

CREATING A NEW INBRED. James R. Larkins, Line Development Breeder, Monsanto Company, 1051 Landsdowne Ave., Greenville, OH 45331.

Inbred line development in corn depends upon two concurrent activities: inbreeding, and testing. It requires six to eight years to develop a new commercial inbred. The process can be thought of as a pipeline beginning with choice of parents, recombination, followed by six to seven generations, of inbreeding, testing, and selection. This time frame is dependent on the use of multi-season nurseries.

Inbreeding begins by creating source variation for selection by making new crosses among existing inbreds. Breeding objectives, accumulated information, and breeder experience are all brought to bear on choosing parents of the development cross. The F<sub>2</sub> is the first generation in which progeny plants are culled based on heritable differences. During the ear-to-row inbreeding process, selection among rows becomes more effective than selection among plants within rows. Prior to testing, selection is limited to culling for highly heritable traits such as chlorophyll mutations, disease reaction, herbicide reactions, plant type, and ear morphology.

Testing is the primary basis for selection among putative inbreds. The value of an inbred is determined by its performance in F<sub>1</sub> hybrid crosses, which are evaluated in yield trials. Yield testing is the rate-limiting step in developing a commercial inbred. It is expensive and can only be conducted once a year in temperate regions. Furthermore, testing must be conducted over a sufficient number of seasons and sites to adequately characterize performance.

Plant breeding is a numbers game. Increasing the number of lines increases the odds of occurrence of a truly superior segregate. Increasing the number test plots per line improves the chances of recognizing it. Since testing is a limiting factor, a key strategy is to allocate resources effectively with a fixed number test plots. A tradeoff exists between deriving more inbreds with less information per line versus fewer inbreds with more information per line. A successful strategy strikes an optimum balance between number of lines and information per line to maximize the rate of gain.