

A New Breeding Technique for Selecting Early High Yielding Corns

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A new method has been tested by the author for the last two years to indirectly select corn plants with characteristics to more effectively utilize North Dakota's short growing season. Preliminary results indicate the method is an inexpensive but effective way to increase corn grain yields without increasing ear moisture content at harvest.

North Dakota's short growing season would seem to pose a serious limitation to the production of corn which is traditionally considered a long season crop. However, the disadvantages of the short season are largely offset by the extremely long days during the growing season. A common misconception is that corn requires very high temperatures for maximum growth and production. While 86°F is generally considered the optimum temperature for corn growth, extremely high temperatures are detrimental to the plant and actually slow its growth rate.

When supplied with adequate moisture and good fertility many adapted hybrids have the genetic potential to produce yields in excess of 200 bushels/acre in North Dakota. In recent irrigated trials at Carrington, two experimental hybrids produced more than 220 bushels per acre while grain yields over 250 bushels per acre have been obtained in irrigated trials at Oakes.

While the genetic potential of these hybrids is not often achieved under typical growing conditions by the average farmer it is highly desirable to have hybrids with a high yield potential when those near ideal conditions do occur. It also appears possible to develop hybrids which will produce more under average growing conditions.

One approach that the corn breeder in Agronomy at NDSU has taken to develop corn hybrids for this area is to select plants which appear to fully utilize our growing season. We believe these corn plants ideally should have a relatively short vegetative period before silking and tasseling, and a relatively long reproductive period with fast rate of dry matter accumulation. Numerous studies have indicated that grain yield often is highly associated with a long grain

filling period. Selection for a short vegetative period is easily accomplished by selecting plants which silk earlier but it is very difficult to select for rate or duration of grain filling since one cannot easily judge which plants have long filling periods or fast rates of dry matter accumulation.

A potential alternate method of achieving the same goal is to select for a character which is highly associated with rate or duration of grain filling and which is easily identifiable on an individual plant basis. One character which appears to hold promise in this respect is derived from an old Indian variety, "Cudu." This character is a unique purple colored area in the aleurone layer of the corn kernel called Navajo pattern. The gene which produces this color is designated by the gene symbol *R-nj*.

A selection method has been devised by the author, Agronomy, NDSU, to attempt to utilize this *R-nj* gene as an indicator of rate and/or duration of the grain filling period. Preliminary evidence obtained in the last two years utilizing this method indicated that yield was increased significantly over randomly selected check populations while ear moisture at harvest was unchanged.

This method has received very limited testing to date so possible limitations and disadvantages still must be determined. However, if the preliminary results obtained by the author are a true indication of the general effectiveness of the method it could be a highly effective and very inexpensive method to produce inbreds from which early high yielding hybrids are grown. Special grant funds have been received by the author to continue and expand this pioneering research.

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