

APPLICATION OF TUBE AND STICK METHODS FOR GRAFTING OF FRUIT CROPS

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Fruits have become an integral part of human diet, not only for their nutritional values but also as a source of satisfaction to their palate. Therefore, every effort must be made to improve the fruit industry both agriculturally as well as in post harvest technology.

The first step in a crop improvement programme is selection of varieties or cultivars with desirable traits. Selection will be followed by a well-planned breeding programme where desirable characteristics of different individual plants would be combined to produce premium quality varieties. These good qualities of developed varieties have to be maintained continuously. This is more important in cross-pollinated crops. Suitable vegetative propagation techniques have to be tested and recommended for this purpose.

Grafting is the most common vegetative propagation method practiced besides the use of cuttings. Most other techniques practiced at present are cumbersome, time consuming and at the same time need certain skills. It is therefore, necessary to develop simple and easy methods of grafting or modify the presently practiced techniques so that everybody could easily practice them.

Asian vegetable Research and Development Center, Taiwan developed new techniques of grafting i.e., tube and stick methods of grafting for the propagation of tomatoes with much success (Personal communication, Deng - ling Wu, 1997). Based on their experience and with certain modifications, 'tube' and 'stick' methods of grafting were tried for the propagation of yellow passion fruit (*Passiflora edulis f-flavicarpa*), bael (*Aegle marmelos*), woodapple (*Feronia limonia*) and sweet orange (*Citrus sinensis*) at the regional agricultural research and development center, Bombuwela.

METHODOLOGY

A distinct advantage of this method is the use of both stock and scion at an early growth stage when their stem thickness is about 3-5 mm in diameter. The materials used in these methods are bicycle valve tubing and plastic flat edged brush bristles which are of low cost and easily available.

GRAFTING WITH TUBING

The rubber tubing was selected according to the diameter of the stock and scion and was normally about 5 mm in diameter and 15 mm long.

About 3 weeks before grafting three fourths of the leaves of the scion wood were trimmed while they were still attached to mother plants. Scion wood of 6-10 cm length of semi hardwood stage was used. The lower end of the scion wood was cut with a sharp razor blade at an angle of about 30 degrees (Fig. 1). Three fourth numbers of leaves of the scion wood were removed to reduce evapo-transpiration.

