

# GRAFTING INSTRUCTIONS

FOR TOMATO ROOTSTOCK PRODUCTION

USING THE  
JAPANESE GRAFTING METHOD

'Guidelines for grafting' & 'Text with Video'  
Provided to you by:

DeRuitter Seeds and  
Hydro-Gardens Inc.

Note: The video contains measurements in metric and temperatures in Celsius

# GUIDELINES FOR GRAFTING

## Method: Japanese Top Graft

With this method, the scion (variety) and the rootstock are cut off at a 45° angle and the scion is put straight on top of the rootstock. They are kept together with a silicon-grafting clip.

Grafting consists of the following actions:

1. Sowing the rootstock
2. Sowing the variety
3. Preparations
4. Grafting
5. Fusion
6. Potting and Spacing

## **1. Sowing the Rootstock**

Recommended germination conditions:

- Temperature: 77F or 25C day and night
- RH: 80%
- EC 1000-1200 PPM  
(In general: source water + 750PPM nutrition)
- PH 6.0 – 6.5
- Light (D/N) 17h / 7h (120 umol/cm2/second)

Sow the rootstock, **Maxifort**, according to recommendations, 5 to 10 days before the variety, in 1 ½” horticultures at 50 per tray. Due to the uneven emergence, the seedlings must be selected. This is usually done at the third true leaf stage (after 18 days). The selected seedlings are placed in another tray. Selection is done every 4 to 5 days. The first time usually produces about 40% of seedlings per tray. Keep this in mind for the required number of plants within one period. Experienced plant raisers have a success rate of 95%

**Maxifort or Beaufort** is a typical light germinator, which makes the light the most important factor to achieve a more equal plant. It is best not to store the sown trays in the shed or germination cell.

**Our Advice:** Put the trays onto the propagation mat immediately after sowing. If it is necessary to cover the trays, use damp newspaper.

Selected rootstock seedlings should be kept at a lower temperature to make them thicker and sturdier (64 to 68F – 18-20C).

## 2. Sowing the Variety

Sow according to the standard recommendations.

Graft after about 17 to 18 days

## 3. Preparations

Grafting must be done in an area with no direct sunlight. Make a plastic tent, about 12” to 16” in height. Clear plastic is preferred. The film must have sufficient strength. Under high light condition, a white film may be used. However, clear plastic is preferred and a rectangular screen or Styrofoam sheets can reduce strong sunlight.

Disinfect hands with an anti-bacterial soap.

Razor blades: it is always recommended to use new blades and replace them often.

Climate: temperature 70 – 72F (21-22C); RH inside the tent should be at least 80% (wet floor or misting of plants as well as the inside of the plastic tent).

No smoking during grafting, it increases the risk of viruses.

Make sure that the horticulture stays damp with fertilizer solution at 1500 PPM.

## 4. Grafting Procedure

Cut off the rootstock, or seed leaves, with a razor blade at a 45° angle. This can be done either above or below the cotyledons, depending on the weather. During the summer, cut below the seed leaves to avoid sucker growth from the rootstock. During the winter, make the cut above the cotyledons in order to benefit from the extra photosynthesis.

Put the grafting clip in place (onto the stem of the rootstock)

Cut off the top of the variety (the scion) that you want to graft at an angle.  
(Suggestion: if temperature is high or is relative humidity is low, store the scion briefly in a tray with clean or sterile water.

Place the scion in the clip making sure of good contact with the rootstock (air between the two parts will result in failure).

**Note:**

1. Cutting at an angle ( $45^\circ$ ) is preferred over a straight cut, because the fusion surface is larger and the chance of success better.
2. The ideal situation is to cut the rootstock as well as the variety above the cotyledons (seed leaves).
3. Cut the rootstock at a maximum of  $\frac{3}{4}$ " – 1" (2cm) above the horticulture. If higher, there is a risk of graft falling over. If lower, the variety may root into the media.
4. If the variety (scion) grew too fast, it is advisable to cut it higher (even as high as the 2<sup>nd</sup> or 3<sup>rd</sup> true leaf)

Put the grafted plants in the plastic tunnel immediately. The optimum fusion temperature is 70-72F (21-22C). The maximum temperature under sunny conditions is 82-84F (28-29C).

