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# THE CITRUS BUDWOOD CERTIFICATION PROGRAM IN TEXAS

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In Texas, a program of citrus budwood tree registration and nursery stock certification has been in operation since 1948. This program is based upon the principles followed in the citrus budwood certification program in California (4, 9). In 1946, prior to the start of the program in Texas, a committee of three (two nurserymen and a plant pathologist) was sent to California to study the California program and to report on its adaptability to conditions in the Lower Rio Grande Valley. Dr. J. M. Wallace of the University of California Citrus Experiment Station at Riverside discussed psorosis at the first annual Rio Grande Valley Horticultural Institute (9) in 1946 and aroused increased interest in the problem.

Wallace's visit was followed by that of Dr. H. S. Fawcett, who made an outstanding contribution to the establishment of the psorosis-free budwood program. In the spring of 1948 Fawcett made a thorough survey (5) of the psorosis situation in the Lower Rio Grande Valley. He found that psorosis affected all the grapefruit varieties grown in the Valley and that in some grapefruit groves 60 to 80 per cent of the trees had psorosis. He outlined in detail a psorosis-free budwood source program similar to that followed in California, with the addition of a progeny or special test nursery in which the candidate tree would receive an additional check for freedom from psorosis. He further suggested that nurserymen plant seed from at least one tree of each variety or strain of commercial importance and select the more promising seedlings for propagation. This suggestion was not adopted at the time—to our present regret. If this had been done, we would now be much further along in a program to find or produce virus-free trees.

The initiation of the citrus budwood tree registration and nursery tree certification program in Texas was a joint undertaking by the Rio Grande Valley Nurserymen's Association and the Texas Nursery Inspection Service of the Texas Department of Agriculture and the Texas Agricultural Experiment Station. The nurserymen contributed to the success of the program by their active interest, by financial support, by helping to select candidate trees for possible registration, and by assisting the nursery inspectors in the cutting of budwood from registered trees. Supervision of the program has been the responsibility of the Texas Department of Agriculture. The Agricultural Experiment Station functioned in an advisory capacity and maintained the progeny or psorosis test nursery.

The Texas program is a voluntary one. For practical purposes it may be divided into two parts: 1) registration of citrus budwood trees as free of psorosis, and 2) the growing of certified psorosis-free nursery planting stock from registered trees. Only those nursery trees which have been tagged by a State Nursery Inspector with the State seal of certification can be sold as certified trees. The rules and regulations governing the

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Texas program are long and detailed. Its more important features are essentially those outlined by Fawcett (5) on March 22, 1948, at Weslaco, to the nurserymen and citrus growers of the Lower Rio Grande Valley.

The procedures followed in the Texas program are:

1) Selection by nurserymen or growers of promising citrus budwood trees which are apparently healthy, consistent producers of good-quality fruit, and true to type.

2) Selected trees are given a preliminary inspection by the Special Psorosis Inspector of the Texas Agricultural Department. If found to be apparently free of psorosis and other obvious diseases, the tree becomes a candidate for registration and is subject to continued inspection.

3) As an additional check on field inspection, buds from the candidate tree are placed in three different rootstocks, sour orange, Cleopatra mandarin, and Mexican lime, in the special test nursery. Leaves of both scion and stock are carefully inspected for psorosis leaf symptoms during the spring growth flushes for at least two years.

4) If the candidate tree remains free of psorosis after two or more years of field inspection, and if no symptoms develop in the progeny in the test nursery, the tree is eligible to be registered by the Texas Department of Agriculture as psorosis-free.

5) To increase the availability of psorosis-free budwood, a scion grove may be established by the planting of progeny from a registered tree.

6) Certified nursery stock can be propagated only by the use of buds from registered citrus trees and under the strict supervision of the Special Psorosis Inspector. The supervision continues from the time the budwood is cut until the nursery tree is ready for transplanting and tagged with the State seal of certification. However, more untagged trees propagated from registered trees have been sold than tagged certified trees.