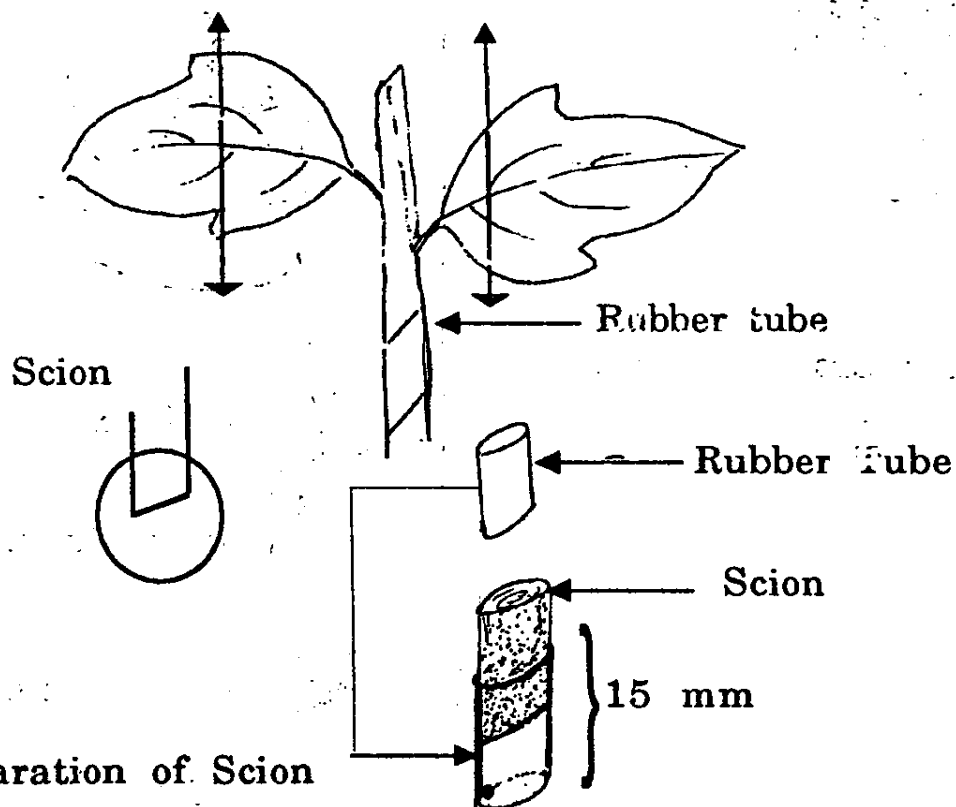


Fig. 1: Preparation of Scion

The root stock was prepared in similar manner. The stock plant was severed at about 10 cm above the base with a neat slant cut at an angle of about 30 degrees made with a sharp razor blade. The lengths of the cut surfaces of both scion and root stock should match one another (Fig. 2).

The lower end of the scion is then inserted into one end of the tubing and pushed about half the length of rubber tubing. The root stock is then inserted at the other end of the tubing and pushed to touch the lower end of the scion. Both stock and scion were then adjusted so that the slant cut surfaces of both stock and scion

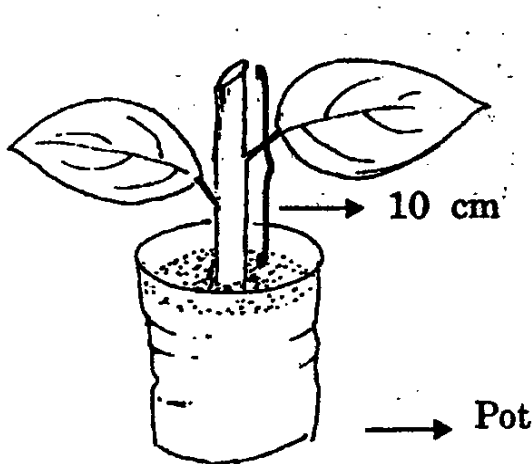


Fig.2: Preparation of root stock

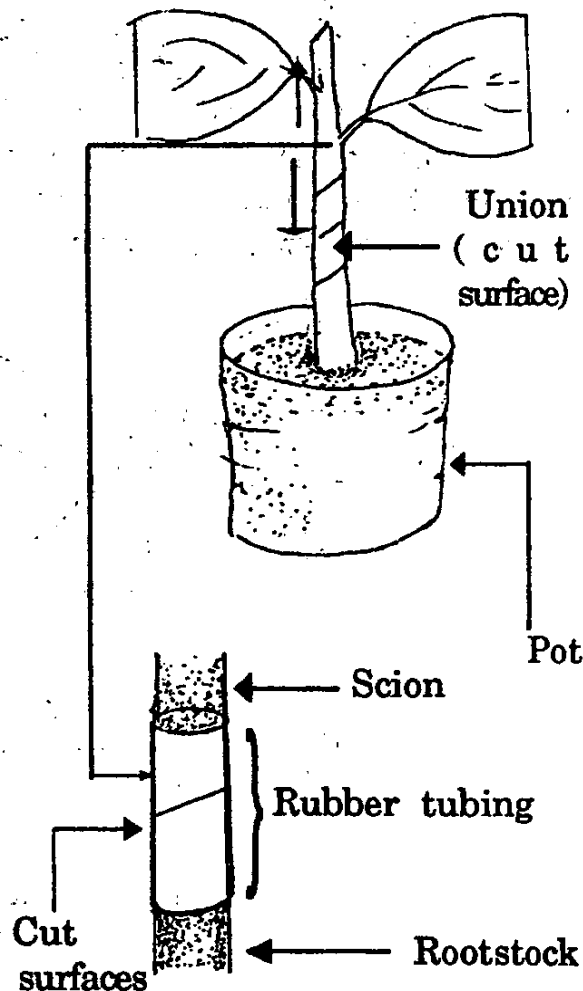


Fig.3: Grafting

firmly touched each other (Fig. 3). Rubber tubing ensures that the scion and stock are kept in place. The grafted plants are then enclosed in an opaque polythene cover with a support to maintain high humidity and left for a few days for callus formation (Fig. 4). For large scale grafting a propagator may be used.

