A SYNOPSIS ON OVER COMMING THE PROBLEM OF SOIL SALINITY AND QUALITY DEGRADITION IN CITRUS THROUGH DOUBLE GRAFTING

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Abstract

Double grafting refers to the use of mutually compatible graft wood (MCGW) between scion and root-stock. This technique, in the back ground of an already conducted and successfully concluded trail at Horticultural Research Station Sahiwal, is worth exploitation for enhancing its scope to over come the dual problem of salinity and quality degradation our citrus fruits are confronted with. At Sahiwal, problem of stoinic incompatibility was effectively over-come through the use of inter-stocks (Orlando and Kinnow) between Musambi scion and Rough lemon root-stock. Hence using salt tolerant root-stocks as primary one and graft wood of Citranges i.e. Carrizo Citrange, Troyer Citrange and *Citrus aurol1ti1lm* as inter-stock, can successfully address the problem of soil salinity and quality degradation in our breath.

Introduction

Cultivation of citrus fruit is chiefly concentrated in semi-arid areas characterized by the inadequate rain fall, necessary for proper leaching down of excessive salts. Aggravating to this problem is brackish and salt-laden under ground water at varying degrees, which renders irrigation water in-hospitable and detrimental for the healthy flourish of citrus. The other problem confronted by our citrus fruits is a rapid degradation in fruit quality characters and the over all situations warrants not to go let loose but to find out a pragmatic solution.

Rough lemon root-stock, which is sensitive to salt conditions, is no more desired. In addition to its less tolerance to the salty soils, it produces poor quality fruit of the scion varieties, which is highly mismatching to the important quality parameters particularly from international trade quality considerations of citrus fruits. This problem creates imperative for its early addressed. Available literature of citrus abound, in valid reference about the usage of double grafting technique for citrus improvement employing suitable root-stocks for the perceived objective.

The use of inter-stems have been reported by various workers chiefly to over-come graft incompatibility between desired scion varieties and the root-stocks, obtaining dwarfing effect and for inducing disease tolerance in the scion varieties. Hartmann and Kester (1958) reported better performance of inter-stocked plants. Tanaka *et al*. (1979) employing Satsuma and Sanbakan as inter-stocks obtained better performance of Valencia Late. For obtaining salt tolerance, Douglas and Walker (1983) obtained better results in Rangpur Lime as being "Cl" excluder as a primary root-stock.

Observing the role of inter-stocks on fruit quality, Endrew *et al.* (1992) found

that N.Z. grapefruit was blond tasted where Orlando tangelo was used as inter-stem on trifoliate root-stock reported root-stock hybrids viz. Carrizo Citrange, Troyer Citrange and Citrumello, produced high juice contents and total soluble solids, favorable acid ratio and highest juice color ranking in scion cultivars as compared to Rough Lemon. Niaz *et al*. (2000) obtained better quality characters of Musambi orange using graft wood of Orlando tangelo and Kinnow mandarin as inter-stems as compared to the plants directly budded on Rough Lemon root-stock.

In the back ground of established and valid research findings that confirm Rangpur Lime as a potent salt excluder root-stock and various citranges (Carrizo, Troyer and Citrumelloes) are qualities improving root-stocks; their combination can be well exploited to prepare double grafted plants. Using Rangpur Lime as primary root-stock for salt tolerance and Carrizo, Troyer or *Citrus aurantium* (Gada Dehi) as inter-stem for quality improving purpose of any desired scion variety. Employing this pragmatic, simple and less cumbersome technique, can effectively address the dual problem of salinity and quality degradation of a wide array of commercial citrus cultivars in our breath.

Technique for the preparation of double grafted plants

Technique for the preparation of double grafted plants is simple and precludes any type of technical complexities. However, the real wisdom rest on the choice of suitable combination of stock and inter-stem. For this purpose, following guidelines are suffice to write for the preparation double grafted plants.

1) Select Rangpur lime as root-stock for salt tolerance.

2) Select graft wood of Carrizo, Citrange or Troyer Citrange as inter-stock.

3) Select desired scion variety particularly the variety of commercial significance.

4) Extract Rangpur Lime seeds from its fruit and treat them with N.A.A at 100 ppm for enhancing their germination ability during Aug, Sep.

5) Transplant nursery seedlings after 6 months in field, establishing it in proper rows and distance.

6) After 6 months i.e. during coming Sep; grafting the plants with the afore mentioned graft wood as inter-stem. All the inter-stems should be equal in size i.e. 10 cm each.

7) Grafting of inter stock is carried out at 30 cm from ground level.

8) After 6 months graft the desired scion variety of inter-stocked plants. After another 6 months, double grafted plants will be ready for permanent orchard plantation.

Time taken for the Preparation of double grafted plants

a. From seed sowing to bud-able attainment. 1 year
b. From inter-stock grafting to proper inter-stock growth. 9 months
c. Scion grafting to proper attainment of canopy size 9 months

Total= A+B+C=12+9+9

30 months/2.5 years

Availability of Rangpur Lime and Citranges rootstocks

Salt tolerant rootstock (Citranges, C-35 and Citrumello etc.), bearing experimental testimony of fruit quality improvement are available at Horticultural Research Station, Sahiwal

and most probably at Horticultural Department, University of Agriculture, Faisalabad. At Horticultural Research Station, Sahiwal, systematic work on double grafting has already been initiated and about 30 double grafted plants have been prepared according to following combinations:

1 Rangpur Lime as root-stock and Sweet Lime as inter-stock

2 Rangpur Lime as root-stock and Carrizo Citrange as inter-stock

3 Rangpur Lime as root-stock and C-35 Citrange as inter-stock

4 Rangpur Lime as root-stock and Gada Dehi as inter-stock

5. Scion variety Kinnow directly budded on Rangpur Lime root-stock.

In a11 the above mentioned combinations Kinnow has been used as scion variety.

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