

A Technique Which Has Been Useful in Classification of
Seedling and Adult Plants for Resistance to Stem Rust
Under Field Conditions.

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In many varieties there is a poor correlation between rust reaction under greenhouse and field conditions. It has been necessary to develop a rapid and more efficient method for determining the rust resistance of lines in our backcross program, where we are in many cases making backcrosses on F_1 plants.

Our experience over the past three years indicates that a combination of seedling and field tests are desirable from a practical breeding viewpoint.

The method currently being used involves planting the advance backcross F_1 generation seed in paper cups in the greenhouse, with only 1 seed planted in each cup. As soon as the first two seedling leaves are sufficiently developed they are inoculated with the "tester stem rust race", which will permit the identification of factors contributed by the donor parent. As soon as the seedlings have been classified for seedling resistance the plants from each cross are divided into two groups. The seedling susceptible plants are transplanted into the field in one row and the seedling resistant plants into an adjacent separate row.

Good fertilization and irrigation practices are necessary both in the greenhouse and when transplanting is done into the field if well tillered plants are to be obtained. Seedlings should be inoculated as soon as possible and the seedling rust notes taken as soon as possible so that early transplanting to the field can be accomplished. If this procedure is followed and temperatures are not high when the seedlings are transplanted to the field, the seedlings suffer very little "shock", tiller profusely and develop into robust plants which permit good adult plant classification and also provide an abundance of F_2 seed.

When the plants in the "transplanted rows" begin to boot, they are inoculated by injecting a spore suspension of the tester race or races separately into each boot. Each inoculated culm is marked with a tag indicating the race employed and the date when the inoculations were made. This procedure permits the use of five or six different tester races on each plant if desirable.

Careful examination of the inside surface of the leaf sheaths of the inoculated culms from 3 to 4 weeks following inoculation will serve as a valuable guide to the plant reaction to any given race. The pustule type which develops on the inside surface of the leaf sheath of the inoculated culms are less influenced by adverse ecological conditions and therefore a better guide than those which may develop on the neck, glumes and awns of the spike which develops from inoculated

culms ("boots").

Additional information on relative susceptibility of plants and the spread of tester races can be obtained by applying light irrigations every 6 to 7 days, but this is not necessary if the pustule type on the inside of the leaf sheath is used as a primary guide in classification.

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Seedling Reaction of Wheat Varieties to Different
Physiologic Races of Leaf Rust.

C. O. Johnson.

The following table summarizes the studies which have been made at Kansas in recent years to determine the seedling reactions of nine winter and twelve spring wheat varieties to a large number of different leaf rust races. Most of these varieties are currently being used as parents in different breeding programs.

Seedling reaction to physiologic races of leaf rust of several wheat varieties that have been used as sources of resistance in breeding programs.

Variety	C.I. No.	Reaction of Wheat Varieties to races indicated			
		Highly Resistant	Moderately resistant	Intermediate	Susceptible
<u>Winter Wheats</u>					
Pawnee	11669	1,9,10,11,13,19,37,68,84,93	15		3,5,6,28,35,44,54,58,105,122,126
Ponca	12128	1,9,10,11,13,19,37,68,84,93	15		3,5,6,28,35,44,54,58,105,122,126
Concho	12517	1,5,6,9,10,13,15,19,35,54,93,122	3,37,84	11,58	6,11k,28,44,68,126
Mediterranean sel. 40		1,3,5,9,10,11,13,15,19,37,44,58,68,84,93,105,122	6,54,126		28
Westar sel.	13090	1,3,9,10,13,15,35,37,44,58,84,93,105,122,126	5,19,68		6,11,28