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A DIGEST OF THE ANNUAL REPORT OF THE BARBERRY ERADICATION
CAMPAIGN IN SOUTH DAKOTA, 1926

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Introduction

The rust-spreading common barberry is slowly but surely losing its hold in South Dakota. The active campaign against this bush was started in April, 1918. Up to December 31, 1926, over 130,000 bushes, sprouting bushes, and seedlings have been destroyed from 1,200 different properties in this State. In addition to this, many previously unknown facts relative to black stem rust and the common barberry have been discovered. The willingness of the property owners, and the splendid support of the citizens and organizations within the State, have combined to make these results possible.

Barberry eradication in South Dakota is a part of the general campaign, started in 1918, to reduce stem-rust losses by eradicating all harmful varieties of barberries from the 13 north-central wheat-growing States of the upper Mississippi Valley. The campaign in this State is conducted cooperatively by the United States Department of Agriculture, the South Dakota State College, and the State Department of Agriculture. The Conference for the Prevention of Grain Rust, Minneapolis, Minnesota, composed of representatives of agricultural and allied interests, and several State and local organizations, cooperate closely in carrying on certain important phases of the campaign.

Survey for Barberries

Three types of survey have been used in finding barberries. These are the original or preliminary survey, the second survey, and the re-survey.

The original or preliminary survey is a property-to-property survey in cities, towns, and villages and a farm-to-farm survey of all rural properties in the State. The purpose of this survey was the destruction of the largest possible number of bushes in the shortest possible time. It was completed in South Dakota in 1924.

The second survey is more intensive than the original survey. On this survey every foot of every property upon which barberries may be growing is searched for barberries. The second survey finds and eradicates not only the straggling bushes missed on the original survey, but also the new bushes which have grown from seeds scattered from the planted bushes by birds or other agencies.

The resurveys are reinspections of the properties on which barberries have been found and destroyed. Such resurveys are necessary to find and kill sprouts and seedlings developing where bushes were destroyed in the first or second surveys.

In addition to these surveys for barberries, stem-rust surveys are made during the growing season. These surveys are inspections of grains and grasses over the entire State, for the purpose of noting the development of the rust. Tracing the severity of the stem-rust attack serves as a valuable means of locating missed barberry bushes. The observations made on these surveys also aid in the solution of many problems concerning the spread of stem rust.

Other Activities in Barberry Eradication

In addition to the actual surveys for barberries, there are carried on publicity and educational activities and stem-rust epidemiology studies. A brief summary of these phases of the campaign follows:

Publicity activities, which have been an important part of the campaign since its beginning, are still being carried on. By the use of demonstrations, exhibits, bulletins, circulars, circular letters, newspaper stories, motion pictures, and talks, the public is kept familiar with the purpose and progress of the campaign. As a result of these activities, the campaign is more and more gaining the confidence and cooperation of the people.

The children in the schools are being taught to know the harmful barberry and how it spreads black stem rust. Through the cooperation of the State and county superintendents of schools it has been possible to send suggested lesson plans and material for the study of black stem rust and the common barberry to all of the high schools and city public schools and to a majority of the rural schools of the State. A future citizenship well informed as to the necessity of barberry eradication will result from these educational activities.

Studies on the epidemiology of stem rust are carried on every year in order to determine what influence the weather and other growth factors may exert in bringing on an epidemic of this disease. These include studies on the spread of stem rust from barberries to susceptible grains and grasses, the probability of stem-rust epidemics from infection blown into the State, and the possibility of overwintering of the red stage of stem rust in South Dakota and its return to small grains and grasses without the aid of the common barberry. Other special problems are being studied as time and facilities permit. All of the information thus far obtained in these studies indicates that the common barberry is the main, and probably the only important, source of stem rust in South Dakota.

