ONE of the salient features of the present-day method of corn improvement consists of the testing of many inbred lines in experimental hybrid combinations. It is not uncommon to include several hundred hybrid strains in trials within a single locality. The soils on which yield trials are planted frequently are quite variable. An experimental design which can effectively cope with the increased soil heterogeneity encountered in large experimental fields is an important asset to enable more accurate selection of the most promising strains. The designs which served satisfactorily for a small number of varieties may be relatively ineffective in eliminating variability due to soil differences in experiments involving a large number of varieties. Sub-dividing the large group of varieties to be tested into several sub-groups and including suitable controls or standard varieties in each sub-group has been used in many trials. Although this method minimizes some of these difficulties, it increases the number of plots of the experiment, thereby adding to the cost of conducting the test. The semi-Latin square design, such as was used in the Iowa Corn Yield Test previous to 1940, enables the testing of a large number of varieties but is subject to a biased error.

For field tests involving a large number of varieties, the incomplete block designs seem to be desirable. These new designs are becoming more general in use and are favorably accepted by those who have used them. Numerous incomplete block designs have been formulated, but four of these designs are at present commonly used, namely, triple lattice, lattice, lattice square, and balanced lattice.

Incomplete block designs employ blocks containing a fewer number of varieties than the total number compared. In the lattice designs the $k^2$ number of varieties within each replication are grouped into $k$ blocks of $k$ varieties each, while in the lattice square designs each replication is arranged as a square of $k$ rows and $k$ columns. In the balanced lattice design every pair of varieties appears once in the same block, the number of replications necessary for complete balance being $k+1$ where $k$ is an odd number. In the lattice square design where each variety appears with every other variety in either a row or a

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1Contribution from the Farm Crops Subsection, Iowa Agricultural Experiment Station, Ames, Iowa, cooperating with the Division of Cereal Crops and Diseases, Bureau of Plant Industry, U. S. Dept. of Agriculture. Jour. paper J-869 of the Iowa Agricultural Experiment Station. Project No. 163. Received for publication July 18, 1941.

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