

# TRISTEZA DISCOVERED IN TANGERINES IN ARIZONA

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Until October, 1962, Tristeza or "Quick Decline" virus disease of citrus was thought to be restricted in Arizona to the noncommercial variety of citrus called Meyer or Chinese lemon. Results of a state-wide virus survey, however, show this dangerous disease to be present in Clementine (Algerian) tangerine trees at the Yuma and Tempe Citrus Experiment Stations.

The first discovery of tristeza in Clementine tangerines (for which the commercial name is Algerian tangerine) in Arizona involved three trees on rough lemon roots which had been imported from California for planting at the Yuma Citrus Experiment Station about 1927.

These three trees, possibly infected when planted, have declined since 1950, with gradual reduction of vigor and yield. Subsequent virus indexing tests have revealed four additional cases of tristeza-infected tangerines at the Yuma Station and two have been found at the Tempe Citrus Experiment Station.

All six of the newly-found diseased trees apparently were grown from infected buds taken from the imported trees during the years 1946 to 1950. These recent propagations of diseased material are the cause of considerable

concern, since records indicate that most of the Clementine tangerines in Arizona are bud descendents of trees located on the Yuma Station. It is, therefore, entirely possible that numerous diseased tangerines have been distributed unknowingly throughout the citrus areas of Arizona.

## Rootstock is a Prime Factor

When sweet oranges, grapefruit, tangerines, tangelos, or limes are grown on Rough lemon, Troyer citrange, or Cleopatra mandarin roots, they are much more tolerant of tristeza than when these same varieties are grown on sour orange rootstock. Lemons are generally tolerant of the virus.

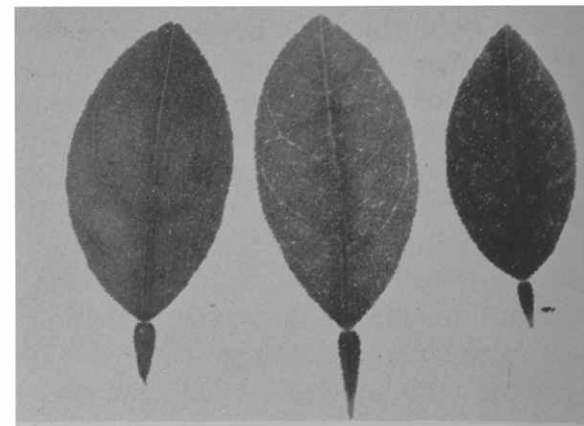
These circumstances cause the presence of tristeza in Arizona to be of considerable concern to the citrus industry in the Salt River Valley. Approximately 95 per cent of citrus grown in that area is on the susceptible sour orange root. In the Yuma area nearly all of the trees are being grown on the tristeza-tolerant Rough lemon root.

Although the immediate potential danger possibly is greater for the Salt River Valley area it must be noted that all commercial citrus varieties may serve as virus reservoirs, regardless of the root-scion combination. In Florida, several strains of tristeza virus have been recognized on the basis of severity of injury to susceptible varieties. New strains can be developed through mutation. Some newly developed strains may even be capable of causing severe decline of citrus on roots which are now presumed to be tolerant.

## Narrows Choice of Rootstock

In any event, the presence of tristeza will have the effect of restricting the

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TRISTEZA VEIN-CLEARING symptoms are shown in the two leaves of a Mexican lime, at right, after inoculation from Clementine tangerine. The healthy leaf, at left, is for comparison.

choice of rootstocks to those currently tolerant of the disease. Some of these may be undesirable for other reasons, such as susceptibility to diseases other than tristeza, lack of adaptability in a particular locality, or fruit yields of inferior quality or quantity.

## Insect Spread Is Possible

The presence of tristeza in a commercial variety cannot be regarded lightly. Tristeza is one of the few citrus viruses known to be transmitted from tree to tree by aphids. One of the insect vectors, or virus carriers, is the cotton or melon aphid (*Aphis gossypii* Glover), which is commonly found in all Arizona citrus areas. These aphids may be especially numerous where black mustard (*Brassica nigra* (L.) Koch) occurs as a common weed. Although *Aphis gossypii* is known to be an inefficient carrier of the virus causing tristeza it has been responsible for transmission of the disease in California and Florida.

