The Citrus Variety Improvement Program in Northeastern Brazil After 15 Years

H. P. Santos Filho, O. S. Passos, A. P. da Cunha Sobrinho, C. de J. Barbosa, and O. Nickel

ABSTRACT. The citrus variety program in northeastern Brazil began in 1983 with the purpose of producing virus-free plants by shoot-tip grafting selected varieties in Bahia. The resultant plants were indexed to ensure their virus-free status and then propagated. Virus-free budwood was then released to commercial nurseries in small quantities to establish new foundation and multiplication blocks, and to establish primary sources for certified trees. Superior field trees from commercial cultivars were selected and indexed for tristeza, exocortis, psorosis, cachexia, and citrus variegated chlorosis. Each selection was shoot-tip grafted, indexed, inoculated with a mild strain of citrus tristeza virus and evaluated for horticultural characteristics upon fruit production. This program has established 10 foundation and 50 multiplication blocks in commercial nurseries and government institutions. This program now makes budwood certification possible.

The absence of citrus budwood certification programs based on strict regulations has hampered efforts of Brazilian states to establish disease-free material. Graft- and insect-transmissible disease agents are widespread in northeastern Brazil which has led to severe losses. Tristeza, exocortis, cachexia, psorosis, Bahia bark-scaling (formerly tBA psorosis), vein enation and citrus variegated chlorosis (CVC) have all been detected in commercial orchards, with most trees being infected (1, 10, 12). In order to overcome this situation, Embrapa Cassava and Tropical Fruits began a program in 1983 to produce disease-free, true-to-type citrus for both commercial propagation and research purposes (10). Initially, plants in the germplasm collection were evaluated, after which superior commercial clones were selected as described by Navarro (4, 5).

The following varieties were selected after screening: sweet orange (Lima, Bahia CNPMF 01, Rubi, Pera D6 and D9, Natal CNPOMF112 and Valencia CNPMF27), mandarin (Mexerica and Ponkan), Murcott tangor and Tahiti lime (2, 11, 13). They were indexed for tristeza by ELISA, CVC by PCR and ELISA, and exocortis, cachexia, psorosis, concave gum, and vein enation by standard biological indexing (8). Bahia bark-scaling was tested by the mmuno-fluorescence assay developed by Nickel (7).

Shoot-tip grafting was carried out as described by Navarro et al. (6). The technique developed by de Lange (3), where the shoot-tip grafted plants were grafted onto established rootstocks after the graft had taken, was modified by grafting immediately after the shoot tip was placed on the recipient seedling (9). This resulted in an 80% graft success rate, compared to 70% with the de Lange method, and a 30% higher plant survival rate than those obtained via the method of Navarro et al. (6) after 60 d.

The shoot-tip grafted plants were re-indexed to ensure their disease-free status, then multiplied and established in a field block, both with and without protection using mild tristeza strains for horticultural evaluation. Leaf and fruit morphology were evaluated in greenhouse grown plants, and comparison of growth and fruit characteristics between the virus-free trees and cross-protected trees. The trees were re-tested for tristeza each year; exocortis every 3 yr; and other viruses every 6 yr.

Foundation trees have been established at 10 government and private locations. Surveys in all these blocks have shown that they are still free of viruses and viroids, and that the stability of the protective tristeza mild strains has been maintained.

Unfortunately, the rules and procedures established for citrus budwood certification have not yet been applied to the northeastern states of Brazil despite the establishment of virus-free foundation blocks.

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