

Pub. 106

BARBERRY ERADICATION

controls the

STEM RUST

of

WHEAT, OATS, BARLEY, and RYE



Stem Rust (Red Stage) on Grain Stems

This folder was prepared co-operatively by the Experiment Station and Extension Service of The State College of Washington, the State Department of Agriculture, and the Bureau of Entomology and Plant Quarantine, Agricultural Research Administration, U. S. Department of Agriculture. By H. B. Busdicker, Pathologist, U. S. Department of Agriculture and G. W. Fischer, Plant Pathologist, Washington Agricultural Experiment Stations.

EXTENSION SERVICE
INSTITUTE OF AGRICULTURAL SCIENCES
THE STATE COLLEGE OF WASHINGTON
Pullman, Washington

ALL RUST-SUSCEPTIBLE

RUST-INFECTED barberry bushes are the important source of stem rust in the northwestern states. From these bushes, the disease spreads to near-by grains and grasses during May and June. If the weather is favorable, these local infection centers expand rapidly and result in extensive damage before crops ripen. Stem rust spreads from the barberry to grains and grasses and from field to field by tiny seedlike bodies called spores. These are wind-borne and function as "seeds" to start new food-sapping rust growths.



A Typical Common (Rust-Spreading) Barberry

BARBERRY ERADICATION is an old and proved method of reducing losses caused by stem rust. As early as 1660, France passed laws prohibiting barberry bushes near grain fields. For many years, Denmark, Germany, Norway, England, and France have recognized the value of barberry eradication for stem rust control.

Barberry bushes were brought from Europe by America's early settlers. By 1700 grain was being seriously damaged near barberry, and in 1726 Connecticut enacted legislation requiring its eradication. Not until 1918, however, was an organized eradication program begun. By that time, barberry bushes had spread throughout the United States, and stem rust losses amounted to millions of dollars annually. Now, eighteen northern States and the United States Department of Agriculture are co-operating in an extensive program of barberry eradication for stem-rust control.

BARBERRY MUST GO

Questions & Answers

WHAT IS STEM RUST?

Stem rust is a disease of wheat, oats, barley, rye, and many grasses, caused by a tiny parasitic plant called a fungus. So-called "red rust" and "black rust" usually refer to the different colors of the summer and fall overwintering spores of stem rust.

DOES WEATHER CAUSE STEM RUST?

Stem rust increases rapidly under warm, moist conditions and thrives especially in low spots and on lodged grain. However, the disease cannot occur unless spores of the rust fungus are present.

WILL SEED TREATMENT CONTROL STEM RUST?

Seed treatment aids in controlling smut and certain other cereal diseases, but has no effect on rust.

WILL BURNING THE STRAW CONTROL STEM RUST?

No. It would be impossible to burn all infected straw and grasses.

IS BARBERRY THE ONLY SHRUB KNOWN THAT SPREADS STEM RUST?

Hundreds of different rusts may be found attacking as many different kinds of plants, but only certain species of barberry harbor the stem rust of grain.

HOW ARE BARBERRY BUSHES DESTROYED?

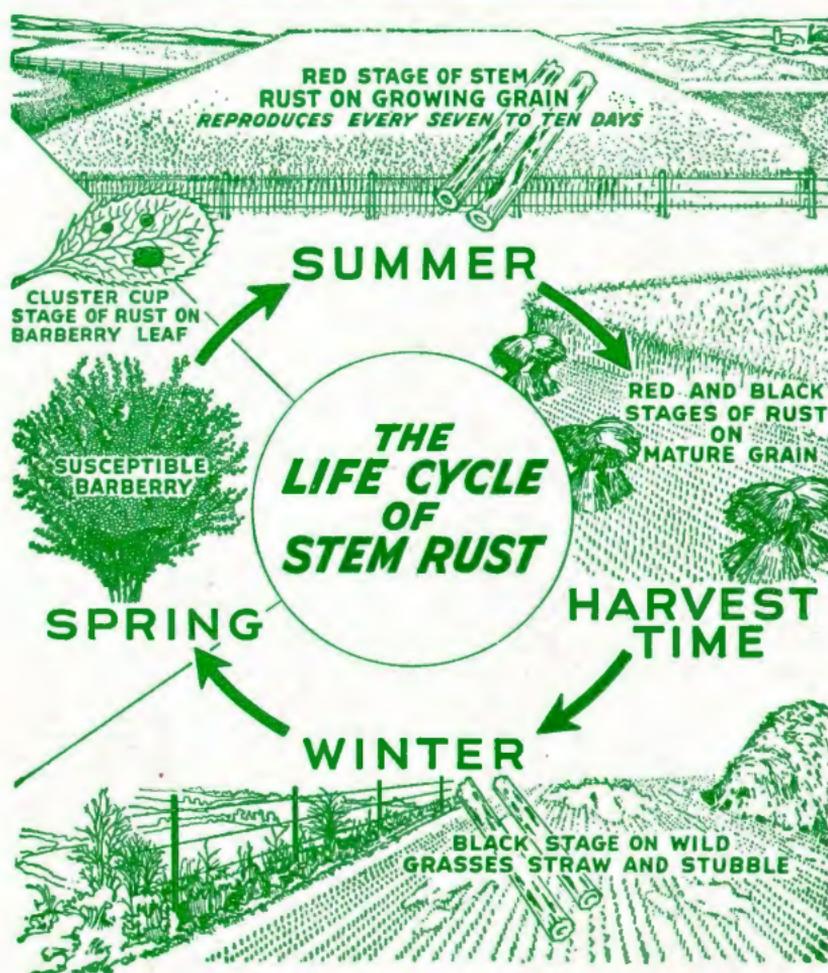
Common stock salt applied around the base of each plant is recommended for killing barberry bushes. In yards or pastures where the use of salt in large quantities would endanger livestock or poultry, kerosene may be used with equally effective results. Bushes should be dug where the chemicals would kill valuable shrubs or trees.

