

VIRUS DISEASE PROBLEMS ON HARDY STONE FRUITS IN NORTH DAKOTA

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Virus diseases have been of major importance on leading commercial species of stone fruits for many years. They have not been given much attention, however, in hardy species of stone fruits such as are grown in the Northern Great Plains. Observations in North Dakota during 1948 and 1949 indicate that several serious virus diseases are widely disseminated in hardy stone fruits and that the virus disease problem must be given attention just as much as the hardiness problem. We depend heavily upon some of our native stone fruits, particularly chokecherry, sand cherry, and wild plum in our shelterbelt and wild life plantings. Any serious threat to these species is likely to have more serious consequences than may be apparent on first thought.

X Disease

By far the most serious virus disease of stone fruits in North Dakota is that known as "X Disease" of chokecherry. This disease affects all our native stone fruits and many cultivated kinds and varieties. In 1933 the disease was first recognized. It occurred on chokecherries and peaches in Connecticut at that time. In North Dakota the first published report of the disease was made by the writer about a year ago, but indications are that the disease has been present in the state for eight or ten years. By August 1949, the disease had been observed in practically all areas of North Dakota. In the southeastern area of North Dakota, where the disease apparently first gained a foothold, it is present in practically all native chokecherries in Richland and Ransom counties. These counties include several extensive areas which are more or less wooded and chokecherry is one of the most abundant native species. Many of these have died during the past two years and it is difficult to find chokecherry plants in this area which are not showing some symptoms of the disease.

In the northwestern part of North Dakota chokecherries or other woody species are found only in ravines, along rivers, and in other favored areas. Thus, the native chokecherry plants are sometimes separated by many miles and yet the disease is prevalent and obviously spreading rapidly throughout the area.

Under Northern Great Plains conditions the seriousness of this disease in chokecherries alone is obvious. Chokecherries are not only one of our most valuable species in shelterbelt planting but also are very valuable in the over-all game and wild life picture in the state. In commercial fruit areas chokecherries may just be a nuisance and the medium for spreading X disease. In the Northern Great Plains we value chokecherries for themselves.

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The native sand cherry (*Prunus besseyi*) is also readily infected by the disease and is killed in a few years after infection. In the sand hills areas of Richland and Ransom counties where sand cherries were once abundant they are now becoming scarce and the few remaining plants are obviously diseased. Only ten or twelve years ago it was common to see heavy crops of sand cherries in this area while in the past two seasons it has been difficult to find fruit of this species in the above areas.

Published reports vary as to the susceptibility of wild plum to this disease. The writer's observations in 1949 indicate that the virus attacks wild plums and either directly or indirectly results in death of this species under North Dakota conditions. During mid July a vein-clearing symptom was very noticeable on the newer terminal growth of the wild plum which appeared to be infected with the disease when growing with X diseased chokecherries. In this same area of heavy infestation of X disease in chokecherries, wild plum thickets have been dying during the past few years for no other apparent reason. Some of these wild plum thickets are old thickets which the writer has observed for at least twenty years.

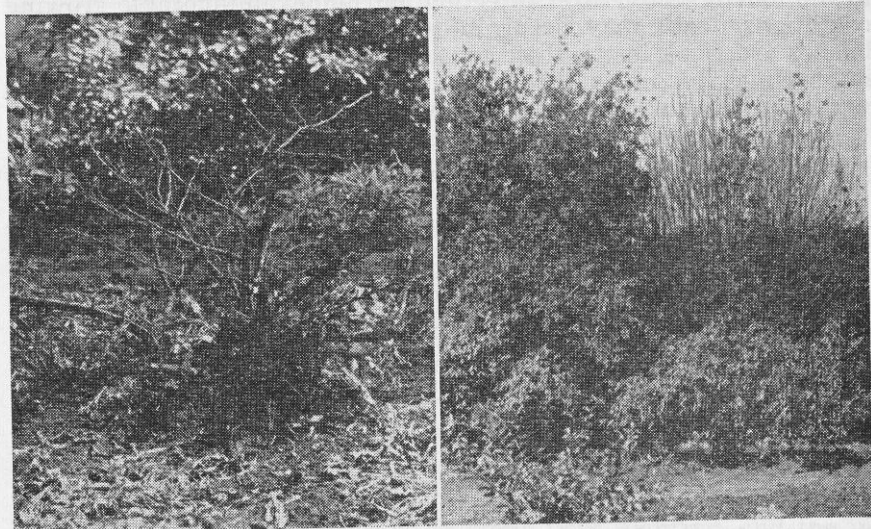


Fig. 1. Characteristic dying of improved sand cherry (left) and chokecherry (right) three or four years after infection with X Disease. Both pictures were taken in southeastern North Dakota.

