Learning from old practices and local farmers to improve and assure rootstock quality of Nagpur mandarin saplings: Performance of Nagpur mandarin buds on Rangpur lime (C. limonia) and Rough lemon (C. jambhiri) rootstock

All across India, Nagpur mandarin trees have been declining earlier much to the dismay of farmers. The trees tolerant to early citrus decline phenomenon are grown by farmers from the Amravati district. What are they doing differently?

Citrus in India is grown in 0.9 million ha with a total production of 8.70 million tonnes. The most important commercial citrus cultivars in India are the mandarin (Citrus reticulata Blanco), followed by sweet orange (Citrus sinensis Osbeck) and acid lime (Citrus aurantifolia Swingle). Citrus cultivation largely occurs in the Vidarbha region of Maharashtra state where over 350 public and private Nagpur mandarin nurseries that raise and sell budlings. In the villages Bargaon, Nagziri and Jarud farmers earned in 2009 on average only 11,671 Rupiah per acre with their fruit trees due low harvest results, which contributed to 42% of their total income earned. Rangpur lime (Citrus limonia) and Rough lemon (Citrus jambhiri) are citrus trees that produce extremely acidic fruits. While their fruits are sour and unpalatable, their hardy root systems make them valuable as rootstock for other citrus species. The Nagpur mandarin produces delicious fruit that is a favourite in the markets of India, but farmers often have difficulty growing them due to their poor tolerance to abiotic and biotic stresses especially Phytophthora foot rot disease. By budding a Nagpur mandarin bud onto a Rangpur lime or Rough lemon rootstock, farmers can overcome this problem and take advantage of the Nagpur mandarin’s delicious fruit. This budding technique is common among citrus growing farmers. Knowledgeable farmers recognize that both Nagpur mandarin scion is better budded onto a Rangpur lime rootstock whereas an orange bud is better performed onto a rough lemon rootstock. Farmers are willing to pay an additional Rs 10 to 15 per sapling for the suitable scion-rootstock combination, as the quality saplings sell for more then Rs 25 against Rs 15 for ordinary saplings that are budded on inferior rootstock material.

Twenty five years ago, local farmers used to grow their own rootstock mother plants or buy the saplings from trusted local nurseries. Farmers supplied the nurseries with the seeds of their own rootstock mother plants to ensure qualitative saplings with the right rootstock. Farmers today solely rely on buying rootstock from large distant nurseries as farmers and government are keen to
increase area under commercial plantation. Many unscrupulous nurseries generally do not maintain mother blocks of Rangpur lime rootstock seeds and import their seeds from outside northern Himalayan foothills states. Rootstock seeds are randomly collected from different citrus species, mostly from Galgal (C. pseudolimon) trees (which are not the preferred rootstock material) regardless of their growth performance. In addition, these seedlings are raised without much care. Instead of receiving the better quality Rangpur lime or Rough lemon seeds, farmers have unknowingly been buying mixtures of rootstocks containing Galgal. Nagpur mandarin scions budded onto Galgal rootstocks initially look vigorous and healthy, however, these cut the life spans of the trees from 25 years to 10 years and make the trees susceptible to the *Phytophthora* disease. In recent years, farmers have had to replant orchards every 10 years resulting in huge economic losses to the farmers. This huge shortage in quality planting material has resulted in unnecessary replanting (increasing cost of production overtime) and led to decline in citrus production.

Fortunately, a farmer, Udhav Futane, in Amravati continues the tradition of growing his own rootstock seedlings (see picture below). By having his own Rangpur lime and Rough lemon mother trees, Udhav Futane ensures use of quality rootstock supply. His trees are healthier and produce for longer periods of time. Additionally, he selectively picks and grows seeds from his best performing rootstock trees. He also selects the budding materials from the best performing Nagpur mandarin trees to bud on the rootstock seedling. This gives Udhav Futane a distinct advantage over other Nagpur mandarin growers and makes him a choice of preferred nursery. There are three local farmers in Amravati that have adopted such good practice of growing and selling reliable Rangpur lime and Rough lemon rootstocks to local farmers. Vasant Madhavrao Wankhede is another enthusiastic nurseryman in Borgaon community. Vasant identified two mother trees in declined Nagpur mandarin orchards. He cut down all trees of mandarin orchards and started nurseries and sericulture. He harvested 2000 seeds from two mother trees and used them to grow budding. He has also planted about 10 to 12 mother trees along the boundary of the nursery of his field to have more quality seed for rootstock. After budding, he can sell his saplings for Rs 35 each to his fellow farmers, still not able to meet the demand. Not only do the owners of the nursery get paid an additional 10 to 15 rupees per sapling, but the local farmers increase their income by enhancing their productivity by extending the lifespan of the orchard by 10 to 15 years and reducing diseases. Farmers should also be encouraged to grow a few mother trees in their gardens like Udhav Futane and Vasant Wankhade. If this good practice is adopted on a larger scale, environmental, social and economic benefits will occur.

[This short story gives a good insight into the value of mother trees maintenance for specific rootstock, how it is maintained and used successfully in the field, how it contributes to the livelihoods and well-being of many rural households. The UNEP/GEF funded project identified the efforts and role of these innovative nurserymen as a good practice of diversity management that is selected for further strengthening and scaling within the community and elsewhere.]

(Compiled by Sara Hom, IP Singh, V. Ramanatha Rao, Hugo Lamers and Bhuvon Shhapit)