*Diagram: This is the best way to place the grafting clip*

**Note:** If somewhat larger seedlings are grafting or if the number of plants is small, one may prick out the rootstock first and then graft (after at least 2 or 3 days). The advantage is that the plants will not wilt as quickly (larger volume), but it takes up more room.

**5. Fusion**

It is important to avoid direct sunlight onto the plants and to maintain a uniform climate. Until the plants have been hardened, shading will be necessary when it is sunny.

The most common procedure is to keep the tent closed for three days and to test if the graft will hold on the fourth day. The plants must not wilt. Should this happen, lightly mist the plants (do not use warm water!)

On the fifth day ventilate a little. It is preferred to make a small gap in the plastic tent and to check the condition of the plants each hour. Should they wilt, lightly mist the plants with clean water using a Fogg-It Nozzle, and close the tent again. In the evening or the next morning, the gap can be made again. On day 6, make the gap larger if the plants can handle it and move the plastic on the seventh day (preferably in the morning or evening).

**6. Potting and Spacing**

After day 7, the normal plant raising procedure can be followed. Transplanting into a 3" net pot is recommended from 9 to 10 days after grafting, when the rootstock and the variety have joined solidly.

(If the grafting clips are silicon, removal is not necessary).

**We wish you the best of luck!**  
**TEXT WITH VIDEO**

## **Grafting Instructions**

For  
Tomato Rootstock  
Using  
Japanese Grafting Method

In this video, a method of grafting using Maxifort rootstock is demonstrated. The end results presented in the video are based on Dutch conditions and experience from tests and in practice. We strongly recommend that you first read the enclosed grafting instructions before watching this video. Although the video and grafting instructions have been compiled with the utmost care we accept no responsibility whatsoever for the results of the grafting method shown.

Grafting is a process, which is applied preferably to plants, which have not been treated with growth regulators. In this video, a number of exceptions are dealt with but some things are a question of experience and feel. Then you have to respond to the specific situation.

The plants in this video are sown in a tray with rock wool plugs, horticultures are also acceptable. If you wish to sow in the ground, we advise you to do this in a tray with plugs. If this is not possible, prick out the plants quite a while before grafting. Sow the rootstocks according to the growing instructions. The sowing date depends on plant growth in your climate. In order to be able to graft, the stems of the rootstock and scion must have to same thickness. The ideal thickness for grafting is 1.5 mm. Rootstock and scion can therefore only be grafted together during a short period.

Maxifort is a light germinator and germinates best at a maximum temperature and germinates best at a maximum temperature of 77F, slightly damper than ordinary tomatoes. If necessary, cover lightly to prevent dehydration, for example with vermiculite.

Here you see the Maxifort rootstock. These plants are now 17 days old. In order to simplify the grafting process, the plants must be sorted according to stem thickness. It is best to do this as soon as possible, but no later than 2 days before grafting, because the plant needs time to recover.

A full tray has 240 holes. The distance between plants is about 2.5 cm, from stem to stem. When transferring the plants, take hold of them by the plug wherever possible to avoid contaminating them or damaging them.

Sorting reduces the number of plants per tray to 120 to 80, so that the distance between plants is about 3" from stem to stem. This ensures better growth of the rootstock and creates more space for the grafting process. This is important because grafting would otherwise take too long.

This is the ideal situation. You get the most attractive plants when you sow the scion in trays, but you can naturally use soil trays or other sowing methods.

By varying the light and temperature, you can influence the growth of the cultural variety and the rootstocks. In this way, you can ensure that the stems have the same thickness, which is necessary for the grafting process.

One day before grafting, the plants must be given the possible tending, with fertilizer and water.

First a plastic tent must be made about 12" to 16" high, preferably from strong transparent foil about 5 or 6 mil thick.

The grafting must take place where no direct sunlight can shine on the plants. Shield the plants if necessary.

Apply means of increasing the humidity where the plants are to be grafted, for example, by keeping the floor wet, using a humidifier or plant spray.

Make sure that the ambient temperature is right during grafting (70 – 72F)

Before starting to graft, make sure you have all the relevant equipment at hand.