Many hybrid plum varieties involving wild plums (*P. americana*) and Japanese plums (*P. salicina*) are seriously affected by X disease. Likewise, some and possibly all cherry-plum varieties are affected by the disease. The susceptibility of the Nanking cherry (*P. tomentosa*) to this disease is not known, but there is no reason to think it is not susceptible.

Symptoms on Chokecherry

The symptoms of this disease vary on different fruits. On chokecherry the first evident symptoms are seen as a slight upward cupping and leathery texture of the foliage, beginning in early summer of the first year. This may be followed by a slight yellowing of the foliage with faint touches of red later in the season. Apparently the fruit is not affected the first season. The second season the foliage of an infected bush shows more intense color and during the last half of July and early August the leaves may become brilliant red and yellow. At this stage it is very easy to locate infected chokecherries because their foliage takes on autumnal coloration while healthy bushes remain green. During the second season there may be a normal set of fruit but the cherries do not ripen normally, their flavor is bitter and the fruits may hang until severe frosts. In the third season the foliage symptoms continue as in the second season except that the leaves may be smaller and a distinct rosetting may occur at the tips of the branches. Bloom may be heavy but very few or no fruits set, resulting in the characteristic barren racemes. The few fruits which set do not contain an embryo. Under North Dakota conditions the bushes usually start to die out in the fourth season after infection, but under unfavorable growing conditions death may occur in the third season. Frequently the bushes are weak in the third season and fail to leaf out the following spring. This has naturally led to the erroneous impression that winter injury was the cause of death.

Transmission

In nature it is assumed that some insect vector is responsible for the rapid spread of this disease. In spite of many attempts in various states, it has not been possible to prove this assumption experimentally. Artificial transmission by budding or grafting can readily be accomplished. In the propagation of horticultural varieties of stone fruits this is obviously a serious hazard. Fortunately, the disease is not transmitted through seed.

A peculiar characteristic of this disease is that it spreads readily from chokecherry to chokecherry but in nature rarely or not at all from tree to tree of other stone fruits. The disease has been most destructive on peaches and sour cherries but control on these fruits is relatively simple. It requires the elimination of chokecherries from within 500 feet of the orchard or nursery where these fruits are grown. Transmission then is normally from chokecherry to chokecherry: from chokecherry to peach; but not from peach to peach, for example. We think that sand cherries, wild plums, and horticultural varieties thereof bear the same relationship to chokecherry as does the peach. However, transmission from chokecherry to chokecherry can occur even if they are separated by many miles.

Control

For our purposes in North Dakota control presents some problems. As with any virus disease in plants, control is based on prevention. Control on stone fruits other than chokecherries should not be difficult. It will require:

1. *Start with clean planting stock.*
2. *Eliminate, or do not plant chokecherries within 500 feet of present or possible future stone fruit plantings.*

To meet the first requirement every nursery that produces stone fruit trees will find it essential to follow through with the second requirement. This may not be easy but it is already being done by some of our best and largest nurseries. The second requirement practically eliminates chokecherry from farmstead shelterbelts as well as from other plantings containing stone fruits. These are the control measures which have been used successfully for similar situations in other states.

Since for various purposes we are interested in chokecherries as such, we are confronted with a more difficult problem than is the grower of horticulturally more important kinds of stone fruits. The disease spreads from chokecherry to chokecherry over considerable distances, hence, practical isolation of chokecherry plantings appears to be out of the question. If chokecherries are to be planted under present conditions, the importance of starting with clean stock from the nursery cannot be over-emphasized. To start with diseased stock would only be inviting more rapid dissemination of the disease than would occur in nature.

Based on our present knowledge it appears that X disease can be controlled on stone fruits other than chokecherry. We may be forced to let Nature take its course on chokecherries. By aiding the natural control of this disease through the planting of healthy stock or even restricting the planting of chokecherry until the disease is no longer epidemic we may aid materially in bringing it under control.

The most important factor in the control of this disease is an awareness of it and its control measures by nurserymen, public and private agencies concerned in stone fruit planting, and the individual grower.

The above control recommendations and planting suggestions were accepted and recommended as control measures for X disease by the North Dakota State Farm Forestry Committee at a meeting held in Bismarck, North Dakota, on November 29, 1949.