

ROLE OF GRAFTING IN TOMATO

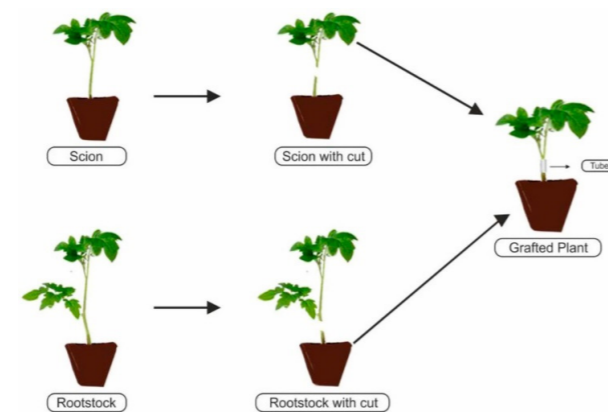
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INTRODUCTION

Grafting is horticultural techniques used to join parts from two or more plants so that they appear to grow as a single plant. In grafting, the upper part (scion) of one plant grows on the root system (rootstock) of another plant. The practice of grafting can be traced back 4,000 years to ancient China and Mesopotamia. As early as 2,000 years ago, people recognized the incompatibility problems that may occur when grafting olives and other fruiting trees.

Grafted tomatoes are produced when two tomato plants joined together. The resulting plant exhibits the strengths of both its "parents." These method give the plant a certain characteristic of the rootstock - for example, hardiness, drought tolerance, or disease resistance. Since this method require extensive knowledge of nursery crop species and their compatibility, grafting technique is usually practiced only by more experienced nursery operators. Grafting can be performed only at very specific times when weather conditions and the physiological stage of plant growth are both optimum. Most grafting is done in late winter or early spring before new growth begins. Tomato grafting is a horticulture technique that has been utilized worldwide in Asia and Europe for greenhouse and high tunnel production and is gaining popularity in the United States. Typically, stock or rootstock are selected for their ability to resist infection by certain soil borne pathogens or their ability to increase vigor and fruit yield. The scion of the grafted tomato represents the upper portion of the plant and is selected for its fruit quality

characteristics. There are several methods for grafting tomatoes and they have certain advantages and disadvantages. Once the grafts are made, the plants are moved into a chamber or environment with high relative humidity (>90%) and low light levels to reduce water stress in the scion while the graft union forms.



ANATOMY OF A GRAFTED TOMATO

One tomato's roots are used and another tomato's body is used for the graft.

- Stock (or rootstock): the below-ground part of the tomato plant, used in a graft for its roots. This variety is chosen for the graft because of its resistance to fungal, bacterial, viral, and nematode pathogens, such as those pesky diseases like early blight, late blight, Septoria leaf spot, verticillium wilt, fusarium wilt, and

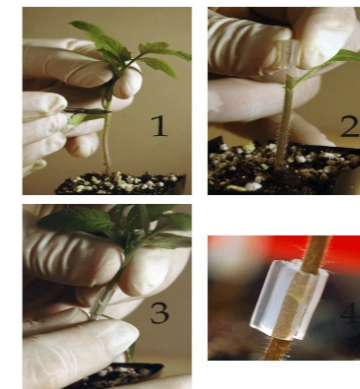
bacterial wilt. Hybrid tomatoes are often the rootstock of choice since they have been bred for significant disease resistance.

- Scion: the above-ground part of the tomato plant, used in a graft for its stems, leaves, blossoms, and fruit. This variety is chosen for the graft because of its fruit qualities. Heirlooms are a favorite scion, especially for gardeners who have a passion for a particular heirloom's taste.

TYPES OF TOMATO GRAFTING

I. Tube grafting (or Japanese top-grafting):

A fairly new technique that produces large numbers of plants quickly. Seedling rootstock and scion are severed and reattached with a clip during healing.



II. Cleft grafting:

A V-shape in rootstock and wedge-shaped in the scion are held together with a clip during healing.



