2. Random inbreeding in open pollinated corn belt maize.

For purposes of comparing the effects of selection upon the range of variation in corn belt inbreds, a series of inbred lines have been developed without selection other than that imposed by nature. These have undergone five generations of selfing from open pollinated material and are more or less equally distributed among four varieties, namely, Midland, Reids, Krug, and Lancaster. The total number of lines emerging from the project is approximately 1600. Each of these lines has been scored for approximately twenty morphological characteristics and although the morphological analyses are still incomplete it is apparent that for certain plant and ear characteristics some of the random inbreds are outside the range of variation of selected inbreds of the corn belt. In 1953 each of the random inbreds were grown out in ear to row progenies where they were observed by corn breeders and classified as to desirability for breeding purposes, a type of selection essentially like that practiced by most corn breeders during the process of inbred development. It is interesting to note that approximately 90% of the total number of lines available failed to pass this observational screening and had they been a part of a regular breeding program would have been discarded prior to top crossing. In a regular breeding program the number of lines eliminated by visual selection would probably be somewhat more than 90% since the selection would continue over a period of years as opposed to a single year in the case of this material. Nevertheless, so far as I am aware, these figures are the only ones available on the percentage of lines one might expect to survive the usual process of visual selection. Of the 90% of these lines which failed to survive visual selection, 73.8% were discarded because of susceptibility to root and stalk lodging, susceptibility to disease and barrenness, all of which are factors of major practical importance. The remaining 26.2%, however, were eliminated largely because they did not fit the corn breeders mental picture of what a corn plant should look like.

A number of these random inbreds will be used in experiments in heterosis for which, it is felt, they may provide more critical material than the usual selected lines.

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