

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 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 Afghanistan, Angola, Australia, Botswana, China, Chile, Democratic Republic of the Congo, Dominican Republic, Egypt, Kenya, Morocco, Mozambique, Namibia, Portugal, Réunion, Spain, Thailand, United Arab Emirates, Zambia and Zimbabwe.

The following rootstock cultivars are established at CFB:

- C35 citrange
- Carrizo citrange
- M×T (Minneola × Trifoliata)
- Rough lemon Cairn
- Rough lemon Schaub
- Swingle citrumelo
- Volckameriana
- X639 (Cleo × Trifoliata)

Phytosanitary quality of seed produced 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, or previously considered, to be seed transmissible

Citrus disease	Causal pathogen(s)	Scientific reference	SA and CFB context
<i>Scientifically proven seed transmissible pathogens</i>			
Leaf Blotch	Virus	Guerra <i>et al.</i> (2004) Plant Dis. 88: 906.	Does not occur in South Africa; see also points 3 and 4 below.
Citrus Infectious Variegation	Virus	Davino <i>et al.</i> (1983) 10 th IOCV Conference, pg 322-326.	Does not occur in South Africa; see also points 3 and 4 below.
Citrus Canker	<i>Xanthomonas axonopodis</i>	No scientific proof, but seed can become contaminated when harvested from infected fruit	Does not occur in South Africa; see also points 3 and 4 below.
<i>Pathogens erroneously considered to be seed transmissible</i>			
Citrus greening	<i>C. Liberibacter asiaticus</i> , <i>C. L. africanus</i> or <i>C. L. americanus</i>	No scientific proof; Experimental findings showing possible seed transmissibility. Several subsequent studies failed to show any seed transmissibility.	Asiatic greening does not occur in South Africa. African Greening as caused by “ <i>Ca. L. africanus</i> ”, which is endemic in certain areas in South Africa. However, the CFB is free from greening disease; see also points 3 and 4 below.
Psorosis	Virus	Campiglia <i>et al.</i> (1976) 7 th Conf. IOCV. Study could not be confirmed and considered to be mistaken identification.	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.

Mal secco	<i>Plenodomus tracheiphilus</i> (syn. <i>Phoma tracheiphila</i>)	Fungus colonises seed coats and not embryos; cannot pass from seed coat to developing embryo.	Does not occur in South Africa; see also points 3 and 4 below.
Variiegated chlorosis	<i>Xylella fastidiosa</i>	Scientifically proven not to be seed transmissible.	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 *Phyllosticta 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 citrus biosecurity in this secluded location, South Africa's Department of Agriculture, Forestry and Fisheries (DAFF), which is the National Plant Protection Organisation of South Africa, promulgated 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 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 DAFF 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 from fruit and washed in hydrated lime (20 g/L for 3 minutes). All seed is immersed in hot water at 51.5°C for 10 minutes and thereafter treated with 8 hydroxy-quinolene sulphate (Chinosol) 15 g/litre. This surface disinfection treatment prevents bacterial or fungal contamination from unknown sources and prolongs the storage life of seed. Treated seed are air-dried and hand sorted. Subsequently, it is packed in 1- or 2-litre plastic bags and stored at 5-10°C.

For more information on seed production or orders, please visit <http://www.citrusres.com/cis/downloads> or contact the CIS Manager, Dr. Paul Fourie at phf@cri.co.za.