Proceedings of the
Lower Rio Grande Valley Citrus and Vegetable Institute
1950 4:26-28

Observations of the Freeze Damage to Some Sub-Tropical Fruit

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Ever since the potentialities of the Lower Rio Grande Valley area as a horticultural section were recognized, there has been an ever-increasing interest in growing sub-tropical fruits of one kind or another. The success, or perhaps the failure, with the most important of the subtropicals, citrus, has stimulated new interests and new efforts in, other fruits hard or impossible to grow except in a few areas in the Continental United States.

Among those that have been tried with varying degrees of success or could be tried hoping for varying degrees of success, we can mention the avocado, the papaya, the mango, the white sapote (*Casimiroa edulis*), the wooly leaf white sapote (*Casimiroa tetrameria*), Ceylon gooseberry (*Dovyalis hebecarpa*), lychee (*Litchi chinesis*), Sapodiila (*Archras sapota*), Surinam cherry (*Eugenia uniflora*), jaboticaba (*Myrcairia cauliflora*), feijoa (*Feijoa sellowiana* and feijoa coolidge), common guava (*Psidium guajava*), Cattley guava (*Psidium cattleianum*) and Barbados cherry (*Malpighia punicifolia*). In the report of the subtropical fruit committee published in the first volume of the Texas Avocado Society, there is a rather complete list of other exotic fruits that could be tried, but the qualification is made that they are not cold hardy.

Most of the specimens of one or another of these fruits to be found in the Valley have been planted mostly as backyard trees and in many cases subjected to unfavorable soil environment. Their failure to make a better showing can be traced to these adverse soil conditions. But what is really going to count is their ability to stand the peculiar weather conditions during the winter months. Which of the fruits listed above will ever get out of our back-yard to go into orchard form, only time can tell. Some will remain in the care of the housewife, others even she might give up; but some can and are making a better showing than expected.

It is rather hard to change soil conditions economically and it is still much harder if not impossible to change the climate; but we can change the nature of the plant by various horticultural methods to where we can get one or more of these interesting fruits to grow in our Valley.

As pointed out earlier, it is the peculiar and unpredictable winter temperatures that limit our ability to grow some of these sub-tropical fruits. The rather sudden changes from

mild, sometimes warm weather, to freezing temperatures destroys nature's way of protecting plant life against cold, which is dormancy. Most tropical and sub-tropical plants are characterized by the lack of a dormant period, but they can be induced to slow their growth, or for all practical purposes to slow it appreciably to where they can increase their dormancy and stand colder temperatures. This is possible only when steady cool temperatures pre-

ceed freezing weather, the plant will be in a state of growth making it less hardy and more vulnerable to cold. Last year's freeze was preceded by such a period of mild temperatures, consequently bringing more damage than would have occurred otherwise. It is true that the lowest temperature recorded (20°F), was entirely too low and sudden to provide an effective measure of cold resistance in plants which were not dormant. Had the average temperature during late December and January been lower than it was, we would have had a better measure and be better able to judge varietal resistance to cold. As it was, all unprotected sub-tropicals, other than citrus, were either greatly damaged or killed.

In the avocado group, for example, the Mexican type, supposedly able to stand such low temperatures and actually proven able to have enough hardiness when growing under California conditions and subjected to lows of as much as 20° F, actually suffered extremely severe damage. In this particular case, the apparent tenderness of supposedly hardy varieties can be safely attributed to lack of dormancy at the time of the freeze. Actually, they were in full bloom at the time and had been blooming profusely for a long period before the date of the freeze. Varieties less hardy than those of the Mexican type, as Guatemalan and West Indian varieties, their hybrids and hybrids between them and the Mexican type were killed in many cases below the bud union. Again, in spite of the recognized or expected tenderness accounting for such a severe damage, there are plain indications of lack of dormancy due to growing conditions previous to February the 1st. They could have, growing conditions prevailing before the freeze being less, favorable, been able to endure better than they did. In fact, some old trees of the tender West Indian type came through as well as some supposedly hardier types. The factor here was a later blooming habit in the West Indian type and undoubtedly the age of the trees involved.

A series of observations made at different localities revealed that seedling avocados were less damaged than grafted trees. The writer is not at this time offering a hypothesis to explain such a reaction and wants only to record the observation.

Soon after the freeze a committee from the Texas Avocado Society made a Valley wide trip with the purpose of studying damages in. avocados. At the time, all trees observed had lost foliage and damage to the wood could already be recognized. The group made many cuts into the bark so as to expose the cambium and observe damages to the bark and wood. A discoloration of the cambium layer, in many cases a general discoloration, was observed. When indications of new growth was apparent, mostly as buds sprouting from the trunk, growth always occurred above a strip or over an irregular portion of normal cambium, the portion sometimes surrounded by discolored cambium above, below and to each side. At the time, the writer thought that the discoloration was going to extend to every portion of the cambium layer, thus killing the tree. We observed later, however, an increasing ability to regenerate new cambium in such places where there

was enough sound cambium to keep life long enough to permit extensive regeneration. In many cases though, death followed and such trees were forced to sucker very close to the bud union or below it.

In a letter from Dean R. W. Hodgson of the College of Agriculture of the University of California at Los Angeles, we were informed of similar cambium discoloration occurring after a severe freeze. He reports having seen such a condition in avocados and walnuts. He also observed a recovery with time. Similar cases of cambium discoloration were noticed by the writer in guavas, Cattley guavas, white sapote and Ceylon gooseberry. The guavas had been banked rather high saving a good portion of the trunk and all have made wonderful recovery since the freeze. The Cattley guava showed very plain cambium discoloration, clear down to the trunk. In spite of this, they are showing recovery. The white sapote have made some recovery although slow. Neither of these two plants were banked since being seven or eight years old they were thought safe. The Ceylon gooseberry has recovered also very well.

We regret that the mangos available for observation were too young at the time and did not offer good opportunities to measure their resistance to cold and their ability to recover. This is a plant which will see trials in larger scales.

The papaya is another of the sub-tropical fruits that have caught the eye of some Valley growers. They are easy to grow and the question has arisen as to the possibilities of commercial production of this fruit. It must be said that this is perhaps the most tropical of the fruits listed above and that no hardy varieties have been found in nature or produced by hybridization. It is so tender that even a light frost will cause damage and temperatures of 32° or below will kill the tops and cause a loss of the crop for that year. The trunk, however, will resist temperature below freezing and be capable of suckering again specially if banked high. Temperatures of 30° or below will damage the trunk, the severeness of the damage depending on how low the temperature gets. As expected, the February 1st freeze killed all papayas as far down as the bank or outright if this was not provided.

The writer wants to point here to the advisability of protecting the trunk against possible freeze damage. It has been observed time and again that dirt banking is very effective in accomplishing such results. It has saved almost all of the banked portion of the trunks of all sub-tropicals observed. Other methods of protection could be worked out where a bigger portion of the trunk could be saved, thus enabling the grower to reshape his trees better and faster.