

Peach Yellows as Related to a Peach Breeding Program

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Peach yellows, a virus disease of peaches, according to Cochran and Reeves†, was recognized soon after peach culture was started in Massachusetts. Peach yellows is generally recorded as the first known peach virus disease, and it became prevalent in the Philadelphia area as early as 1750. Its early occurrence on peaches leads to the supposition that the casual virus was present in hosts native to the northeastern United States, and that it spread from these hosts to the peach. As peach culture spread, peach yellows spread along with it until it reached the limits of the range of the insect vector. A number of severe epidemics of the disease occurred, and wiped out peach orchards in different sections of the country, particularly in the northeastern United States and in the Great Lakes States.

The disease has been studied intensively from the standpoint of symptoms, appearance of diseased plant parts, transmission, dissemination, speed of spread, life history of the insect vector, treatment, eradication and other points of fundamental interest. No further mention of these aspects will be made here, as this information is rather general knowledge. This paper will report on the occurrence of peach yellows in a peach breeding program, the problem it presents, and possible means of minimizing its effects in the program.

In 1945 and 1946 the Virginia Agricultural Experiment Station purchased

about 240 acres of land for development of a horticultural research farm about 5 miles south of Blacksburg. No peaches had been grown on the farm for a number of years prior to the purchase. A peach variety orchard was established along the northern border of the farm in 1945 and additional plantings of varieties, selections or seedlings have been made annually since then (Figure 1). Though the soil of the farm is not of the type

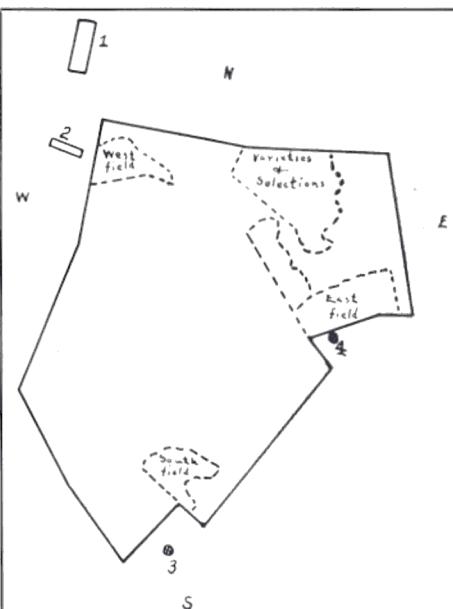


Fig. 1. Map of V. P. I. Horticultural Farm Near Blacksburg, Virginia, showing location of peach plantings and sites (1, 2, 3, 4) of known trees infected with peach yellows.

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†Cochran, L. C. and E. L. Reeves. 1953. Virus Diseases of Stone Fruits. Plant Diseases, the Yearbook of Agriculture for 1953 :714-721.

generally considered most desirable for peaches, most of the trees planted have grown well and started bearing at an early age. No particular problems in the control of insects or fungus diseases have occurred.

In 1950 several abnormal appearing trees were noted in the variety orchard early in the season. The senior author, having had limited experience with peach yellows, sought the opinion of a visiting pomologist, who pronounced the two trees in question as being unmistakably affected by peach yellows. This diagnosis was confirmed a few days later by the junior author. As the season developed, four additional trees in the variety orchard that appeared to be diseased developed unmistakable symptoms of peach yellows, and these were destroyed. Two younger trees in a nearby seedling peach orchard were identified as having peach yellows, and were removed. Since 1950, trees having unmistakable symptoms of yellows have been found every year except in 1953 and 1955. The yearly occurrence of infected trees is shown in Table 1.

It was recalled that in the winter of 1948-49 an adjoining landowner pulled the remnants of an old peach orchard located about 500 yards to the northwest of the variety orchard (Site 1). The junior author recalled also that he had noted unmistakable symptoms of peach yellows in the few trees of that orchard that were still alive, the summer before it was pulled.

The adjoining landowner planted four rows of peach trees in Site 2 in 1948, directly across the highway from the Horticulture Farm entrance. By 1955, two trees in this planting were observed to be infected with yellows. In 1959, a total of 18 seedling peach trees in the Horticultural Farm were destroyed because of yellows, and all were in the West Field, sep-

arated from the infected orchard of private ownership only by state highway.

The number of yellows infected trees observed decreased markedly in 1960 and 1961. In 1962 a total of 4 trees were found with yellows in the variety orchard, and 21 trees in the seedling orchards. Of the latter, 12 were found in the South Field, and 9 in the East Field. Again the sudden increase in the number of infected trees could be associated with the occurrence of infected trees on nearby property. Late in the summer of 1960, a suspicious appearing peach tree was observed growing near an abandoned hen house at Site 3. It had unquestionable symptoms of yellows and the owner had no objections to our destroying it later that winter. Of the 3 seedling trees found in 1961 with yellows infection, two were in the South Field, and one was in the East Field. In the spring of 1961, the Horticultural Farm foreman called the senior author's attention to a small, weak, and obviously diseased, peach tree growing in the fence row adjoining the East Field. It was destroyed at once, but apparently it had been the source of infection for the 9 yellows infected trees discovered in the East Field in 1962.

It appears that eradication of yellows from the experimental orchards will be difficult, and may well be impossible. Comment may be in order here concerning the apparent greater frequency of occurrence of infected trees in the seedling orchards as compared to the variety orchard. The planting distance in the variety orchard is 20' x 20', or greater in the contoured rows of the orchard. The seedling orchards are planted a 18' x 5' spacing. In most years there have been more trees of various ages in the seedling plantings than in the variety plantings; but it appears likely

that the increased number of yellows infected trees in the seedling plantings may have resulted from the closer planting of the seedling trees. Usually the infected trees found in the seedling plantings were concentrated in one or two rows or parts of rows.