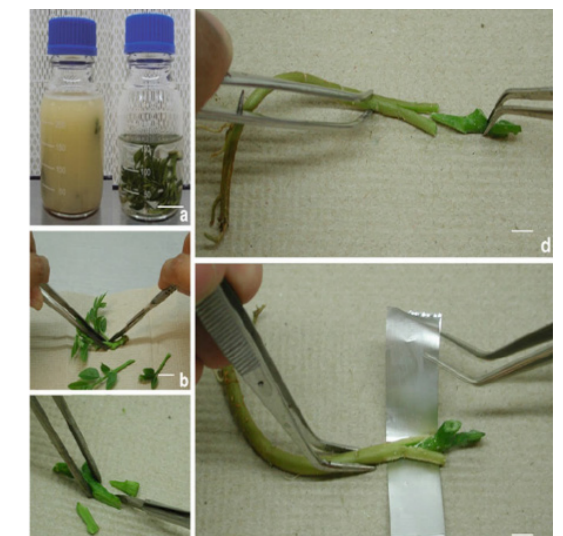
III. Approach grafting:

Notches on two stems held together with a clip during healing.



IV. Micrografting:

A new technique used primarily with hybrid tomatoes. Very tiny scions are grafted onto 3-week-old rootstock.



ROLE OR PURPOSE OF GRAFTING

Grafting may increase the productivity of tomato plant because they make it possible to do the following things:

- **Change varieties or cultivars:** An older established orchard of tomato may become obsolete as newer varieties or cultivars are developed. The newer varieties may offer improved insect or disease resistance, better drought tolerance, or higher yields. As long as the scion is compatible with the rootstock, the older orchard may be top worked using the improved variety or cultivar.
- **Optimize crossing programme:** In tomato stigmas are surrounded by anthers in such way that self-pollination occur. For crossing programme emasculation and pollination should done, which may causes some difficulties like fertilization, seed setting etc. The chances that cross-pollination will occur can be increased by grafting a scion from a male plant onto the female plant.
- **Take advantage of particular rootstocks:** Compared to the selected scion, certain rootstocks of tomato have superior growth habits, disease and insect resistance, and drought tolerance, which may be useful
- **Repair damaged plants:** Sometimes tomato plants can be damaged easily at or slightly above the soil line. The damage may be caused by maintenance equipment (such as lawn mowers, trenchers, or construction equipment), or by disease, rodents, or winter storms. The damage can often be repaired by planting several seedlings of the same species around the injured tree and grafting them above the injury. This procedure is referred to as inarching, approach grafting, or bridge grafting.
- **Index viruses:** Many plants carry viruses, although the symptoms may not always be obvious or even visible. The presence or absence of the virus in the suspect plant can be confirmed by grafting scions from the plant onto another plant that is highly susceptible and will display prominent symptoms.
- **Tolerance to salinity:** Grafting tomatoes with tolerant rootstocks has been highly effective at producing a saline-tolerant plants. Research indicates that several rootstocks prevent the translocation of sodium and chloride into the shoot.
- **Tolerance to thermal stress:** Many of the most economically important varieties of tomato are highly sensitive to thermal stress in the roots throughout vegetative development and reproduction. Whether using rootstock tolerant of hot or cold temperatures, the use of temperature tolerant rootstocks often leads to the extension of the growing season in either direction, resulting in better yield and economic stability through the year.
- **Increasing Yield:** In tomatoes, increases in fruit yield are typically the results of increased fruit size. Research has shown that possible mechanisms for increased yield are likely due to increased water and nutrient uptake among vigorous rootstock genotypes.
- **Nutrient uptake:** Nutrient uptake for the macronutrients, such as phosphorus and nitrogen were enhanced by grafting.
- **Increases fruit quality:** Largefruit size, red fruit colour, freedom from external blemishes or abnormalities, low pH (<4.4), high TSS (4.5-7%) and high alcohol insoluble solids (AIS) can be improved by choosing proper rootstock genotype.

CONCLUSION

Usually there are many benefits of grafting in tomato but it depends upon skill of worker while choosing rootstock and choosing method of grafting. Grafting techniques combine the science and the art of horticulture. The scientific aspects include comparability, timing, disease and insect resistance, drought, tolerance, and hardiness. Acquiring practical skills in the art of grafting, on the other hand, requires hours and even years of practice to perfect.

