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BARBERRY ERADICATION

in Relation to
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STEM RUST

of

WHEAT, OATS, BARLEY, and RYE



Stem rust on grain stems

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UNIVERSITY OF MINNESOTA
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All Rust-Susceptible Barberry Must Go!!



Stem rust infection on barberry leaves



A typical common (rust-spreading) barberry

4 Facts to Remember

- 1 Stem rust starts on barberry in the spring in Minnesota several weeks before rust spores are blown into the state from outside sources. A single bush may be responsible for considerable damage to grain crops, as has been shown by careful study of more than 500 stem rust spreads from barberry bushes to grains and grasses in Minnesota since 1918.



- 2 New parasitic races of stem rust that may attack resistant varieties of grains can be produced on the barberry, the only plant on which the sexual stage of the rust occurs.



- 3 If rust-susceptible barberries were allowed to grow and multiply from seeds scattered by birds, they would become so numerous and spread such great quantities of stem rust spores that the growing of small grain would be extremely hazardous.

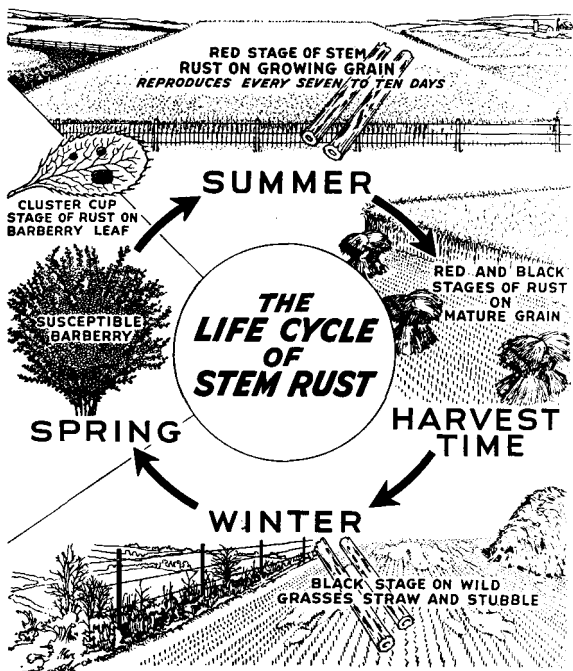


- 4 Some barberry seeds may remain dormant in the soil for 10 years or longer. Consequently, properties where bushes have been destroyed must be watched closely for new growth developing from seed scattered by birds and other agencies.



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How Stem Rust Develops



Life cycle of stem rust of wheat, oats, barley, and rye

Stem rust of small grains is caused by a moldlike fungus that multiplies and spreads by means of spores which are produced each year in the northern states. The black or winter spores overwinter on grain stubble, straw, and wild grasses and germinate in the spring, producing spores that attack only rust-susceptible barberry bushes. Here the fungus passes through the sexual stage, and the spores produced by hybridization in the spots on the barberry leaves may be of a new, more virulent race of stem rust.

A single barberry bush may produce 70 billion rust spores, which are shot out from tiny cuplike growths and are carried considerable distances by the wind. They attack only grains or grasses and produce the summer or red stage of the disease. In this stage the rust multiplies rapidly and spreads to other grains and grasses until harvest time, when the black spores are produced.

Barberry bushes, therefore, are doubly dangerous: first, they enable hybridization between rust races and the production of new races that may attack hitherto resistant varieties of grain; second, the rust gets an early start each spring on the barberry, from which it can spread many miles to grains and grasses.

STEM RUST SPREADS FROM BARBERRY TO WHEAT, OATS, BARLEY, AND RYE

Sources of Stem Rust

TWO facts are important: (1) The red spores which can infect wheat and other grains directly rarely overwinter north of Texas; (2) the black or winter spores, which do live through the winter in the North, cannot infect grains or grasses directly but infect only susceptible barberry bushes.

For rust to develop in Minnesota, either the red spores must be blown into the state from rust-infested fields in the South, or the black spores must cause rust on barberry, from which it spreads to grains and grasses.

In some years considerable amounts of the red or summer spores survive the mild winters in Texas and northern Mexico. From this source, stem rust sometimes is blown into Minnesota, but it usually arrives too late in the season to cause heavy damage.

Do Not Confuse Stem and Leaf Rust

STEM rust should not be confused with the leaf rusts that attack wheat, oats, barley, and rye. Although both types of rust may be found on the stems and leaves, stem rust is primarily a disease of the stems, and the leaf rusts are predominantly diseases of the leaves. While both types of rusts develop and spread under similar conditions, they are entirely different. The barberry is the alternate host for stem rust only.

Your Help Is Needed

BARBERRY eradication is a cooperative plant-disease-control project involving federal, state, and local agencies, and individuals. Boys and girls and adults can help to reduce stem rust losses by reporting locations of barberry bushes on their own and other properties.

County organizations in most Minnesota counties pay bounties for reports of locations where barberry bushes are growing. The bounty system does not eliminate the necessity of an organized survey in certain districts, but it does help in finding new locations of barberry as well as in furnishing leads to old properties that are reinfested. To report locations of barberry bushes or for information concerning the project, consult your county agent, or write to the Barberry Eradication Office, University Farm, St. Paul 8, Minn.



The Japanese barberry, *Berberis thunbergii*, which is widely grown in Minnesota as an ornamental plant, is harmless. This and several other species of barberry are immune from stem rust. They are sold without restriction after the usual inspection by nursery inspectors to determine that they are free from disease and insects, and they are grown in compliance with state and federal quarantines.

