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THE CHOICE OF A CITRUS ROOTSTOCK, RESISTANT TO
TRISTEZA FOR GUYANA

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The Ministry of Agriculture recognizes the desirability of expanding the citrus industry, and plans to establish citrus plantations in areas such as Matthew's Ridge, the North West District, the Tumatumari area and other co-operative land development schemes.

Apart from fresh fruits and juices, a variety of citrus marmalades and preserves can also be produced. The refuse, comprising of peel, pulp and seeds, can be ground with a small amount of lime and dried to produce stock-feed. This feed is an excellent carbohydrate conditioning food for beef and dairy cattle. Citrus molasses and press liquor resulting from the manufacture of stock feed is used in the manufacture of mixed stockfeeds and alcohol. Citrus peel oils are highly prized for their flavouring qualities. Ethyl alcohol is produced from waste citrus juices, and table wines are made from citrus juices (2). Thus it is evident that a good citrus industry can lead to the development of auxiliary industries.

Although oranges and grape fruits have been produced in several areas for many years there are a number of citrus diseases recorded in Guyana.

1. Foot rot caused by *Phytophthora gummosis* is one of the main diseases and in older trees it is followed by heart rot. The situation is worsened by termite, condition of high humidity and excessive growth of weeds.

2. In 1962 vein clearing and stem pitting symptoms of tristeza were observed on West Indian Lime C. aurantifolia. In 1968 S. Bisessar

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found that West Indian Lime (C. aurantifolia) and sweet orange C. sinensis growing on sour orange rootstock were infected with a mild strain of TRISTEZA.

In 1970 the presence of tristeza on citrus was confirmed at No. 63 Sub Station-Corentyne, Mara-Berbice River area, the Pomeroon, area and Hosororo-North West District. The citrus raphid, Toxoptera citricidus a potent vector of TRISTEZA is recorded in Guyana since 1956. Until 1968 about 90 percent of the citrus rootstock used was sour orange C. aurantium which is well known to be susceptible to Tristeza. (1).

3. Recent tests indicate that among the other viruses, at least Xyloporosis is present.

Rootstocks exert a significant influence on the growth and production of citrus trees. The choice of a rootstock could be the most important single factor responsible for the success or failure of the citrus industry. During the early thirties a root disease attacked the lime groves of the West Indies and killed lime trees on their own roots. With the use of appropriate citrus rootstocks the lime industry has been rehabilitated. Similarly, the citrus industry of Brazil and Argentina was almost destroyed by a virus disease- Tristeza. Here again with the use of Tristeza tolerant rootstocks, the citrus industries in these two countries have been rehabilitated and expanded beyond that of the pre-TRISTEZA period. (6).

In view of the fact that:

- (I) Tristeza is present in Guyana.
- (II) Tristeza has wiped out citrus industries in other countries.
- (III) We are using Tristeza susceptible rootstock.
- (IV) Rootstocks resistant to Tristeza are available.

It is felt that possibilities of replacement of the Tristeza susceptible rootstock with a resistant rootstock should be explored.

Studies on the performance of different citrus rootstocks were carried out in Trinidad by I. Hosein and his data are presented in Table I.

TABLE I

Root stock	Tolerance to tristeza	Tolerance to Exocortis	Resistance to foot-rot or Gum-mosis	Fruit Quality	Vigour	Suitable soil type	Length to period of commercial quality	Yield
Sour Orange	No	Yes	Good	Excellent	Good	Clayey to loam	Long	Good
Rough Lemon	Yes	Yes	Poor	Poor	Excellent	Sandy	Short	Very Good
Cleopatra Mandarin	Yes	Yes	Good	Excellent	Fair	Clayey to Sandy	Long	Good
Troyer Citrange	Yes	No	Good	Excellent	Good	Clayey to loam	Long	Good
Rangpur Lime	Yes	No	Good	Fair	Excellent	Clayey to loam	Average	Very Good
Sweet Orange	Yes	Yes	Poor	Good	Fair	Sandy to Loam	Long	Good

The performance of different rootstocks in Trinidad suggests that -

1. Rangpur lime could be used as a rootstock where the soil is heavy.

This rootstock is resistant to tristeza but is susceptible to Exocortis. This exocortis can however, be easily controlled by using disease free budwood,

which is possible to obtain from trees that are tested. It is a very vigorous rootstock and produces fruits of acceptable quality. It is resistant to Phytophthora gummosis in the same order as sour orange. Thus it is felt that it can easily replace the sour orange on heavy clay soils.

