

## The Texas Budwood Certification Program - An Autopsy

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### Summary

Budwood certification programs in Arizona, California, and Florida are operative and improvements are continually being made as new information becomes available. The Texas certification program began at about the same time as programs in other states. The Texas program, however, is dead. In this article, I will discuss the history of the program, the possible reasons for its demise, the virus status of presently used budwood sources and possible future programs for control of budwood-transmitted pathogens.

### *History of the Program*

The psorosis problem became serious in the late 1940's and provided the impetus for the initiation of the certification program (3). Dr. H. S. Fawcett of the University of California was invited to Texas by the Rio Grande Valley Horticultural Society to assess the psorosis situation and make recommendations. As a result of his report and the necessity for cooperation in a psorosis control program, the Valley Nurserymen's Association was formed (2).

The budwood certification program was initiated through the cooperation of the Valley Nurserymen's Association, the Texas State Department of Agriculture and the Texas Agricultural Experiment Station. Basic criteria for the certification of nursery trees were established (12, 13, 14) and a nursery inspector was hired.

To be eligible for registration as a budwood source, a tree had to be vigorous, productive, true to varietal type, and at least 8 years old. To pass the initial inspection a tree had to be free of psorosis bark or young leaf symptoms, Rio Grande gummosis, any other obvious diseases, and chimeras. Continued inspections for symptoms of psorosis were required. A candidate tree was checked periodically for young leaf symptoms including inspections during 2 successive spring flushes of growth. Buds from candidate trees were propagated in the nursery at the Texas Agricultural Experiment Station and young leaves were inspected frequently for flecking symptoms. In addition, the 4 trees surrounding the candidate tree had to pass the same initial and continued inspections as the candidate tree. Registration was for a period of 3 years after which the registration procedure had to be repeated. Progeny of registered trees could not be registered until they were 6 years old. Production of nursery trees was carried out under the supervision of the Special Psorosis Inspector. The State seal of certification was attached to each certified psorosis-free nursery tree.

By the spring of 1950, 263 budwood source trees had been registered and the following year large numbers of certified nursery trees were available for sale (14). The program proceeded well through the early 1950's and by 1957, 595 trees had been registered as psorosis-free (9). Subsequently, no new registered parent trees entered the program. Nineteen scion orchards propagated from registered trees had been planted by 1957 (9).

In the late 1950's attempts were made to broaden the program to provide nurserymen with budwood sources free of tristeza, exocortis, and xyloporosis as well as psorosis. A foundation planting of virus-free bud sources was established at the Texas Agricultural Experiment Station. Budwood from virus-free trees was released to nurserymen (7, 10). Foundation plantings were to be established by nurserymen under the supervision of the nursery inspector. Such plantings were to be inspected periodically for symptoms of virus diseases by the nursery inspector. This type of program was never formally adopted, and with time interest in the psorosis program also diminished.

An exact date for the demise of the budwood certification program is difficult to establish since it apparently died a lingering death. With the benefit of hindsight, it may be possible to discern some of the problems with the program and some of the reasons for its death.

Firstly, the requirement that trees be free of non-budwood transmitted diseases, such as Rio Grande gummosis, eliminated many candidate trees which may have been excellent parent trees. This problem was apparently not serious since adequate numbers of psorosis-free trees were found.

Certified nursery trees could not be propagated from the progeny of registered trees. Thus, the original candidate tree was the only source of certified budwood. This restriction and the requirement that the 4 trees surrounding the registered tree pass the same inspections as the registered tree created some problems. The program was always a voluntary one and most nurserymen sold both certified and non-certified stock. Non-certified trees were usually sold at lower prices. Nurserymen often took budwood from the 4 trees surrounding the certified tree (9), especially when budwood was in short supply. This was a good practice in the sense that they were using sources of budwood which had been thoroughly inspected for symptoms of psorosis. This practice helped eliminate some of the budwood spread of psorosis which had occurred previously. But, the practice, while helping to achieve the goal of the certification program, tended to defeat the program itself. Nursery stock could be propagated from these surrounding 4 trees with reasonable assurance that they were psorosis-free. The nurseryman did not have the expense and the trouble of tagging nursery trees, keeping records and the other costs of producing certified trees. Thus, these trees which were also probably free of psorosis could be sold at a lower price than could certified trees. Demand for nursery trees was slow at that time and cut-throat competition forced nurserymen to sell trees at the lowest possible price. Of the 7 million trees propagated in Texas between 1951 and 1957, only 1.6 million were propagated from registered sources. Only 200,000 were tagged and sold as certified trees. While the registration of budwood source trees for freedom from psorosis was successful, the certification of nursery stock as psorosis-free was apparently never acceptable to the majority of the nurserymen.