## No Evidence of Spread

At present, there is no evidence that insect transmission of tristeza has occurred in Arizona. However, a note of caution must be emphasized regarding this point. Many reports of first recognition of tristeza in other parts of the world have included statements that indications of insect spread were lacking.

Continued study eventually showed that insect transmission actually was occurring in most locations. Many additional indexing tests will be required before satisfactory conclusions can be made regarding this possibility in Arizona.

## Prevent Inoculum Sources

Increase of inoculum sources of tristeza in Arizona groves must be prevented. In California, where tristeza (better known as Quick Decline) is still causing losses of thousands of trees each year, insect spread was enhanced by inadvertent establishment of numerous bud-propagat-

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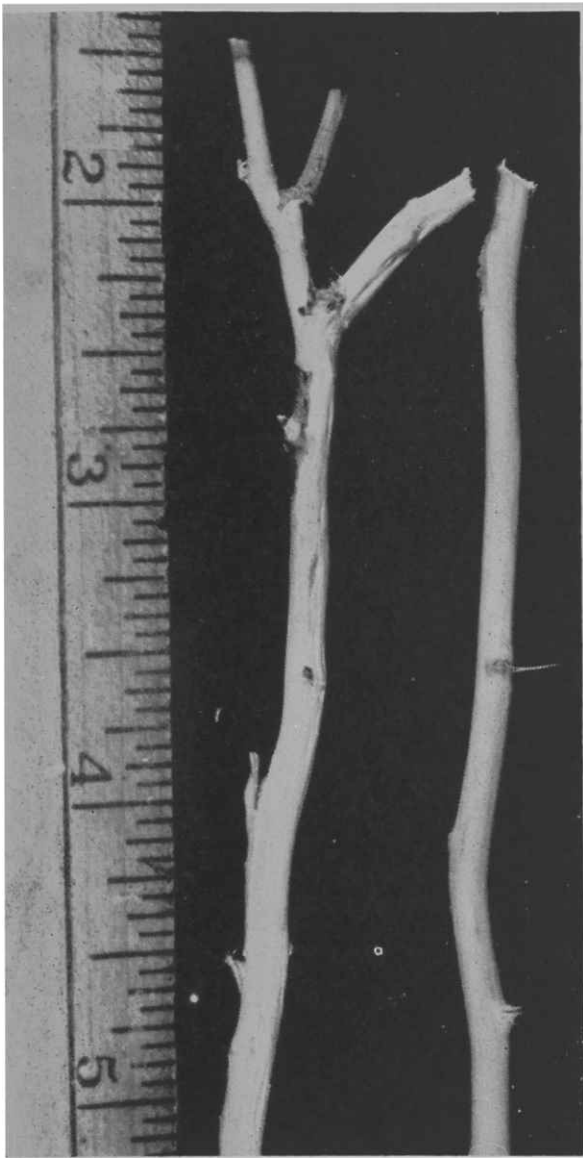
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cent capitalized value of \$1.99, reduced 24 cents for all future maintenance costs, leaves \$1.75 per acre for the initial pinyon-juniper control costs and other special costs if necessary.

## Allows for Variables

Obviously, the capitalized value, hence allowable costs, will vary not only with the capitalization rate but with the productivity of each site and the pertinent recovery rates over time. The example here, based on the average productivity relationships in the pinyon-juniper type shown in the table, indicates that large per acre control costs may be questionable, especially on sites with below average potential.

The subject of the economics of pinyon-juniper removal and control will be treated more fully in forthcoming bulletins and releases of the Arizona Agricultural Experiment Station.



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inoculum sources. These virus infected trees served as centers from which *Aphis gossypii* was able to spread the virus to adjacent trees.

Virus laden trees having the appearance of good health are more dangerous to have in a grove than declining trees. The insect vectors are more apt to feed and multiply on healthy-appearing ones, and in time spread the virus within the grove. Tristeza-infected trees should be eliminated as promptly as found regardless of their current appearance.

