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Control Stem Rust by Barberry Eradication in Wheat, Oats, Barley, Rye

Michigan State University

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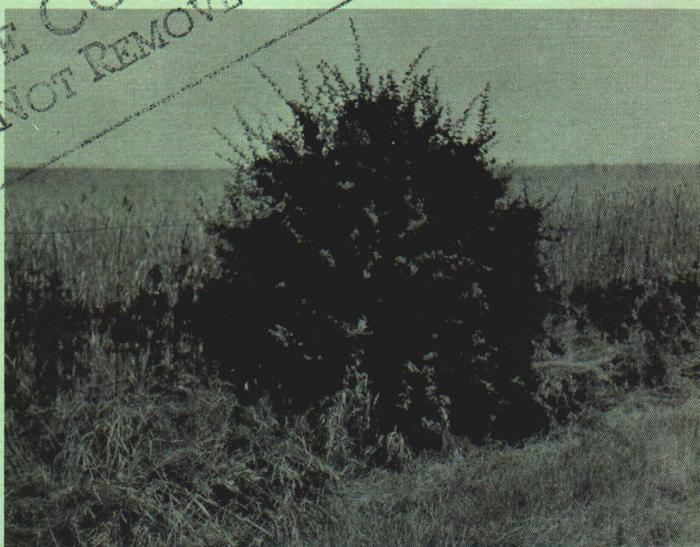
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**control stem rust  
by**

# **BARBERRY ERADICATION**

**in wheat, oats, barley, rye**



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## **Diversity of Stem Rust Races**

There are over 300 described races of the rust fungus that can attack wheats, barleys, and grasses, and over 90 races that attack oats and certain other grasses. These races can be identified on wheat and oat hosts by their ability to attack certain varieties and not others. New races frequently originate through hybridization of existing races on leaves of the common barberry, and certain native species.

This large number of races complicates the plant breeder's work of producing rust-resistant varieties of grain. New races of stem rust are occasionally produced on barberry. These races attack small grains which were resistant at the time they were released to the farmers as new varieties. A search for new sources of stem rust resistance must then be made by the plant breeders to prevent possible devastation of the small grain crop.

Race 15B of wheat stem rust and race 7 of oat stem rust became widely prevalent in 1950, and other more dangerous races have appeared recently to threaten the cereal crops. Races 32B and 151 have the ability to attack many of the new wheats. Race 6AFH of oat stem rust, first found near barberry in the eastern United States in 1965, has the ability to attack all commercially-grown oat varieties. It now appears that this race has become established in the middle west independent of barberry.

The role of barberry bushes in the perpetuation of old and unusual races, as well as spawning new races of stem rust, is well documented throughout the grain growing states. In 1965, 15 races of wheat and oat stem rust were identified in 29 collections from barberry, or about 1 race

per 2 collections, compared to about 1 race per 50 collections taken directly from wheat and oat plants.

## **It Is Caused by a Fungus**

Stem rust is caused by a fungus plant that lives alternately on the barberry bush, the small grains, and many wild grasses. The rust is spread between the host plants by wind-borne, seedlike spores. During the summer season, the fungus attacks the grain plants, taking its nourishment from the stems on which it lives. Under warm, moist weather conditions, the rust makes rapid growth and spreads from plant to plant and from one field to another over wide areas during the growing season.

In itself, the summer-spore stage cannot survive the cold winters in the Northern States. So, as the grain ripens in the fall, thick-walled black "resting spores" are produced which live through the winter on wild grasses and grain straw. When these spores germinate in the spring, the rust cannot directly infect the new grain crop, but must develop first on the leaves of the barberry. The disease then spreads back to the grains and grasses to form the red, or summer, stage again.

## **Do Not Confuse Stem and Leaf Rusts**

The leaf rust that attacks small grain should not be confused with stem rust. Stem rust spots are irregular and elongated in shape, and occur principally on the stems. The leaf rust spots are round, and are found predominantly on the leaves. Both rusts develop and spread under similar conditions, although the rusts themselves are entirely different. The barberry is the alternate host only for stem rust.

## Barberry Bushes Brought to Michigan by Early Settlers

The rust-spreading barberry was first brought to Michigan in about 1805 by early settlers. It was used for hedge and ornamental plantings and, because of its many uses, it was grown widely. From the planted locations, seed was scattered by birds and other agencies, so that the plant became well established in the native timber, along the streams and fences, and in many other uncultivated places.