The certification program was initiated by a few nurserymen, experiment station personnel, and other interested persons. With time, some of these people moved to other areas, passed away, retired, or simply lost interest in the program. In the later years, there was a distinct lack of enthusiastic advocates of the program. With the exception of limited advertising by a few nurserymen and the Valley Nurserymen's Association, no effort was made to convince growers of the merits of the program. Efforts of experiment station and extension personnel were only partially successful. Many orchards were planted by land and orchard-care companies with the intention of selling these orchards to investors. Many of these companies were not aware of or were not interested in the long-term advantage of planting certified nursery stock. They consistently chose to buy and plant non-certified nursery stock which was available at lower prices. The tristeza scare of the late 1940's and early 1950's helped to maintain interest in the virus status of budwood. With the gradual realization that tristeza would not destroy the industry in a short time there was a diminution in interest in the psorosis program as well.

At the present time in Texas, there is no budwood certification program, no regulation of the nursery industry, and the Valley Nurserymen's Association is defunct. The nurserymen's association, which was organized to deal with the psorosis problem, apparently suffered the same fate as the budwood certification program. The only service which remains is the maintenance of records of nursery tree movements by the Texas State Department of Agriculture.

### *The Present Situation*

We do not have an accurate picture of the virus status of budwood being propagated in the Valley at present. I will present that information which I have been able to gather during my 3 years at the Texas A & I University Citrus Center.

Psorosis is not a serious orchard problem in Texas. It is present in old orchards but has been eliminated from most young orchards by selection of psorosis-free trees. Some orchards which were propagated from registered sources, nevertheless have psorosis. In some cases, this may have been due to registration of trees which were thought to be psorosis-free, but were in fact, infected. Field and nursery inspection is adequate to eliminate many psorosis-infected trees, but indexing of candidate trees in the greenhouse gives more reliable results. In other cases, psorosis infection in presumably registered trees may have been due to errors in labeling of budwood, nursery rows, etc. In a 20-year-old, 10-acre orchard of registered 'Webb Redblush' grapefruit planted by a commercial nurseryman at the Citrus Center, 17 trees with psorosis bark lesions have been found. Indexing of apparently healthy trees in that orchard indicated that at least some of the trees were free of psorosis. The presence of some 'Foster Pink' grapefruit trees in this supposed 'Webb Redblush' orchard indicates the extreme care used in gathering and labeling the budwood for the orchard. A tree with psorosis bark lesions has also been found in a 6-year-old 'Riddle Red Gold' grapefruit orchard budded from a registered source. Other trees from the same orchard have been indexed and found to be free of psorosis. In a 6-year-old orchard of 'Marrs Early' oranges presumably free of psorosis 1 tree with young leaf symptoms of psorosis has been found. Undoubtedly, there has been some mixing of infected bud sources with registered psorosis-free bud sources.

None of the commercially used budwood sources which I have indexed for psorosis has been found to be infected. Nevertheless, I have found trees in relatively young commercial orchards which have psorosis bark lesions. I doubt that psorosis is common in commercially produced nursery stock, but undoubtedly some psorosis-infected nursery trees are unknowingly being propagated.