Much progress has been made in providing psorosis-free nursery stock for planting in the Lower Rio Grande Valley. Since the program was started, 595 citrus trees have been registered as psorosis-free. Of these trees, 376 have been grapefruit, 214 orange, 3 tangelo, and 2 tangerine. A total of 19 scion groves with 3,619 trees averaging 5 years of age have been established; of these 80 per cent are grapefruit trees. Since 1951, a summary of the annual reports issued by the Nursery Inspector shows that 23 per cent of 7,000,000 nursery trees grown have been propagated from registered trees. Of the 1,600,000 trees propagated from registered trees, only about 200,000 have been tagged and sold as certified trees.

The total value of the program is not given by the foregoing figures. In addition to the planting of psorosis-free trees propagated from registered budwood trees, either as certified trees or as untagged trees, there has been an over-all improvement in the quality of the trees produced. This has been brought about in part by the use of trees adjacent to or within 35 feet of a registered tree as sources of budwood. These trees must pass the same field inspection as the registered tree and be apparently healthy. Also, there has been a decline in the use of psorosis-infected buds by non-program-participating nurserymen, for it is general practice to have at least one field inspection by the psorosis inspector before using a tree for budwood. Better quality trees are consequently being produced.

We in Texas are in the process of evaluating the present citrus budwood program and in expanding it to include other bud-transmissible virus diseases, such as exocortis, xyloporosis, and tristeza, which were unrecognized in the Lower Rio Grande Valley before 1950. Other bud-transmissible virus diseases will be included in the program, if and when they are recognized. The distribution of these diseases in Texas citrus varieties is not known. However, there are indications that trees of most of the present commercial varieties and strains of grapefruit and many of the oranges are infected with either exocortis or xyloporosis or both. The importance of these diseases is em-

phasized by the results obtained in preliminary tests, which strongly suggest that most if not all of our presently registered grapefruit trees carry at least one of these viruses.

Exocortis is perhaps better known in Texas as the "Rangpur lime disease," which was reported and described by Olson (7). Typical symptoms of exocortis develop on Rangpur lime rootstock below the bud union and may extend into the larger roots. The seriousness of the situation is emphasized by the results obtained from a row of Rangpur lime stock put in to supplement the psorosis test plot of 1954. Two years after budding, exocortis symptoms had developed on stock that had been budded with buds from candidate trees which were later registered. Showing symptoms were the progeny of 32 red grapefruit trees, which included strains of Webb, Curry, Henninger, Riddle, Shary, Ballard, Fawcett, and miscellaneous reds, as well as Pink and White Marsh. In a few instances, symptoms have not appeared after four years of growth but may develop later.

Xyloporosis, which was reported by Childs (1) as a new disease (cachexia) affecting Orlando tangelo is undoubtedly widespread in Texas. Olson and Shull (8) found that trees of seven different commercial strains of red grapefruit carried the xyloporosis virus. There is a strong suspicion that all the commercial varieties and strains of grapefruit in Texas carry this virus; only nucellar seedlings have been found free, up to the present. There is no reason to believe that the situation is better in Texas than in Florida (2, 3), where a high incidence of the disease has been reported.

In our citrus budwood certification program, which is being reorganized, we are aware of some of the difficulties in obtaining desirable virus-free budwood sources. The search for and testing of potential budwood trees is carried on primarily by the Texas Agricultural Experiment Station with the cooperation of the Citrus Rootstock Investigations group of the U.S. Department of Agriculture. This program includes testing of the old-line commercial varieties on virus indicator plants, appraisal of nucellar lines, and perhaps heat treatment (6) to obtain virus-free material from some old-line varieties. As varieties or strains free of the recognizable virus diseases are obtained, they will be established in a foundation planting on sour orange, Rangpur lime, and Orlando tangelo rootstocks. We anticipate that these trees will provide a sound basis for our budwood certification program and become the source from which budwood-scion groves will be established. The supervision and regulation attendant upon the propagation of scion groves and the certification of nursery stock will be the responsibility of the Nursery Inspection Service of the Texas Department of Agriculture. We feel reasonably certain that within a few years we shall be able to find budwood trees of desirable horticultural characteristics free of exocortis and xyloporosis, as well as of psorosis and tristeza.

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