# Behavior of Seedling Lines of Citrus Naturally Infected with Tristeza Virus

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This paper reports results of an examination carried out in three citrus variety collections at Limeira Experimental Station, Limeira, to determine the incidence of tristeza stem pitting.

Varieties were evaluated in relation to their response to tristeza virus since many are potential rootstock or scion material (*1*). Trees were infected naturally with tristeza in the field, where *Toxoptera citricidus* Kirk. was abundant.

Stem pitting in an older variety planting at Limeira was reported by Salibe (*4*). Varieties in our study are different from those studied by Salibe.

## MATERIALS, METHODS, AND RESULTS

All trees were propagated from seedlings, and budded on Rangpur lime. The collections examined are six, eight, and 15 years old.

Three trees of each variety were examined by removing the bark from three branches, about 18 months old, on each tree. The peeled branches were rated as not pitted, slightly pitted, moderately pitted, strongly pitted, or very strongly pitted (fig. 1). The average determined the final classification of each variety.

NOT PITTED

**Sweet Oranges**

Baiana Retiro
Biondo
Bizri
Boa Vista
Caipira
Campista
Corsa Comune
Do Céu
Doppio Sanguigno Acireale
Feijão Crú
Grosse Sanguigno
Imperial
Itaboraí

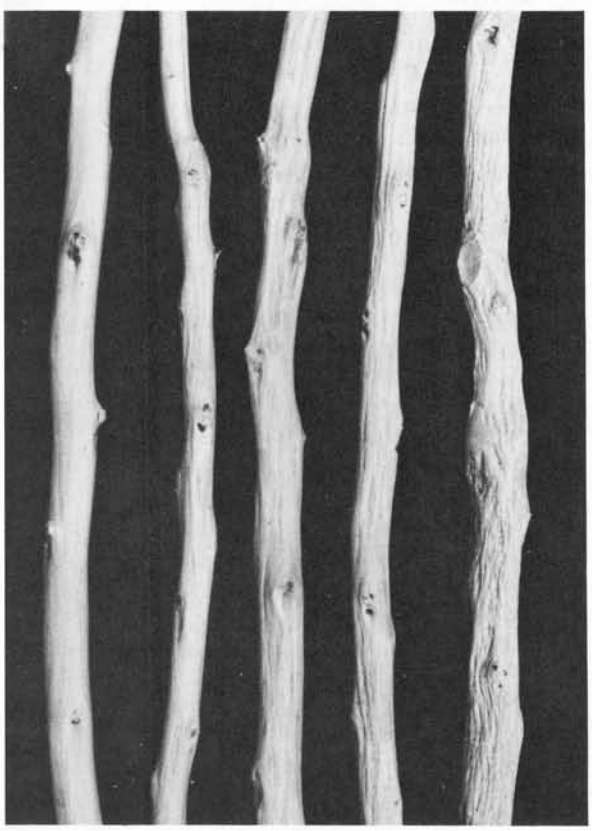

**Fig. 1. Left to right: Effect of tristeza on branches of sweet orange varieties Valencia Colorida (not pitted); Moro (slightly pitted); Seleta Branca (moderately pitted); Ovale Sanguigna (strongly pitted); and Sanguinello de Acireale (very strongly pitted).**

João Nunes
José Paulino
Kinarti
Lanceta
Lara Campos
Limonada
Lisa Paulista
Mangaratiba
Magnum Bonum
Maracãna
Mimo do Céu
Non Pareil
Paulista
Parnazode Franca
Pingo de Ouro
Santa Lucia
São José
Sanguinea Piracicaba
Sanguinello Commune
Setubal
Serrana
Serra D'Agua
Tarocco Acireale
Valencia Olinda
Valencia Palida
Valencia Colorida
Vaccaro
Vermelha
Zancheta

**Tangerines**

Avana
Batangas
Big of Sicily
Cape Naartje
Dancy
Emperor
Giant of Sicily
Israel
Improved
Jaragua do Sul
Kara
Kaula
Large Local
Loose Jacket
Mel
Osceola
Rio
Romana
Santa Cruz
Scarlet
Siracusa
Tardivo de Ciaculli
Thomas
Weshart

**Lemons**

Armstrong
Deodoro
Estes
Flat Branch
Feminello Santa Thereza
Feminello Siracusa
Gênova
Inerme
Indiano
Limone Sanguigno
Lisboa
Meśsina
Meyer
Milan
Monachello
Nostralle
Peretto
Rough lemon
Sicilia
Vicosa