Difficulties of Survey and Eradication

The complete eradication of the common barberry from South Dakota is an extremely difficult task. Barberries have been planted on home sites that are now abandoned. Weeds, shrubbery, and trees hide bushes from view so that an extremely careful survey is necessary. The difficulty of finding and removing barberries is increased many fold by the fact that the bushes which have sprung from scattered seeds may be growing in almost inaccessible places and in many instances are completely hidden by the surrounding vegetation. Escaped

barberry bushes have been found in swamps, river lowlands, rocky ledges, cliffs, and steep hillsides. Often the barberry seeds fail to germinate for three, four, or as many as seven or more years. After germination, several years may pass before the seedlings are big enough to be easily found.

In Moody County, South Dakota, barberry seeds were scattered by birds and other animals from some fruiting bushes to 13 near-by farms. In Kingsbury County barberry seedlings have been found distributed several miles in each direction from one hedge. New seedlings have been found on these farms every year for seven years since the fruiting bushes were destroyed. Over 100 similar instances of the spread of barberry bushes have been noted in South Dakota. More than 48,000 escaped barberry bushes and seedlings have been found and destroyed in this State.

Rust-Spreads from Barberries

Many instances of the spread of black stem rust from the common barberry to grains and grasses, have been found and recorded in South Dakota since the barberry eradication campaign was started. Barberry bushes also have been located by tracing the increasing severity of the stem-rust attack until the bushes were discovered. Many of the best examples of the spread of rust from barberries are those which have been noted year after year by the farmers living near the offending bushes.

Widespread epidemics that cover several counties or a large portion of the State can not be traced in most cases to single barberry locations. However, the large numbers of infected barberries found in South Dakota, and the many local stem-rust spreads from them, have undoubtedly been the principal source of the rust that started these epidemics. With its broad, open country and its contiguous grain fields, South Dakota presents an ideal situation for the spread of stem-rust spores. Barberry bushes responsible for a rust spread may be located many miles from the infection. Epidemics which have come to be general may have been caused in reality by the joining of the local rust spreads.

Practically every year, during the latter part of June or early in July, stem rust is found spreading from barberries. In some instances a small bush may cause serious damage. This year a small barberry growing next to a 20-acre field of oats was found to have spread rust over the entire field, with the heaviest infection near the bush. Other oat fields in the near vicinity had little or no infection on the same date. (See map entitled "Black Stem Rust Spreads from a Small Escaped Barberry to an Oat Field".) Many similar instances of rust spreading from barberries were found this year.

Financial Aid

The barberry eradication campaign is financed largely by Federal funds. Since its beginning, only \$15,000 in money has been furnished directly by the State. During the same period approximately 12 times as much has been received directly from the Federal Government. Splendid support and some valuable indirect aid have been given by various organizations and institutions within the State. The total cost to the Government and the State for finding and destroying over 130,000 barberries in South Dakota has been less than \$200,000. The cost in the State since the beginning of the campaign has been less than \$2.70 per farm. On the other hand the annual stem-rust loss is estimated to have been about \$125 per farm during the past ten years in this State. In certain years losses have been much higher. In 1916 the average loss per farm was approximately \$800.

Summary of the Work in 1926

Second survey constituted the major activity in South Dakota this year. A total of 6.37 counties was covered, with the result that 572 bushes and 143 seedlings were found on 88 different properties. Resurvey was carried on in connection with second survey. A total of 6.60 counties was covered in this activity. Sprouting bushes and seedlings aggregating 76 were found on 8 different properties, while 169 original bushes and seedlings were found and destroyed on properties on which barberries had formerly been found. From January 1 to December 31, 1926, a total of 960 bushes, sprouting bushes, and seedlings was found and destroyed. This gives a total of 130,368 bushes, sprouting bushes and seedlings found and destroyed in South Dakota to December 31, 1926.