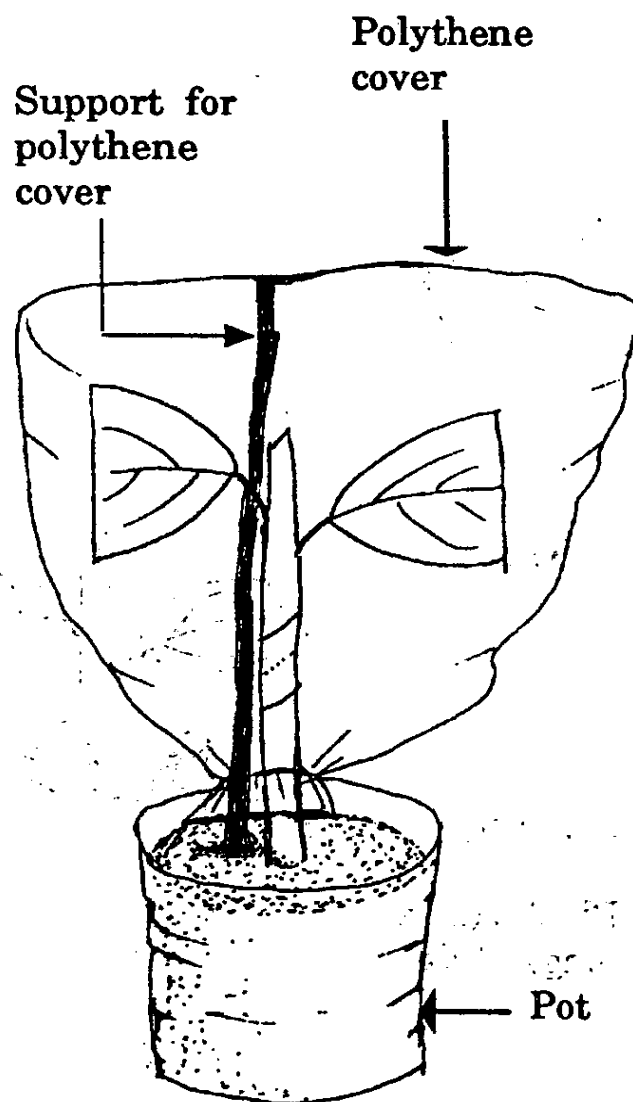


Fig.4: Grafted plant

GRAFTING WITH PLASTIC BRISTLE

The root stock and scion were prepared as in the tube method (Fig. 5 and 6). In the stick method both parts are held together by plastic bristles. Plastic bristles of about 0.5 mm diameter are the most suitable and about 1 cm long pieces are used. About half the length of the bristle was inserted through the cut end of the scion so the remaining end of the bristle was sticking out (Fig. 5). This loose end is then inserted to the root stock at its cut surface.

