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## FIELD CROPS SEMINAR

### A Review of Hybrid Wheat

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Until recent years, small grain hybrids could be obtained only by hand crossing. However, with the discovery of sources of male sterility (4, 9, 17) and fertility restoration genes (5, 13, 16), breeders for the first time have the necessary tools to produce hybrid wheat on a field scale.

Hybrid wheat is of interest because of its potentials in increased grain yield, forages, and disease and insect resistance. It may also be possible to use the male sterile in crosses to enlarge  $F_1$  populations used in our pure line breeding programs (11, 19B).

Several problems confront those interested in hybrid wheat at the present time. The percentage seed set obtainable under field conditions has ranged from 15 to 72% (11, 17, 19E) depending on weather conditions, timing of flowering, and the materials tested. Livers (19F) has found that distances up to 22 feet between pollinator and male steriles did not limit seed set. Earlier, Wilson and Ross indicated that the amount of pollen shed was not limiting in distances of 2 1/2, 5, and 7 1/2 feet. (17) Experiments have shown that the increase in grain yield of hybrids may be as much as 88% above the average of the parents (2, 3, 8, 10, 12, 13, 14). Many of these experiments are based on small numbers and greenhouse conditions, however, so this question is not completely answered. Patterson has found that some



hybrids tested in Indiana have not yielded as much above present, well adapted varieties as was expected.

The largest problem yet unsolved is whether or not the increased yield of hybrids will be large enough to pay for the added seed cost. The answer to this problem cannot come until larger stocks of hybrid seed are available for testing. Disease and insect resistance, baking qualities, and protein content of present varieties must also be carried into the hybrids before their maximum potential can be realized.

Despite all the obstacles, many experiment stations and some private companies are investing large sums of money at present with the goal of placing hybrid wheat on the farm.



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  - (B) L. H. Penny, Cereal Crops Research Branch, USDA, Ames, Iowa
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