PROBLEMS concerned with varietal testing are of prime interest to agronomists in relation to the determination of the adaptation and yield of named varieties and new hybrids for the purpose of making recommendations to farmers. Experiment stations commonly have available a large number of selections for yield tests. Many of these can be eliminated by deficiencies that can be detected by observation, yet many remain that require yield trials to determine their productive capacities. It is important that as much information be secured as possible from the use of small plots. During the past few years considerable interest has been focused on the lattice designs developed by Yates (18) as a means of increasing precision. Many experiment stations test varieties simultaneously in rod rows and in larger field plots. The question then arises as to whether the relative response of the varieties is the same for both methods of testing. Some investigators harvest quadrats in place of the entire plot. The principal questions are, first, how many quadrats per plot are necessary to give the desired precision, and second, how do the responses of the varieties as measured by quadrats compare with those determined on the entire plot basis. In this paper data obtained during the past 6 years by the Wisconsin Agricultural Experiment Station at Madison are used as a study of the points mentioned above.

MATERIALS AND METHODS

The data used in this study consist of the grain yields from the wheat, oats, and barley rod-row and 1/60-acre plot experiments conducted by the Department of Agronomy at the University Hill Farms, Madison, Wis., during the period 1937 to 1942.

1 Contributions from the Department of Agronomy, Wisconsin Agricultural Experiment Station, Madison, Wis. Published with the approval of the Director. Paper No. 185. Received for publication March 26, 1943.

2 Assistant Professor, Associate Professor, and Professor of Agronomy, respectively. The authors wish to thank Dr. Churchill Eisenhart, Statistician, Wisconsin Agricultural Experiment Station, for his counsel in selecting the methods of statistical analysis used and for his assistance in the preparation of the manuscript; and Dr. R. G. Shands for making available to the authors the data for the spring wheat rod row tests for the years 1937 to 1942, inclusive.

3 Figures in parenthesis refer to "Literature Cited", p. 660.