# CRI Citrus Foundation Block – Rootstock Seed Production

The objective of the Citrus Improvement Scheme and its Foundation Block (CFB) is to increase the profitability of the southern African citrus industry, by ensuring that growers are supplied with nursery trees of the highest possible quality, made from the best genetic citrus material and being free from any harmful pathogens.

At present, the various rootstock cultivars (see Table 1) are grown at CFB with the aim of supplying good quality disease-free citrus seed as demanded by the southern African citrus industry. Surplus seed are exported to countries such as China, Chile, Thailand, Australia, Réunion, Dominican Republic, United States of America, Zimbabwe, Mozambique, Zambia, Namibia, Egypt and Spain.

**Table 1:** Rootstock cultivars planted at CFB with the aim of seed production

| Cultivar | Number of trees | Annual seed yield (Litres) |
|---|---|---|
| C35 citrange | 471 | 354 |
| Carrizo citrange | 561 | 1261 |
| Cleopatra mandarin | 46 | 30 |
| M×T (Minneola × Trifoliate) | 119 | 114 |
| Rough lemon Cairn | 247 | 186 |
| Rough lemon Shaub | 107 | 100 |
| Swingle citrumelo | 370 | 645 |
| Troyer citrange | 156 | 384 |
| Volckameriana | 60 | 90 |
| X639 (Cleo × Trifoliate) | 335 | 129 |
| Yuma citrange | 12 | 27 |

## Phytosanitary quality of seed produces at CFB

In Table 2, various factors and actions are described to demonstrate the phytosanitary quality of seed from CFB. In order to put this very important aspect into context of safe trade of citrus seed, the citrus diseases regarded as seed transmissible are listed in the table below with scientific references and brief statement of its applicability to the South African and CFB context.

**Table 2:** Citrus pathogens proven to be seed transmissible

| Citrus disease | Causal pathogen(s) | Scientific reference | SA and CFB context |
|---|---|---|---|
| Leaf Blotch | Virus | Guerri, Pina, Vives, Navarro. & Moreno (2004) Plant Dis. 88: 906. | Does not occur in South Africa; see also points 3 and 4 below. |
| Psorosis | Virus | Campiglia, Silviera & Salibe (1976) In: Proc. 7th Conf. IOCV., IOCV, Riverside CA. E.C. Calavan (Ed). | Almost completely eradicated in South Africa in 1960s; no infected trees known at present. CFB is free from psorosis disease; see also points 3 and 4 below. |
| Variegated chlorosis | *Xylella fastidiosa* | Li, Pria, Lacava, Qin & Hartung (2003) Phytopath. 93: 953-958. | Not present in South Africa |
| Asiatic greening | "*Candidatus* Liberibacter asiaticus" | No scientific proof; Experimental findings showing possible seed | Asiatic greening does not occur in South Africa. African Greening as caused by "*Ca*. L. africanus", which |

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| | | transmissibility prompted USDA to issue a restriction on seed imports (25 January 2008). | is endemic in certain areas in South Africa. However, the CFB is free from greening disease; see also points 3 and 4 below. |
| Citrus Canker | *Xanthomonas smithii* ssp. *citri* | No scientific proof; seed can become contaminated when harvested from infected fruit | Does not occur in South Africa; see also points 3 and 4 below. |

Please note that other diseases and pests often of concern, such as Citrus Black Spot (CBS, caused by *Guignardia citricarpa*), Citrus nematode (*Tylenchulus semipenetrans*) and various citrus viroids, are not seed transmissible [Bitters, Brusca & Dukeshire (1954) Citrus Leaves 34: 8. (Cited by J.S. Semancik, http://www.dpvweb.net/dpv/showdpv.php?dpvno=226)]. Moreover, CFB is free from CBS as proven by annual surveys described in point 4 below.

## 1. Location of Citrus Foundation Block (CFB)

The CFB is located in the Eastern Cape province of South Africa near Uitenhage in a secluded valley where citrus is not commercially grown. The nearest commercial citrus orchards are located in Kirkwood, which is approximately 40 km from the CFB. To preserve this secluded location, South Africa's Department of Agriculture (DoA), which is the National Plant Protection Organisation of South Africa, endorsed a 5 km exclusion zone around the CFB in which no citrus trees are allowed to be grown, commercially or in home gardens.

## 2. All rootstock trees were planted virus-free

Regardless of its origin, any rootstock cultivar selected to be planted at CFB must first be proven virus free after shoot-tip grafting and subsequent diagnostic testing (including hard wood biological indexing, ELISA and/or PCR) before it is multiplied in vector-free tunnels and planted.

## 3. Preventative spray programmes

All citrus trees at CFB are subjected to a rigorous fungicide and pesticide spray programme aimed at prevention of fungal diseases and insect pests. Regular scouting is done in all tunnels and orchards to ensure the disease and pest-free status of the CFB.

## 4. Annual inspections

All trees in the CFB are inspected annually during the winter harvesting period (July – August) by technical experts from DoA and CRI, which includes plant pathologists, entomologists and horticulturists. Suspicious fruit or foliar symptoms are studied by this team of experts and should any uncertainty prevail, samples are subjected to molecular diagnostic procedures.

## 5. Postharvest treatment of seed

Fruit is harvested by means of hand picking. Seed is extracted by a seed extraction machine and immersed in hot water at 51.5°C for 10 minutes and thereafter dip-treated with 8-hydroxy-quinolene sulphate (Chinosol) at 15g/litre. This surface disinfection treatment prevents viral, bacterial or fungal contamination from unknown sources, and prolongs the storage life of seed. Treated seed are dried in the shade and hand sorted. Subsequently, it is packed in 1- or 2-litre plastic bags and stored at 10°C. Optionally, bulk orders are packed in larger containers.

More Information

For more information on seed production or orders, please visit www.citrusres.com/ or contact the CFB Manager, Thys du Toit at tdt@cri.co.za.

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