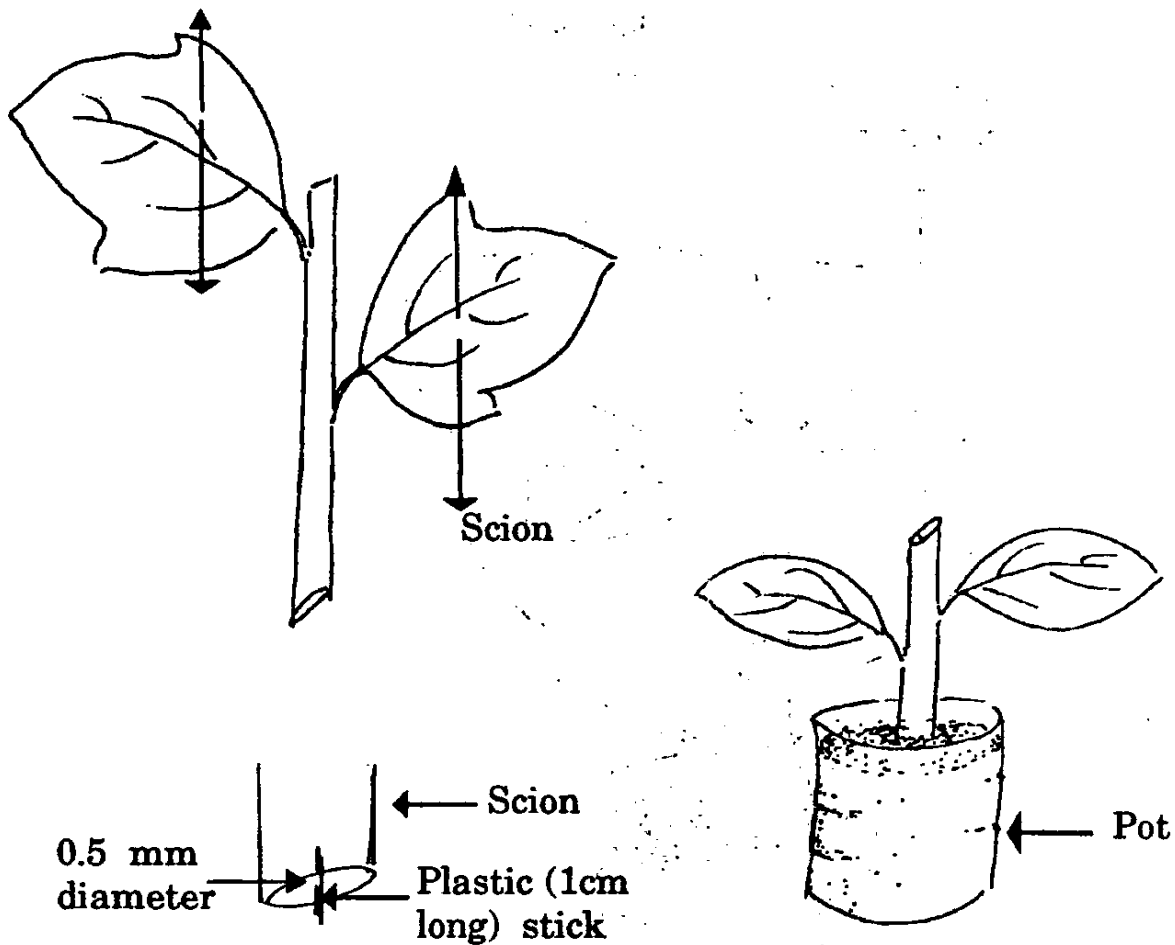


Fig.5: Preparation of scion

Fig.6: Preparation of rootstock

The scion and stock cut surfaces are brought together and adjusted so that both surfaces firmly touch each other (Fig. 7). The bristle inserted will hold the stock and scion firmly together. The grafted plants are then enclosed in an opaque polythene cover to maintain high humidity and staked as in the earlier method (Fig. 8).