THERE ARE MORE THAN 200 KNOWN RACES OF STEM RUST

THESE ARE DESIGNATED BY NUMBER AND DIFFER IN THEIR ABILITY TO ATTACK VARIETIES OF SMALL GRAIN

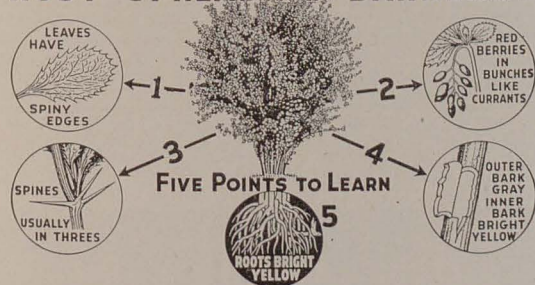
When Races Hybridize on the Rust Spreading Barberry Bush



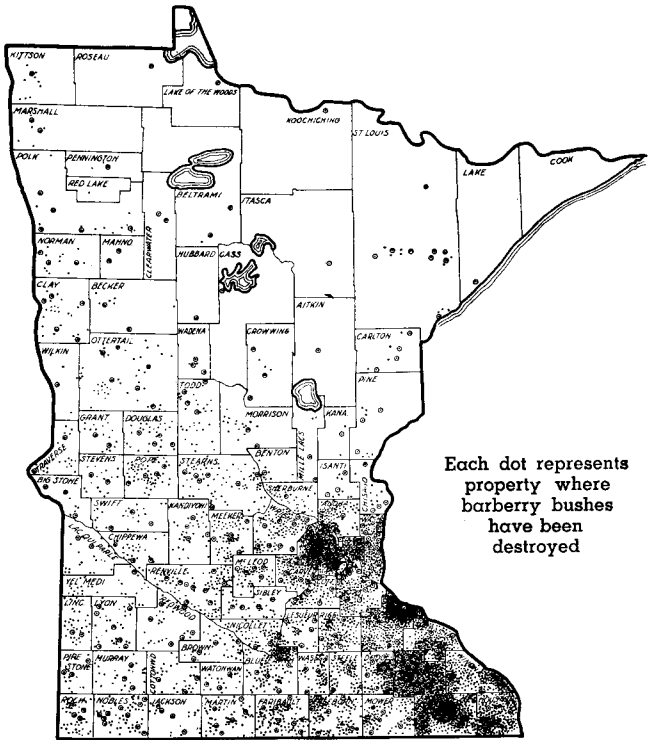
Races Can Be Produced That May Attack Varieties of Grain Now Considered Resistant

HYBRIDIZATION OCCURS ONLY ON THE BARBERRY

LEARN TO KNOW THE RUST-SPREADING BARBERRY



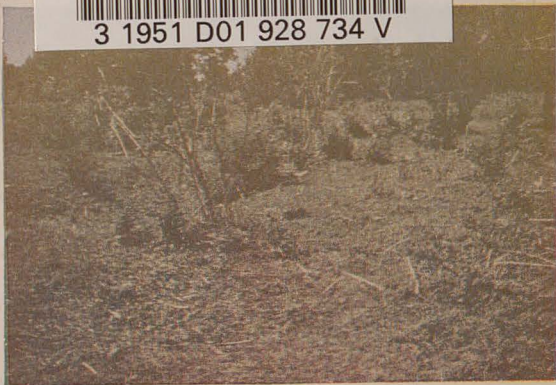
Minnesota Makes Progress



Each dot represents property where barberry bushes have been destroyed

More than 500 spreads of stem rust from infected barberry bushes to grains and grasses have been studied in Minnesota. This represents only a small proportion of the total spreads that have occurred since the barberry was introduced. Almost a million barberry bushes have been destroyed on 9,000 properties in the state since the start of the eradication program. This has eliminated hundreds of local and regional rust epidemics early in the season and thus has contributed greatly to the reduction of stem rust damage. Moreover, stem rust of rye has been practically eliminated through destruction of the barberry.

Progress in stem rust control cannot be determined by comparing rust losses during any one year with those of another year. A comparison of average annual losses over a period of years does provide an index. From 1915 to 1928 the average annual loss to wheat, oats, barley, and rye from stem rust in Minnesota was 11.6 million bushels. For the next 14-year period, this loss was reduced to 5.7 million bushels a year, which represents an annual saving of approximately six million bushels. This reduction in stem rust losses can be attributed to the elimination of more than 990,000 rust-susceptible barberry bushes and to the use of rust-resistant varieties of grain.



Barberry regrowth in wooded pasture

TO insure the complete elimination of the barberry, previously infested properties and adjacent territory must be reinspected periodically. A single barberry bush may produce as many as 25,000 seeds, which either fall to the ground or are eaten by birds and dropped in the woods, along stream banks and fence rows, or in other out-of-the-way places. Reinspections at five-year intervals are necessary to destroy the resulting small bushes before they produce seeds.

From about 1850 until the barberry-eradication program was begun in 1918, barberries grew and multiplied in Minnesota, becoming established as a wild bush in many areas, especially in the southeastern part. Although the barberry has been completely eliminated from some of these areas, further systematic survey work will be needed in others.

Kill Barberries with Salt

The most effective way to destroy barberry bushes is to apply common salt around the base of each plant. Kerosene may be used where salt might be eaten by poultry and livestock. Barberries can be killed by digging if care is taken to remove all roots.

Recommended Control Practices

- Eradicate rust-susceptible barberries.
- Plant rust-resistant varieties of grain recommended by the Experiment Station for your community.
- Use approved cultural practices.

UNIVERSITY FARM, ST. PAUL 8, MINNESOTA

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