The relative humidity in the tent must be between 80 and 90%. That is why you should dampen the plastic on the inside and make the floor wet.

Ensure that everything is very hygienic. All equipment used must be clean. Always disinfect your hands with anti bacterial hand soap. Always use new knives for grafting and be careful when using them. Use a new knife after every tray to prevent contamination. Avoid the possibility of transferring viruses by not smoking in the area in which the grafting is being carried out and where the plants for grafting are kept. Do not smoke while sowing, cultivating or sorting plants either!

First, cut off all heads of the rootstock in one tray. Throw away the heads which have been cut off immediately, to avoid mixing them up with the cultural variety.

Cut off the rootstocks at an angle of 45°. By cutting them on a slant, you get a larger cutting surface, so that the scion can attach itself better to the rootstock. It is best to leave the cotyledons or seed leaves when cutting, and the grafting point must not be higher than 2 to 2.5cm above the pot.

If the grafting point is too low, there is a chance that the cultural variety will form roots. Through these roots the grafted plants can be infected by the diseases the rootstock is protecting them against.

If the grafting point is too high, the head with the clip becomes too heavy and the plant may fall over. It also produces a less attractive plant.

Attach the grafting clips to the rootstocks

Prepare all rootstock before starting to cut off the scions.

Cut off the cultural variety in the same way as the rootstock. Never cut off more plants (scions) than you need for a tray with prepared rootstocks.

In the summer, you can lightly spray the scion or lay it briefly with clean tap water at ambient temperature, to prevent dehydration.

It is best here to cut above the cotyledon or seed leaves. The cutting point of the cultural variety depends on the plant's growth; the head must have at least two fully-grown heart shaped leaves. If there are too many leaves, the head becomes too heavy and may fall over.

A ½" stem is easily long enough.

Always check the necessary stem thickness. If necessary, modify the cutting point.

Ease the scions into the grafting clips on the rootstock, one at a time.

You can move the clip and stems a little if necessary until the rootstock and the cultural variety connects well. The cutting surfaces must make full contact.

If there is a difference in stem thickness between the scion and rootstock, or a difference in the size of the cutting surface, the plant will not grow well onto each other, or not at all.

Place each grafted tray into the tunnel immediately.

Moisten the plants or the plastic in the tunnel using a fine mist of clean tap water, preferably with a fogger nozzle. The temperature in the tent may not exceed 82-84F. A higher temperature seriously reduces success ratio.

Re-close the tent carefully after each tray. This is the only way to maintain the right climate for the plants.

Once all the trays are in the tunnel, check after about three hours that the tent plastic is moist/ there is condensation on the inside.

The plants need as much light as possible, but make sure no direct sunlight can shine on the plants during grafting and the following week.

Look through the plastic everyday to see if the plants are flourishing. It is all right if they are a little limp up to one day after grafting, but after one day they must all be standing firmly erect.

The tent must remain closed for at least four days. On the fourth day, the rootstock and cultural variety begin to attach to each other, you can then peep through a gap in

the plastic to check that the plants are not too dry. If necessary, you can waft some fresh air inside and then close the tent again completely.

On the 5<sup>th</sup> day, start ventilating the tunnel in the morning, by making a gap in the plastic.

The idea is to reduce the humidity to greenhouse level in two days. It is very important that you do this gradually, in a number of stages, so that the plants are able to adapt to the new humidity.

Under ideal conditions, you can open the tunnel on the seventh day. Make sure that the plants continue to stand erect during ventilation. Only expose the plants to the sun again once the plant has been fully removed. If you have not taken enough time in ventilating the tunnel, the plants may become limp. In this case, apply some first aid! Sprinkle the plants with tap water and close the tent. The next day, after the plants have recovered, you can begin the ventilating process anew, but this time more gradually.

Now allow the plants to harden off for 2 days. Make sure that they have enough food and, if necessary, gradually change the ambient temperature, until the desired cultivation temperature is reached.

It is not necessary to remove the silicon grafting clips, as they will drop off on their own accord. If you should remove them there is a risk you will damage the plants.

You can now cultivate the plants further in your usual fashion.

With rootstocks from De Ruiter seeds, you are insured, at all events, of a strong basis for your plants.

**Good Luck!**