2. Three different rootstocks, i.e., Rough lemon C. jambhiri, Cleopatra mandarin, C. reticulata and Sweet orange C. sinensis are poor in relation to Phytophthora gummosis. At any rate gummosis is not too much of a problem on the sandy soils and this disease can be controlled if the plants are treated as soon as they show signs of gummosis. Rough lemon C. jambhiri is most vigorous, it produces high yield, but quality of fruits produced is poor. Production of Cleopatra mandarin C. reticulata on sandy soil is low and it is also slow growing.

Sweet orange C. sinensis produces good quality fruits. Some more detailed studies on the suitability of sweet orange and rough lemon as a citrus rootstock needs to be carried out. A programme should be set up to test these various rootstocks in different areas in the country. The possible areas might be Ebini, Central Horticultural Station, Matthew's Ridge and Wauna.

Program for testing budwood in Guyana -

Parent trees should be selected on the basis of-

- (1) General performance
- (2) Fruit quality and size
- (3) Vigour of tree
- (4) Resistance to virus diseases
- (5) Resistance to Phytophthora gummosis

These parent trees will be identified and numbered so that proper records will be maintained. Each selected parent tree will be tested for the various

strains of virus diseases. The motive will be to have virus free budwood locally so that exocortis will not be a problem. All propagation nurseries will have to ensure that relatively clean budwood is used in all propagation work.

The viruses that would be tested for, are Tristeza, psorosis, Exocortis and Xyloporosis. Different test plants will be used for each virus. The various parts of the plant will be examined for virus symptoms.

Table II will explain this procedure.

TABLE II

Virus	Test Plant	Operations after bud has taken	Path for examination	Symptoms of Disease	Other Notes
1. Tristeza	Lime Seedlings	1. Lime seedlings cut back to leave three leaves above the bud insert 2. All other leaves and buds cut back	1. New flushes of the lime seedling 2. After 6 months, stems of the lime seedling with bark removed	1. Vein clearing 2. Stunting or yellowing 3. Stem pitting from exposed stem after 6 months	1. Observations to be made on seedlings every 3 days for 6 months
2. Peorosis	Sweet orange Seedlings	1. Sweet orange seedlings allowed to grow	1. New flushes of the sweet orange seedlings 2. Stems of the stem orange seedlings	1. Inter vein clearing of new flushes 2. Characteristic scaling of bark on stems	1. Observations to be made on seedlings every 3 months for 3 years 2. Plants can then be transferred for further observations to permanent orchard
3. Xylem necrosis	Orlando Tangelo Seedlings	1. Orlando Tangelo seedlings stock cut back and the bud allowed to develop	1. The wood of the section just across the bud union prepared by the removal of a piece of the bark	1. Gummy in the bark 2. Discoloured pith and pith in the wood	1. Observations to be first made after 18 months and then after every 6 months for 3 years
4. Necrotic	Rangpur Lime Seedlings	1. Rangpur lime seedlings cut back to leave four buds above the bud insert 2. All other leaves, branches and buds removed except the bud being tested	1. Rangpur lime stems	1. Yellow stem blotches 2. Cracking or lesions of the stem	1. Observations to be made every 3 months for a year 2. The bud can then be allowed to develop fully and the whole plant transferred for further observations to a permanent orchard.

The buds taken from selected parent trees will be inserted into the indicators. Buds will be in turn taken from these indicators and budded on to selected parent trees subsequently. Detection of a simple virus in a tree, parent or indicator eliminates it from the indexing programme. This will ensure that budwoods used for future propagation are free of the virus diseases.

SUMMARY

According to reports and the finding of the Plant Pathologist there is proof to believe that there exists some strain of virus disease in the country. The fact that sour orange as a rootstock has been exclusively used for the past years is a clear indication that the citrus industry is at stake, if ever the severe strain of Tristeza disease is to strike Guyana. It is better to start now and set up a programme so that a suitable rootstock can be used in Guyana to combat the Tristeza disease. A screening and indexing programme is necessary. The test plants to be used are sweet orange (C. sinensis) for Psorosis Virus, Orlando tangelo for Xyloporosis, Rangpur lime for Exocortis and West Indian lime (C. aurantifolia) for tristeza.

Rangpur lime as a rootstock should be used on the heavier soils, and rough lemon for lighter soils. Rangpur lime is susceptible to exocortis and this is only transmitted by infected budwood, therefore, all budwood must be virus free before it can be used.

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