The only effective means of controlling the spread of peach yellows within a planting has been eradication of diseased trees as soon as they were discovered, and controlling the insect vector identified elsewhere as the plum leaf hopper (*Macropsis trimaculata*). All peach trees in the orchard are given the standard peach spray schedule recommended for Virginia orchards. The schedule used relies heavily on parathion and DDT for insect control. All sprays are applied with an air blast sprayer. The variety and selection orchard contains trees of all ages; and all trees, regardless of age, receive the full schedule of sprays. The seedling orchards, on the other hand are given sprays to control only peach leaf curl and peach borers until they reach fruiting age, which, under our conditions, is their third season of growth in the orchard. Therefore, in the past, the seedling trees received no insecticidal sprays during the early part of the growing season of their first and second years in the orchard. It is during the early part of the growing season that the plum leafhopper is said to be most active.

The occurrence of peach yellows in an experimental orchard is always embarrassing, but it may be especially embarrassing and seriously destructive of results in a breeding program. Any seedling in an orchard is probably as susceptible to infection as any other. Only pure chance may protect the one desirable seedling in a thousand that the breeder is looking for, from infection by the virus. To date, our program has had only one known ex-

ample of a narrow escape from virus infection in a desirable seedling. In 1957, a promising seedling that had been propagated in 1956 for extensive testing, was found to be infected with yellows. The tree and the budlings of the previous year were immediately destroyed. It was then discovered that two trees of this selection had been budded in 1954, the first year that the original tree bore fruit. One tree survived transplanting to the orchard, and it has shown no symptoms of yellows to date.

The breeder of new varieties is expected to furnish buds or propagations of his new introductions to nurserymen, and others, that are true to name, and free from any pathological disorders. The presence of yellows in an experimental orchard will add difficulty to this function. Our policy in distributing buds has been to send buds to nurserymen and others only from the original seedling tree selected for naming. This has eliminated the possibility of errors in the identity of the material supplied, and probably reduces the possibility of

Table 1. The observed annual occurrence of yellows infected trees of peaches and nectarines in the V. P. I. orchards at Blacksburg, Virginia.

Year	Selection and Variety Orchard	Seedling Orchards
1948	0	0
1949	0	0
1950	6	2
1951	0	7
1952		1
1953	0	0
1954		0
1955	0	0
1956	0	1
1957	3	4
1958	4	0
1959	1	18
1960	0	2
1961	0	3
1962	4	21

distributing buds infected with yellows.

Several implications may be derived from the foregoing account. (1) After peach yellows becomes established in an orchard, it may be difficult to eradicate it. (2) There is constant danger of reinfection from outside sources such as backyard or home plantings which are seldom sprayed adequately, and from chance seedlings arising in fence rows and along roadsides. The latter have been observed to be almost 100 per cent infected in the Blacksburg area. (3) In view of its supposed American origin, it is not unreasonable to believe that native species of *Prunus* may carry the yellows virus without showing visible symptoms. Eradication of such native *Prunus* species within the vicinity of the orchard should be practiced in so far as practical. (4) It appears that all peach plantings should be given the complete schedule of sprays for the entire season, beginning the year they are planted. (5) Constant vigilance on the part of the peach breeder to detect symptoms of yellows as early as possible, and ruthless elimination of all suspicious appearing trees, is absolutely necessary.

New A. P. S. Apple Variety Project

A special committee has recently been appointed by William (Bill) Luce, President of the American Pomological Society, with the support of the Executive Board, to collect (for publication) important facts about our present-day apple varieties.

Only six prominent varieties and their more important sports and hybrids will be included in this report, namely, Delicious, McIntosh, Golden Delicious, Jonathan, Rome Beauty and Northern Spy.

Dr. Earle Blodgett, with the Washington State Department of Agricul-

ture, who has been collecting information on the Delicious sports for many years, will handle that phase of the study, with the help of Murit Aichele. Paul Stark, Sr. will provide valuable data on the original Delicious and Starking.

Dr. W. H. Upshall, of Vineland, Ontario (past President of A. P. S.) will report on McIntosh, and on Northern Spy.

The Golden Delicious story will be reported by Edwin Gould, of West Virginia and Paul Stark, Sr., and should be an almost first-hand account from both individuals.

The Jonathan will be written-up by Dr. Quenton Zielinski, of Oregon State University.

The Winesap account, one of the more difficult ones due to the confusion surrounding its sports, will be handled by Dr. Elliot Degman, of Wenatchee, Wash., with the able assistance of Dr. George Oberle, of Virginia Polytechnic Institute.

Dr. James Mowry, of Carbondale, Illinois, with the help of Dr. E. W. Ellenwood, of Ohio State University, will report on Rome Beauty.

Dr. John Snyder, Extension Horticulturist in the state of Washington, and Secretary of the Wash. State Hort. Assoc., has agreed to edit this story of our present-day apple varieties.

—W. A. Luce, Yakima, Wash.

New Secretary-Treasurer for A. P. S.

At a meeting of the Executive Committee of A. P. S. in Vineland, Ontario, this past July, Dr. James B. Mowry, of Carbondale, Illinois, was appointed Secretary-Treasurer, effective Dec. 15, 1964. Dr. Mowry is Superintendent of the Horticultural Experiment Station of the University of Illinois at Carbondale. A very competent fruit breeder and tester, he has been very active in A. P. S. for many years.