The educational and publicity work carried on in South Dakota during 1926 may be summarized as follows: A total of 94 demonstrations was held. These consisted of fair demonstrations, window displays, and field and miscellaneous demonstrations. Material for study was sent to 2,400 schools and colleges. A speaker was supplied to 33 different meetings. A total of 120 news stories was published in weekly and daily papers, including 18 stories sent out by the college editor. Bulletins and circulars aggregating 42,000 copies were distributed, and 550 posters were placed in conspicuous places. Approximately 38,600 pieces of mimeographed or multigraphed material and about 18,400 miscellaneous pieces of printed matter were sent during the calendar year.

Results of the Work, 1918-1926

The original or preliminary survey of every county in the State was completed by the close of the season in 1924. A total of 51,256 bushes and 15,078 seedlings was found and destroyed on 883 properties during this survey. Second survey was started in several counties during 1923. On December 31, 1926, an equivalent of nearly

26 counties had received a second survey. As a result, 2,103 bushes and 828 seedlings were found and destroyed on different properties. Resurvey was carried on as it became necessary in the various counties. Sprouting bushes aggregating 43,025 were found on 679 properties. New bushes and seedlings totaling 18,078 also were found on resurveys and by reports of interested people. These make a grand total of 130,368 bushes, sprouting bushes, and seedlings found to December 31, 1926. Educational activities and the other phases of the work proceeded simultaneously with the survey.

Present Status of the Campaign

1. The original or first survey of the entire State was completed at the close of the field season in 1924. This survey consisted of a property-to-property search for barberries in every county in the State. As many as 51,256 barberry bushes and 15,078 seedlings were found on 883 different properties as a result of this survey.

2. A second survey was begun in 1923 to find and destroy any barberries overlooked in the first survey. About 26 counties have been covered in this activity with the result that 2,103 bushes and 828 seedlings were found on 210 properties.

3. Resurveys have followed the first or second survey whenever necessary for the purpose of checking up on the properties on which barberries were found. These surveys found 43,025 sprouting bushes and also 9,105 seedlings which had grown as the result of seeds from former fruiting bushes. In addition, 8,973 planted or escaped bushes have been found on these resurveys or on stem-rust surveys.

4. During the entire campaign a grand total of 130,368 bushes, sprouting bushes, and seedlings was found on 1,200 different properties in South Dakota. All of these have been destroyed. (See map showing numbers of barberry bushes and seedlings found by counties, 1918-26).

5. The use of chemicals for killing barberry bushes has practically solved the sprouting-bush problem. However, new seedlings and escaped bushes are found each year. The most difficult problem at present is to find all of these bushes which have escaped from cultivation by means of seed scattering by birds.

6. Publicity and educational activities have helped to clear away much of the skepticism manifested early in the campaign relative to the merits of the project. Practically everyone has heard of the work and is more or less familiar with the facts regarding it. Much remains to be done before the people of the State can be expected to carry on the work independently of Federal aid.

Conclusion

The removal of barberry bushes has decreased the amount of stem rust. A careful check-up each year has shown that only a general

sprinkling of rust now occurs on the farms where infected bushes formerly caused severe damage.

The estimated average annual loss from stem rust in South Dakota from 1916 to 1925 was \$10,918,955. Since 1921 the estimated average loss has been less than \$3,000,000 a year. The eradication from the State of over 130,000 barberries has undoubtedly been responsible for much of this decrease.

In spite of the fact that this large number of barberries has been found and destroyed in this State, the work is not nearly completed. At the present rate of survey and eradication it will take fully ten years to complete the second survey and whatever resurvey may be necessary. It will still be necessary to do considerable cleaning up in certain areas after that. More State aid and larger Federal appropriations might finish the job sooner. However, the project will not be entirely completed until the citizens of the State fully realize the necessity of finding every harmful barberry and causing its removal.

Thorough eradication is essential to the success of the campaign. It can be accomplished only through the cooperation of the citizens of the State. This cooperation can be best given by reporting all common barberries to the South Dakota State College at Brookings, or the United States Department of Agriculture.

United States Department of Agriculture,
Bureau of Plant Industry,
Office of Cereal Crops and Diseases,
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