Stem Rust Infection from Barberry Leaves Spreads
to Grains and Grasses in Spring



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HOW STEM RUST DEVELOPS



Life Cycle of Stem Rust of Wheat, Oats, Barley, and Rye

THE NAMES stem rust and "black" stem rust, given this cereal disease, arise from its reddish or black appearance at different seasons. Stem rust is caused by a small parasitic growth called a fungus, which establishes itself on grain and grass plants. Its nourishment is taken from the food sap in the stems. With favorable summer weather, the rust fungus grows rapidly and produces thousands of dustlike red spores. These are carried by the wind to infect near-by and distant fields. This process of the production and spread of rust spores continues throughout the summer over an ever-larger grain area.

The red summer spores of stem rust rarely survive the northern winters. However, as the grain ripens in the fall, the fungus produces black "resting" spores, which are able to overwinter on the infected grasses and stubble. In the spring, the germinating black spores cannot again directly infect grains, but produce spores that attack only rust-susceptible barberry bushes. In turn, the spores that develop on the leaves of barberry can infect only grains and grasses, where again is produced the red or summer stage of the rust.

The eradication of rust-susceptible barberry removes an essential link in the life cycle of the disease and therefore is an effective control measure for stem rust.

STEM RUST SPREADS

TO WHEAT, OATS, B

Facts to Remember

HERE ARE the important facts at a glance: (1) Rust-susceptible barberries are the only shrubs that harbor stem rust. (2) A single barberry bush may produce more than 64 million rust spores, which are carried by the wind. These infect grains and grasses and produce the rapidly multiplying red summer spores. (3) The red spores rarely survive winter conditions in northern climates. (4) The black resting spores do live through the winter. They can infect only susceptible barberry bushes the following spring. (5) New rust races that may develop on barberry may attack previously rust-resistant grain varieties.

Barberry bushes are doubly dangerous: first, they enable rust to repeat its life cycle from year to year and thus continue the toll of crop damage; second, they enable new rust races to develop and thereby endanger new grain varieties.

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



HYBRIDIZATION OCCURS ONLY ON THE BARBERRY

Do Not Confuse Stem and Leaf Rust

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

OS FROM BARBERRY

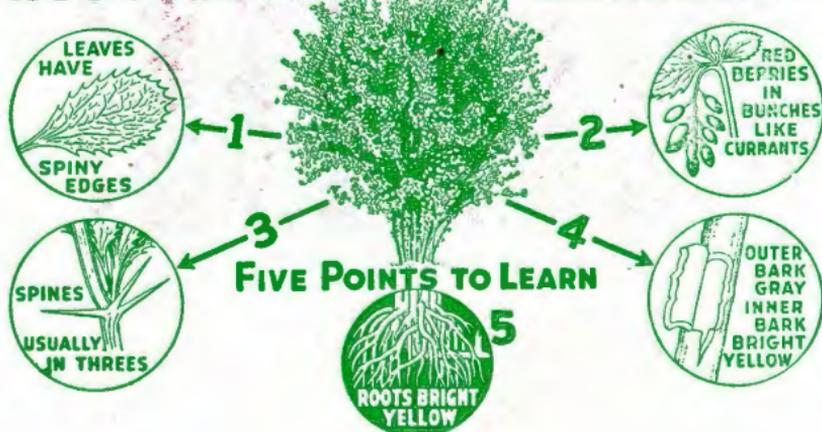
, BARLEY, AND RYE

Weather and Stem Rust

WEATHER AND MOISTURE conditions are closely linked with rust development. The stem rust fungus is itself a simple form of plant life. The red summer spores that are produced as the fungus grows function similarly to the seeds of larger plants. Moist and warm conditions are necessary for the rapid germination of the spores and the subsequent growth of the fungus. With these favorable conditions, new generations of many thousands of rust spores may be produced every six to ten days.