### Action Being Taken

Where diseased tangerine trees have been found, all immediately adjacent trees are being indexed to learn whether spread has occurred. The tangerine strain of tristeza has been inoculated, under greenhouse conditions, into healthy budlings of other commercial varieties on susceptible sour orange roots to determine its virulence and effect on these varieties.

Surveys are being made to trace the lineage of all commercial Clementine tangerine groves to locate diseased trees and to check for spread in these areas. Groves which are particularly suspect are being examined, and sample budwood collections are being made for indexing tests at the Yuma Station. By means of a questionnaire, all grove owners have been

**STEM PITTING** symptoms of tristeza on a tangerine. In twig at left note pits and grooves found in the wood of an inoculated Mexican lime seedling eight months after virus transfer. Twig at right shows smooth appearance of wood of a non-inoculated control seedling.

asked to determine and report the exact origin of all Clementine tangerines in their groves.

Special efforts are being made to locate and index for disease all commercial budwood source trees of the Clementine variety; several of this latter group are already under test. Tristeza-free lines are being located, and budwood of these will be released to the industry through The University of Arizona Budwood Improvement Program as quickly as possible.

### Industry Can Help

Because prevention of tristeza is the most practical means of control, it is certain that a control program in Arizona, to be successful, must be supported by all members of the citrus industry. Nurserymen must assume responsibility for propagating and selling tristeza-free trees, and prospective growers should specifically ask for trees propagated from a source indexed for tristeza and proven clean. Tristeza-tolerant rootstocks should be used when at all practicable.

Owners of established Clementine tangerine blocks, any of which could have tristeza infection, can contribute to the effectiveness of the control program also. The sizable task of learning which groves have diseased trees can be facilitated by indexing the relatively few parent trees from which the groves were derived. If each grove owner or nurseryman will make a maximum effort to learn the exact tree, or group of trees, used as a budwood source for his planting, it may be possible to remove his particular clone from the suspect list within a relatively short time.

It is suggested that owners contact nurserymen, contract propagators, caretakers, former owners, or anyone else who might provide detailed and exact information. Careful detail and exactness in these source reports will promote faster development of specific knowledge regarding the extent and possible spread of tristeza in Arizona.

Initial or revised reports should be submitted to your County Agricultural Agent. Revisions of reports already submitted will be welcomed.



### Cochise County

KAWT, Douglas—Check local listings.  
KWCT, Willcox — Mon. thru Fri., 7:45 a.m.

### Coconino County

KCLS, Flagstaff — Tues. and Thurs., 8:20 a.m.  
KGLS, Flagstaff (Home Agent) — Thurs., 9:45 a.m.  
KPGE, Page — Fri., 2:30 p.m.

### Graham County

KATO, Safford — Sat., 9:30 a.m.

### Maricopa County

KTAR, Phoenix — Mon. thru Sat., 5:30 a.m.  
KUPD, Phoenix — Mon. thru Sat., 5:30 a.m. and 12:25 p.m.  
KPHO, Phoenix — Mon. (cotton report) 12:40 p.m.; Thurs. (dairy and livestock report) 12:40 p.m.

### Navajo County

KDJI, Holbrook — Tues., 12:45 p.m.

### Pinal County

KPIN, Casa Grande — Mon. thru Sat., 6:55 a.m.; Mon. and Fri., 9:30 a.m.; Tues., Thurs. and Sat., 12:20 p.m.; Fri., 5:00 p.m.; Sat., 7:00 a.m.

### Santa Cruz County

KNOG, Nogales — Mon., 6:30 a.m.

### Yavapai County

KYCO, Prescott — Mon., Wed. and Fri., 5:55 p.m.  
KNOT, Prescott — Mon., Wed. and Fri., 5:35 a.m.

### Yuma County

KVOY, Yuma — Mon. thru Fri., 5:45 a.m.  
KYUM, Yuma — Mon. thru Fri., 6:25 a.m.

"More and more, city folks understand less and less about agriculture, its people, its progress, its problems. It appears that soon we will have many city youngsters growing up with the belief that milk comes from a bottle and that the butcher makes steaks at his store."—Leonard Sime, Phoenix, Ariz., Agricultural writer.