Local destructive epidemics of stem rust in the wheat, oat, barley, and rye crops followed the introduction of the barberry. The disease became so severe in some localities that the production of small grain was discontinued. Damage to the crops growing near these plants caused farmers to take the initiative in the first eradication work. As a result, in 1918 the barberry was outlawed as a menace to Michigan agriculture, and its systematic eradication began. Federal, state, county, and local agencies are now cooperating in the barberry-eradication work in Michigan.

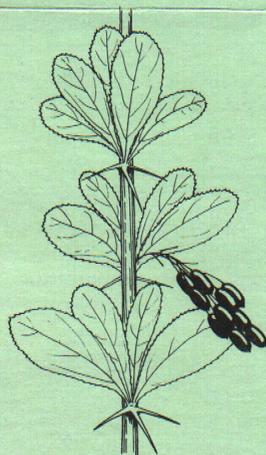
### Effective Control Measures

The following stem rust control measures are recommended to Michigan grain growers:

1. Destroy all rust-spreading barberry bushes.
2. Grow only varieties of grain that are resistant to stem rust and that are recommended by Michigan State University.
3. Plant spring crops early and grow early-maturing varieties.

Barberry bushes are destroyed by digging or by applying "amate" to the stubs of cut off canes.

The barberry is easy to identify:



Leaves with spiny-toothed edges

Spines usually three at a place

Red berries in bunches

Outer bark in gray

Inner bark and roots are bright yellow

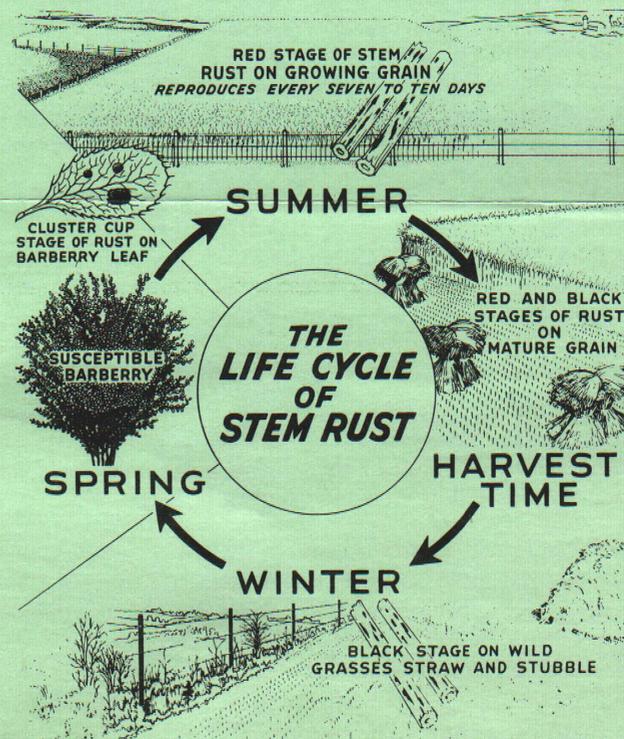
The barberry resembles the well-known spirea and honeysuckle in shape. It is usually 6 feet tall.



On the Barberry

### What Has Been Accomplished?

More than 6¾ million barberry bushes have been destroyed on 19,595 properties throughout the state since the barberry eradication work has been under way. The entire area of the state, which comprises 57,481 square miles, has been given an initial survey, and about 12,500 square miles have been reworked one or more times. Of the area that has been worked, 56,635 square miles have been cleared of barberry bushes and will require only enough work in the future to maintain the barberry-free condition.





On Grain Plants

### The Job Ahead

While a large part of the state has been cleared of the barberry, much work still remains. All areas where fruit-producing bushes have been destroyed will have to be reworked one or more times, until there is no further danger of regrowth. This work is usually done at 5-year intervals, before there is seed production on the new plants and later reinfestation of the worked territory.

The territory needing rework comprises about 846 square miles and includes some of the most heavily infested areas of the state—and also areas where the terrain is rough, and the timber and brush cover is dense. The work in such territory is slow and tedious. Of the 19,595 properties where bushes have been destroyed, only 3,800 will have to be inspected one or more times in the future.