Low, lodged, or damp areas in grain fields are damaged most by stem rust because of the rank growth and warm, humid conditions in these spots. Extended periods of summer rainfall also materially aid rust development. Stem rust does not develop spontaneously from wet conditions. The spores of the disease must be present before infection starts.

LEARN TO KNOW THE RUST-SPREADING BARBERRY



Harmful Barberry Is Easy to Identify

STUDY THE CHART above and learn to distinguish harmful barberry from other shrubs. Rust-spreading barberry bushes may be either green- or purple-leaved. Both are equally susceptible to rust. Special characteristics of stems, leaves, thorns, flowers, and berries distinguish harmful barberry. There are strict state and Federal regulations prohibiting the growing of rust-susceptible barberry or its transportation into or within nineteen states protected by the Federal Black Stem Rust Quarantine.

WHERE BARBERRY IS FOUND

BARBERRIES

ARE SCATTERED

BY BIRDS

Birds eat the berries



1.

Carry them to their roosting places



2.

Where they cough up the seeds



3.

From which seedling bushes grow



4.

They in time bear fruit which again is carried farther on

THE BARBERRY was brought into this region by the earliest settlers. Also, until recent years, nurseries were able to sell rust-susceptible barberry without restriction. As a consequence, these bushes were widely planted and are found as lawn and hedge plantings at farm and city homes and at deserted farms and old building sites.

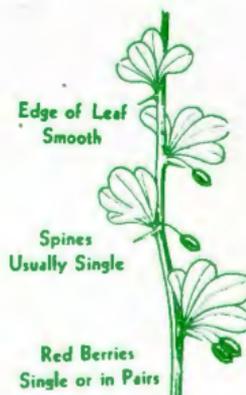
Birds are the principal means of scattering seeds from cultivated barberry bushes. Because of this, barberry also may be found along rivers and creeks, on brushy hillsides, in orchards or wild fruit patches, along fence rows, or anywhere that birds might roost. The barberry may be of any height up to twelve feet, depending on age and growing conditions.

JAPANESE BARBERRY

HARMLESS

Do Not Destroy

THE JAPANESE BARBERRY (*Berberis thunbergii*), of both the red- (*atropurpurea*) and green-leaved varieties, is immune to stem rust. These are attractive ornamental shrubs commonly grown for hedges and other landscaping purposes.



HOW YOU CAN HELP

Report All Barberrry

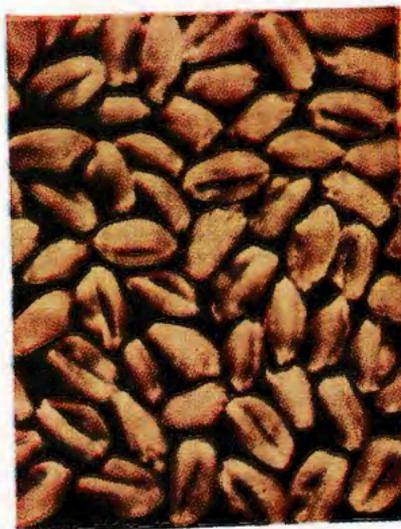
BARBERRY ERADICATION is a co-operative plant disease control project. Federal, state, county, and local agencies and individuals all have joined their efforts to locate and destroy all rust-spreading barberry bushes. In some areas, seeds from planted bushes have been widely scattered by birds, and many barberry bushes are found growing wild. In these localities, crews of men make a careful inspection of all growth, including the timber along river and creeks and scattered brush patches in pastures, on hills, and along fence rows. In other localities, where conditions for barberry growth are not so favorable, only the inspection of farm and city plantings is necessary to locate the bushes.

Boys and girls and adults can help to reduce crop losses from stem rust by reporting locations of barberry bushes growing on their own or neighboring properties and in other places where they may be found growing wild. Information you give will help in two ways: (1) It will result in the removal of the bushes and thus reduce the possibilities of rust losses in your own community; and (2) it will provide leads to other barberry bushes in your community and aid crews and fieldmen to complete their inspection work more quickly.

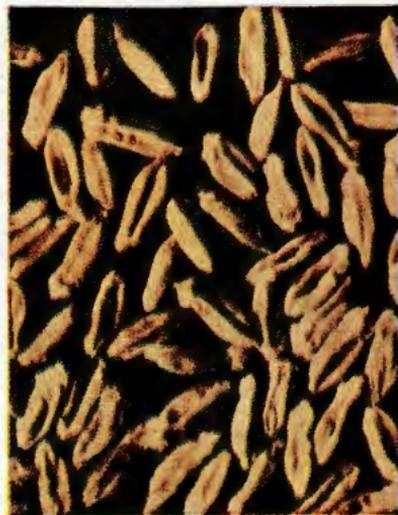
To report locations of rust-spreading barberry or for information concerning the project, consult your county agent or write to the Barberrry Eradication Office, The State College of Washington, Pullman, Washington.

Wheat from a Badly Rusted Field Compared with Normal Kernels from Healthy Plants

PROFIT



LOSS



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