem

- Next, cut the scion stem at the same angle as the root-stock.

Step 4: Insert Scion Stem into Grafting Clip

The scion stem is inserted into the grafting clip. The cut surfaces of the rootstock and scion should be oriented correctly and in full contact with each other. If the rootstock and scion stems are cut at different angles,



Clipped tomato seedlings after grafting. Source ag.purdue.edu

they may not come into contact sufficiently and may not heal.

Tips to ensure success

Before transplanting grafted plants, scout for and remove any rootstock suckers you find by hand. To increase graft efficiency, experienced grafters normally conduct one step for all plants before moving to the next step. However, make sure that the cut surfaces of the plants do not dry out before grafting them, or it will reduce grafting success. Placing scion cuttings in sterile water can extend the time from cutting to insertion.

Post-graft Plant Healing

- The first 48 hours after grafting is the most critical time for graft healing — the grafted plants will form new vascular cambium during this period. Depending on the plants' growth stage at the time they are grafted, plants should be ready to grow in normal greenhouse conditions six to 10 days after grafting.
- Immediately after grafting, mist the grafted plants with water from a spray bottle to prevent them from wilting immediately.
- Promptly place newly grafted plants in an environment that has a relative humidity between 85 and 95 percent and temperature between 22°C and 29°C keep them in this environment for the first 48 to 72 hours. Grafts fail when temperatures soar above 37°C.
- For a small number of plants, mist newly grafted plants with a spray bottle right after grafting and cover the whole flat with a plastic dome that has been sprayed with water inside. This will help achieve desirable humidity during the first two days.
- Place newly grafted plants in low-light conditions during the first few days to reduce water loss through transpiration and evaporation; however, absolute darkness is not necessary. An indoor area with dim light is efficient for graft healing.
- After two or three days (two days if you grafted young), gradually reduce the humidity by partially opening the dome. Keeping the humidity high for an extended time makes the scion to develop adventitious roots that may infect the scion with soilborne diseases if they grow into the soil.
- If you keep plants in high humidity and without sufficient sunlight for more than seven days, the grafts are likely to fail.



The hardening chamber. Source; www.blackdogled.com/blog/grafting-tomatoes/

- If the humidity is sharply decreased or there is a sudden exposure of plants to strong light, they may wilt severely. Gradual reduction of humidity and introduction of light should take place over roughly four to eight days.
- It is preferable to let the clips fall off rather than remove them, which could break a young graft union (which cannot be reconnected). During the first week, water and fertilize the soil directly, because grafting clips could retain water or fertilizer solution around the graft union, which also lead scions to develop adventitious roots
- Grafting tomatoes requires extra effort, time and cost, and may not be suitable in all situations. Before you decide whether to incorporate grafting into your tomato production system, consider specific disease pressures, market strategies, scion and rootstock cultivars, and production practices.





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KALRO/NAVCDP/TOMATO/ Pamphlet No. 088/2024