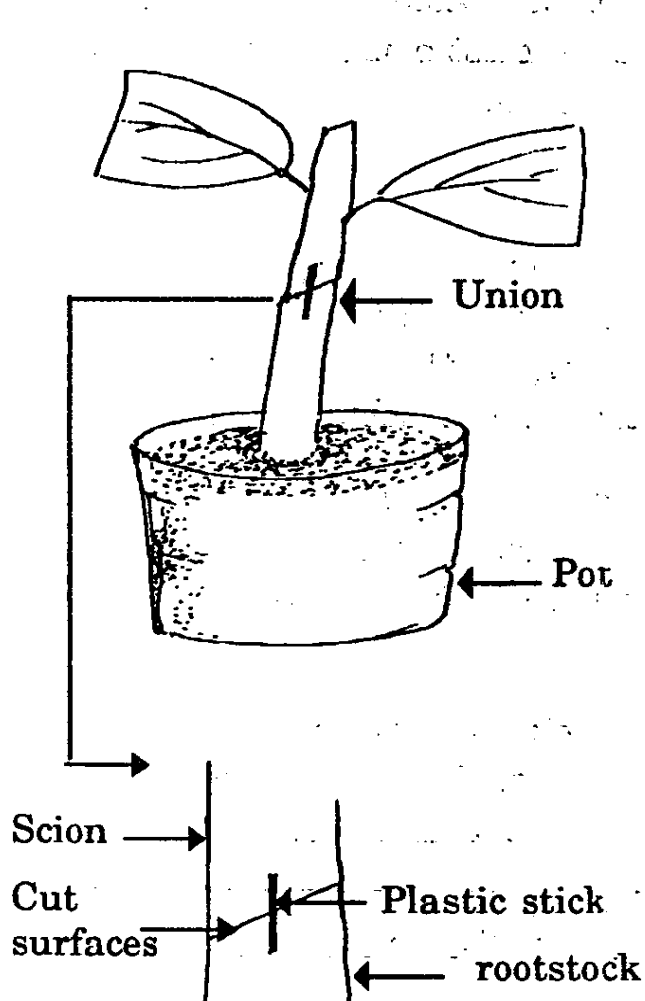


Fig. 7: Grafting

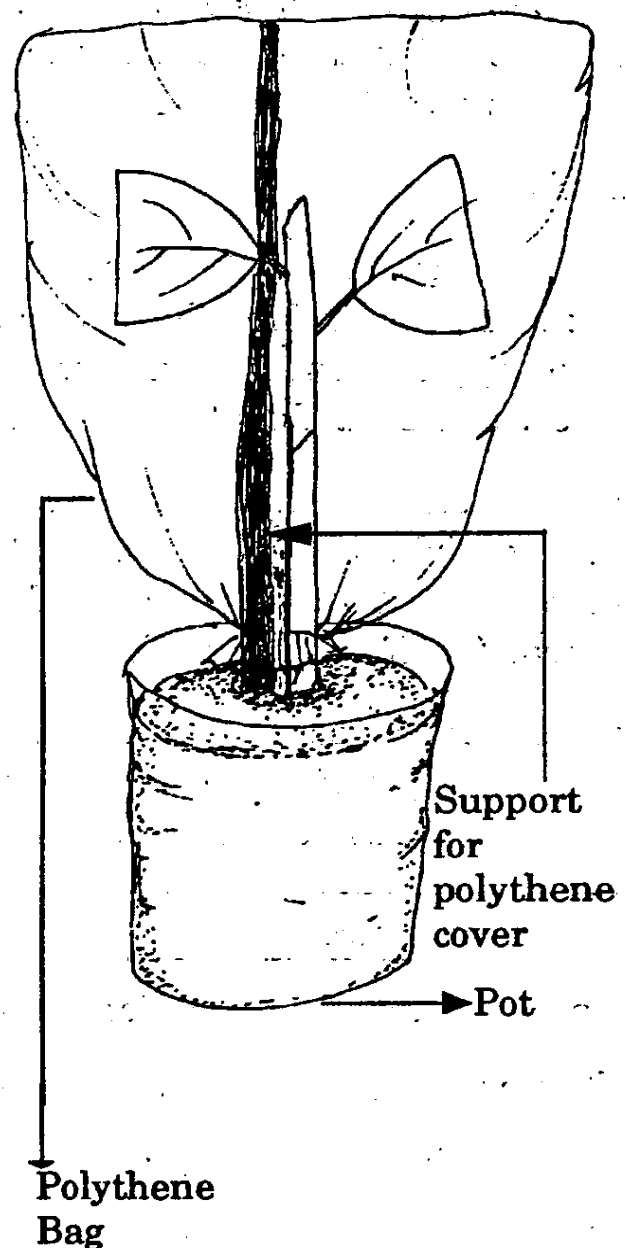


Fig. 8: Grafted plant

AFTERCARE

Grafted plants were kept under 80% light intensity to evaluate their success. Three weeks after grafting covers were removed and the grafts were moved to a shaded bench. Plants were regularly watered to avoid moisture stress. In the case of tube method as the stem girth increased, the rubber tube cracked and fell off. In the case of bristle method, presence of bristle inside the plants did not result in any stress to the plants.

RESULTS

There were 60% and 90% survival rate in passion fruit with tube and stick methods, respectively. In the other crops namely, woodapple, bael and sweet orange the tube method was successful. Results are presented in the table 1 below.

Further studies have already been initiated to evaluate these methods of grafting in other crops such as jak (*Artocarpus heterophyllus*), rambutan (*Naphelium lapp-aceum*) and guava (*Psidium guajava*).

Table 1: Percentage success of stick and tube methods of grafting in different fruit crops at Regional Research and Development Center, Bombuwela in 1998.

Root stock	Scion	Grafting method	% success
Passion fruit	Passion fruit	Tube	60
Passion fruit	Passion fruit	Stick	90
Woodapple	Woodapple	Tube	95
Bael	Bael	Tube	95
Lemonime	Sweet orange	Tube	90