There is some indication that psorosis or a closely-related virus may be spreading naturally in Texas citrus orchards. I have recovered a psorosis-like virus, which I have called a necrotic strain of citrus ringspot virus (CRSV-NS), from some young nucellar grapefruit trees. The symptoms of this disease and its possible relationship to psorosis have been described (11). We have also encountered nucellar trees with psorosis bark lesions. These trees may be infected with psorosis and/or with CRSV-NS. They were apparently infected by some means other than by graft inoculation (11). Natural spread of psorosis in Texas does not appear to be a serious problem at present, but it may be necessary to reinspect and to reindex foundation plantings more frequently than is practiced in other areas.

The situation with regard to exocortis and xyloporosis is probably much the same as described in 1958 (8). Virtually all old-line grapefruit and oranges carry either exocortis or xyloporosis or both. Since sour orange is almost the only rootstock used in Texas, these viruses have not caused serious damage in commercial orchards. However, I have found 2 young tangelo orchards with severe damage from xyloporosis, even though few tangelos are grown commercially in Texas. Evidently, xyloporosis-infected 'Orlando' tangelos have been propagated in the recent past.

The selections being propagated at present are primarily old-line red grapefruit. CES#3, a red grapefruit which has been propagated to a limited extent for some time, and 'Star Ruby', a new, deep red-fleshed grapefruit which has been extensively propagated recently are the only nucellar selections being used. Both were originally free of exocortis and xyloporosis. However, some trees of these selections may carry exocortis since precautions are not usually taken to avoid spread of this virus on knife blades, pruning tools, etc.

The tristeza situation also remains much as it was in the 1950's. Tristeza has not spread in Texas and is found predominantly in 'Meyer' lemons (4, 5, 6). 'Meyer' lemons are used primarily in yard plantings, but there are a few commercial orchards in Texas. Some of the 'Meyer' lemons I have indexed are infected with tristeza. Presumably those that are not infected are the Rickett's strain which was introduced from Florida about 1930 (4) and which was released by Sleeth and Olson (10) as a tristeza-free variety. I had presumed that the Rickett's strain had been propagated exclusively since that time. However, a 2-year-old 'Meyer' lemon which indexed positive for tristeza indicated that some tristeza-infected 'Meyer' lemons are still being propagated.

The situation with regard to stubborn in Texas is unknown, but we do not have a serious problem with the disease. Carpenter (1) reported symptoms of stubborn in Texas orchards and I have found trees with symptoms similar to those of stubborn. However, I have been unable to confirm the presence of the disease by indexing on indicator plants in the greenhouse.

#### *Future Needs*

I feel that there is a need for a budwood certification program to solve some of the problems mentioned here. Some psorosis-infected budwood sources are being propagated and a certification program could eliminate those sources. Tangelo and tangerine budwood sources which are infected with xyloporosis need to be identified and eliminated. 'Meyer' lemon sources which carry tristeza also must be eliminated. Since sour orange rootstock is used exclusively, I see no need at present to eliminate grapefruit and orange budwood sources which carry xyloporosis and exocortis. However, sources of budwood free from these diseases need to be identified and maintained in case other rootstock varieties become necessary or desirable. A budwood certification program would provide the grower with the assurance that the trees he purchased were as free as possible from disease problems. It could also protect growers and good nurserymen from the nurseryman who might propagate trees from any source and without consideration for the long-range effects of his actions.

I have not made a serious effort to initiate a certification program. At present, I do not think there is sufficient demand for one on the part of growers or nurserymen and there are no urgent problems which need immediate action. I am selecting productive trees of different commercial varieties and indexing these for virus diseases. I have found several old-line and nucellar selector which have merit. These will be propagated and planted in a foundation block. These budwood sources will be used at the Citrus Center and will be available to anyone who desires them. In addition, I index budwood source trees for anyone who want to know the virus status of their trees. Within the limitations of my time and facilities, I will continue to provide this service.

Other programs could be of service to the Texas citrus industry. Although tristeza has not spread in Texas, its presence in 'Meyer' lemon trees constitutes a potential hazard. A campaign to eradicate tristeza-infected 'Meyer' lemons could reduce the risk of a tristeza epidemic. At present, soil-borne pests, especially *Phytophthora* and citrus nematode, are often spread on infested nurserystock. A program to certify nursery trees free of these pests would be desirable.

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