

Side Bud Grafting: Rapid Propagation in Darjeeling Mandarin

Darjeeling Mandarin (*Citrus reticulata* Blanco) is one of the important cash crops for the farmers of Sikkim and Darjeeling hills. The crop is grown in hills since time immemorial. The mandarin orchards in the Darjeeling and Kalimpong hills of West Bengal are declining at an alarming rate. Major reasons for the decline are attacks of pests and diseases, old and senile orchards, lack of scientific know-how on cultivation and lack of quality planting material for replanting. Orchard needs to be replaced with healthy quality planting over the years, there has been a huge demand for healthy quality planting material in Darjeeling Mandarin. Side Bud grafting has been a successful technique of grafting for rapid propagation in Darjeeling Mandarin developed by ICAR-IARI Regional Station Kalimpong. Side Bud grafting has a high rate of success and can be easily adapted by farmers for mass multiplication of planting material.

DARJEELING Mandarin (*Citrus reticulata* Blanco) is one of the important cash crops for the farmers of Sikkim and Darjeeling hills. The crop is grown in hills since time immemorial. For most farmers, it is the only source of income that sustains their livelihood. The area under Darjeeling Mandarin is decreasing at an alarming rate. One of the major reasons for the decline is the attack of pests and diseases and lack of planting material, most of the planting materials in the region are of seedling origin. Most of the orchards are old and senile, this needs to be replanted with healthy quality planting material. There is a huge demand for quality planting material of Darjeeling mandarin. Propagation through seeds takes a longer time for production and due to their polyembryonic nature seedlings through seeds are not true to type. Rootstocks play an important role in the citrus industry. Rootstocks are known to have a profound effect

on the vigor, precocity, productivity, internal quality, and longevity of the scion varieties grafted on them. They are also known to influence the susceptibility of trees to various diseases and insects. Rootstock rough lemon shows tolerance to tristeza and quick decline, trifoliate orange imparts cold hardiness to scion and promotes the disappearance of bitterness at the time of maturity, Rangpur lime is found to be resistant to tristeza. Various morphological, biochemical, and physiological parameters of the scion part are influenced by rootstocks. Therefore, Darjeeling mandarin grafting/budding in abiotic and biotic resistant/tolerant rootstock is advocated in hills.

Selection of scion

While selecting scions for grafting or budding we should keep the following points in mind:

- The mother plant should be free from pests and diseases (should be healthy).
- It should produce good quality fruits and yield for at least 5 years.
- The mother plant should be in the reproductive stage ideally above 10 years and should not be above 25 years.

Sowing of Rootstock

Rootstock Rangpur and Rough lemon were found to be the promising rootstock in Darjeeling mandarin. Seeds from the fruits of Rangpur lime and Rough lemon were extracted during December-January. The seeds were thoroughly washed in running tap water and dried in the shade. Before sowing the seeds, seeds were treated with 2% Bavistin. The seeds were sown in beds or portray (primary nursery). The seedlings were transplanted to



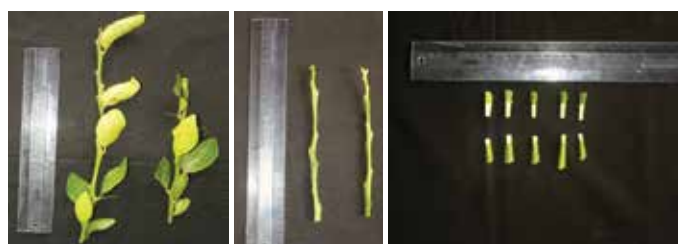
polybags containing soil:sand:farm yard manure (1:1:1) at the secondary nursery, when they attained 4-5 leaf stage. The rootstock becomes ready when they attain pencil thickness size. The rootstock takes at least 1.5 years to become ready for grafting or budding.

Grafting or Budding Time

Grafting or budding time for Darjeeling mandarin takes place in the last week of January to February i.e. just before bud break.

Preparation of scion

Healthy scions of 10-15 cm are selected before the bud bursts. Leaves from the scion are removed. 2-3 cm scion are cut having one or two nodes. At the base of scion two slant cuts are given with the help of grafting/budding knife. One side has longer slant cut and the other side shorter cut. The prepared scions are dipped in water so that it does not dry up before grafting.



Preparation of Darjeeling mandarin scion for side bud grafting

Process of Side Bud Grafting

Rootstock is decapitated at the height of 10-15cm from the soil surface with the help of secateur. All the leaves and side stems are removed from the rootstock. Then with the help of grafting and budding knife, a vertical cut of 1.2 inches is given on one side of the rootstock, Keeping 80:20 ratio i.e. 80 % of the rootstock area and 20 % of rootstock area. The 20 % is kept as a vertical flap of the bark for securing the scion. Scion of 2 cm with slant cut on both sides is carefully placed on the vertical flap without disturbing the bud.

Buds should be wrapped immediately following their insertion into the rootstock. Wrap buds with parafilm paper or polyethene strips (about ½ inch wide by 6-10 inches long), scion and rootstock are carefully wrapped



Begin wrapping from the rootstock by taking 4-5 turns finish with several turns upto the scion. Bud should be covered with white transparent polyethene strip/tape. The end of the tape is secured beneath the last circular turn. The wrap should be firm without being excessively tight.

Side Bud Grafting in Darjeeling mandarin. A. Preparation of Rootstock B. Scion grafted on rootstock C. Wrapping the insertion with polyethene strips D. Bud covered with white polyethene strips E. Successful sprouting of Darjeeling mandarin sprouts F. Flowering in the successful grafts.

Maintenance of the Grafts

The sprouts emerging from the rootstock should be removed at regular intervals. The graft union should not be disturbed and should be kept in a shade net house for higher grafting success. The sprouts emerge within 20 to 25 days of grafting. After successful union the wraps should be removed.

CONCLUSION

Side bud Grafting of Darjeeling mandarin on more than one year-old rootstocks of Rangpur lime and rough lemon has more graft success and better vegetative characters. Exploitation of side bud grafting will be very useful in doubling the production of quality planting material by shortening the nursery phase and reducing the cost of planting material production.

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