**Sour Oranges**

Amaro Caldo Pølposo
Bigarade
Corrugada
Iwaikan
Sicilia
Off Type
Willow Branch

**Limes**

Americana
Da Persia
De Umbigo
Teheran

**Shaddocks**

Ácida
Doce
Indochina
Siameza
Sunshine

**Citrons**

Cedrat Robbs el Arsa

**Tangelos**

São Jacinto
Seminole

**Tangors**

India
Moreira
Ouro
Tangerona

**Rangpur Limes**

Borneo
Cravo Limeira
India
Kusaie
Otaheite
Philippine Red lime
Rose lime
Red Ling Mung
Santa Barbara Red
Taquaritinga

**Miscellaneous**

Baia × Mexirica
Calamondin
Citremon
Citrumelo 4475
*Citrus bergamia*
*C. depressa*
*C. karna*
*C. keraji*
*C. kokhai*
*C. kimikawa*
*C. pectinifera*
*C. volkameriana*
*C. yatsushiro*
*Severinia buxifolia*
Szibat × Tizon

SLIGHTLY PITTED

**Sweet Oranges**

Abacaxi
Acoriana
Baia Rosada
Baiana Valente
Baia Monte Parnazo
Baia Tomazelli
Branca
Champagne
Cléopatra
Corôa
Corôa de Rei
Coronel
Cipó
Itacurucá
Macaé
Malta Blood
Melrose
Monjolo
Moro
Parnazo de Goiaz
Pera sem sementes
Portuguaise
Rosa
Rubi Blood
Sanguinello Allungato
Sanguinello Marrocos
Sanguinello Moscato
Sanguinello Polidori
Sanguinea Venturi
Tomango
Washington Florida

**Limes**

Francana
Sharbutty
Tahiti B. Horizonte

**Shaddocks**

Periforme
Yau Tau
Zamboa

**Citrons**

Cedrat de Corse
Diamante
Rosada

**Tangelos**

Minneola

**Tangors**

Sabara
Temple
Umatilla

**Miscellaneous**

*C. funadoko*
Laranja × Pomelo
Periforme (lemon?)
Sangue de Boi (tangor?)
Sunwuinkon

MODERATELY PITTED

**Sweet Oranges**

Baia Tremembé
Cacau
Campista
Côco
Demi Sanguigna
Moro Palazelli
Ovale de Siracusa
Seleta Branca

**Limes**

Galego Taquari

**Shaddocks**

Singapura

**Grapefruit**

Pernambuco

**Miscellaneous**

Camargo (lemon?)
*Citrus yukitsu*
*C. volkameriana* de Catania
Mexerica do Pará
Mexerica Paraguaia (tangor?)
Rio Claro (lemon?)

STRONGLY PITTED

**Sweet Oranges**

Alexandre Pereira
Baia Gigante
Corsa Tardia
Ovale Sanguigna
Pera Caire
Pera de Abril

**Limes**

Cristal

**Grapefruit**

Leonardy

**Tangors**

Maracujá
Reticulata
São Pedro

**Shaddocks**

Kao Panne

**Citrange**

Uvalde

**Miscellaneous**

Acido (lemon?)
*Citrus pseudoparadisi*
Ingles (lemon?)
Ponderosa
São Matheus (lemon?)

VERY STRONGLY PITTED

**Sweet Oranges**

Misteriosa de Aquidauana
Ovale San Lio
Pera de Umbigo
Pera Mel
Pera Coroada
Sanguinello de Acireale

**Grapefruit**

Duncan
Foster
Hart's
Imperial
Marsh seedless
Red Blush
Royal
Retiro
Triumph
Thompson Pink

**Limes**

Biksi
Mexican lime
Thornless sweet lime

**Shaddock**

Chinesa

**Citrange**

Rusk

**Miscellaneous**

*Citrus macrophylla*
*C. excelsa*
*C. webberi*
Citrumello I-84/67
Meiwa kumquat
Nippon kumquat

## DISCUSSION AND CONCLUSIONS

Most orange, tangerine, and lemon varieties showed good tolerance to tristeza. Many of these have some potential commercial interest. Those varieties showing poor tolerance to the tristeza virus were Pera orange, grapefruit, and lime groups (*4*).

Among the grapefruit types only one, Pernambuco, was classified as moderately pitted. Pernambuco has fruits resembling those of an orange hybrid, but tastes like grapefruit. Fruits are very acid and have an average of 20 seeds per fruit. Variation in severity of stem pitting was found among trees of the same variety of grapefruit (*2*). One tree each of McCarthy, Leonardy, and Red Blush grapefruits was moderately pitted but most were very strongly pitted. Cedrat Robbs el Arsa citron was evaluated as not pitted, and trees were developing and producing well. These data suggest a need for preimmunization with mild strains if commercial orchards of susceptible varieties are to be grown (*3*).

## ACKNOWLEDGMENTS

The authors wish to acknowledge supplementary financial support from Conselho Nacional de Pesquisas.

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