### Stem Rust Losses Have Been Reduced

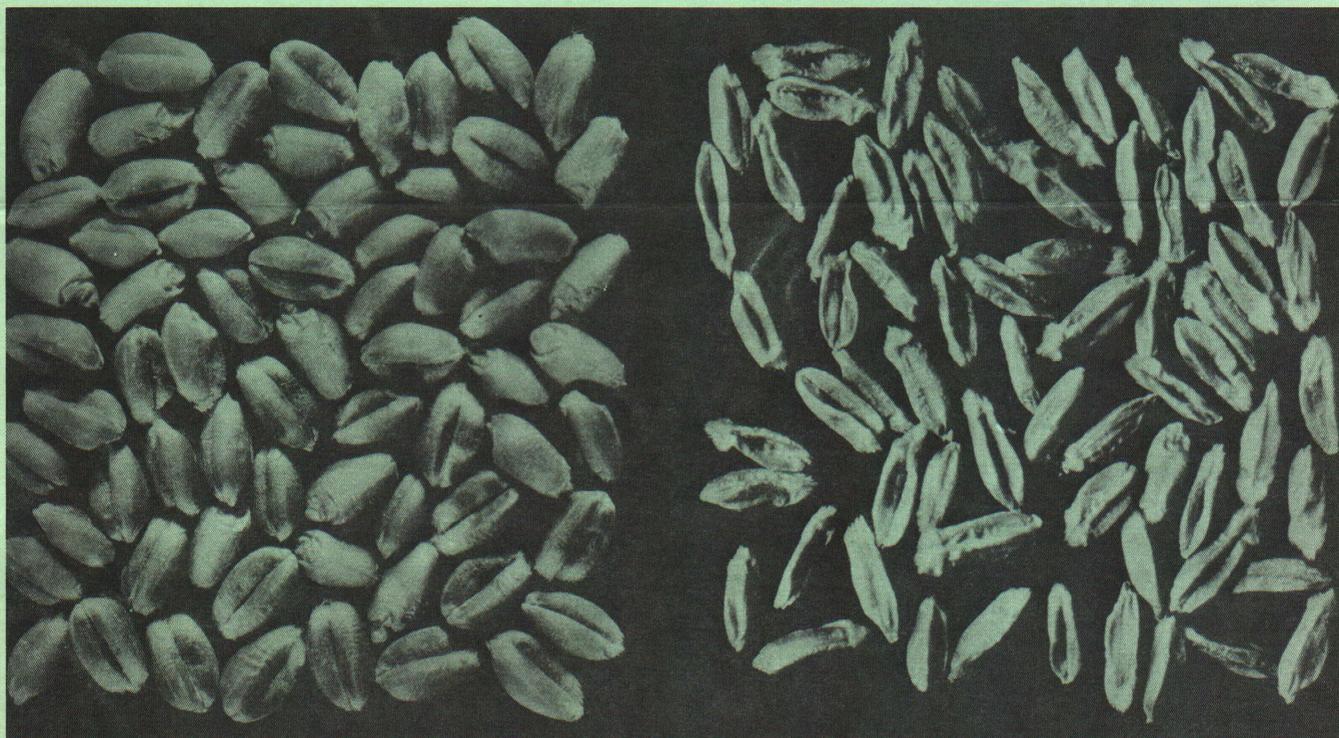
Losses caused by stem rust have been reduced substantially since the start of the barberry eradication work in Michigan. The average annual loss in the state prior to barberry eradication was over 2 million bushels of small grain. Since 1928—after ten years of barberry eradication work—this loss has been less than 550,000 bushels each year. This reduction is the result of barberry eradication progress and the wide use of rust-resistant varieties of small grain. It represents a saving to Michigan farmers of more than 2 million dollars annually. It is significant that, during the last several years, losses from stem rust in Michigan have been almost negligible.

To report locations of rust-spreading barberry, or for information concerning the program, consult your County Agricultural Agent or write to the Plant Pest Control Division, Post Office Box 598, Lansing, Michigan 48903. When reporting barberry bushes, enclose a small twig with your letter.

## STEM RUST MADE THE DIFFERENCE

Profit

Loss



*The engravings in this folder are furnished through the courtesy of the Crop Quality Council.*

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