PROJECT TITLE: Plant and Variety Selection in Spring Wheat, Winter Wheat, and Barley for Control of Foliar Diseases.

PROJECT LEADERS

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OBJECTIVES:

1. To select germplasm of spring wheat, winter wheat, and barley that has improved resistance to foliar fungal and bacterial diseases that presently occur in Montana.

2. To incorporate the resistant germplasm into breeding programs so that adapted varieties can be developed for release to commercial small grain producers.

RESULTS:

Lines and varieties in the dryland and irrigated intrastate and regional spring wheat, winter wheat and barley nurseries were evaluated for disease. Tan spot and Septoria were prevalent in the wheat nurseries and net blotch and scald were prevalent in the barley nurseries.

Barley lines that were previously selected for resistance or tolerance to Xanthomonas translucens (bacterial leaf streak) were grown in a replicated yield trial under dryland conditions and compared with varieties that are currently grown. Agronomic characters were evaluated.

SUMMARY:

Foliar diseases of small grains are of economic importance to small grain producers in Montana. The most prevalent of these diseases are the fungi Septoria tritici, (Septoria leaf blotch), Septoria nodorum (Septoria glume blotch) and Pyrenophora trichostoma (tan spot), the bacteria Pseudomonas syringae and Xanthomonas translucens, and wheat streak mosaic virus. No reliable estimates are available as to the economic losses caused by these diseases, but due to their widespread occurrence, losses in aggregate are probably substantial.

Most foliar diseases are of particular significance under continuous cropping conditions, especially in combination with minimum tillage practices, because the disease inoculum appears to be carried over on crop residues or volunteer grain. Thus, there is a great need to identify germplasm that is resistant to or tolerant of these diseases and to develop resistant cultivars if continuous cropping and minimum tillage practices are to be applied successfully in Montana on a sustained basis.

Cool, wet conditions in Montana caused development of disease in wheat and barley in 1993. Lines and varieties in the dryland and irrigated intrastate and regional spring wheat, winter wheat and barley nurseries were evaluated for disease and rated for susceptibility or tolerance. Tan spot and Septoria were prevalent in the winter and spring wheat nurseries and net blotch and scald were prevalent in the barley nurseries.

A barley disease resistant recurrent selection population has been grown at the Eastern Agricultural Research Center since 1979 in cooperation with the Plant Pathology Department at Montana State University. The population was provided by Dr. David Sands. Each year, the population was evaluated for disease reaction at Sidney and resistant plants were selected. The population was primarily selected for resistance to Xanthomonas translucens (bacterial leaf streak), although selection was for resistance to any disease organism. Each year, several thousand plants were grown and evaluated for disease resistance. Resistant plants were harvested and the seed produced were planted in a winter nursery in Arizona. Plants in Arizona were intercrossed and the resulting seed were planted back in Sidney in the following spring as the disease resistant recurrent selection population.

Twenty spring barley lines were evaluated in a replicated yield trial under dryland conditions in 1993. Lines that were evaluated included some that were selected for good agronomic characters by Dr. Mike Bjarko and by Dr. Rebecca McGee from the disease resistant population.

FUTURE PLANS:

Barley selections and advanced lines which were selected from the disease resistant recurrent selection population and increased in Sidney last year will be grown in preliminary yield trials in 1994. Additionally, recurrent selection will continue in the parent population for disease resistance and good agronomic characteristics.