Uniformity Trials with Spring Wheat

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Uniformity trials with various crops have served a definite purpose in determining the most effective plot arrangement and experimental design for the particular area involved. Where growing conditions are subject to variations of similar magnitude, the design and plot recommendations for each crop have become more or less regional.

Although numerous small grain uniformity experiments have been conducted in the United States and Canada, they have, in the main, been carried out under conditions quite unlike those found in the Palouse area of eastern Washington. Topographically, the Palouse is an area of undulating dune-like hills with south or southwest slopes and steep north slopes and comprising about a million acres in eastern Washington and western Idaho. The problem of adapting cereal trials to this topography, with its associated fertility and moisture gradients, is sufficiently complex to merit study.

LITERATURE REVIEW

Wiebe (9) studied the influence of size and shape of plot on the coefficient of variation using spring wheat uniformity data. He found that as more rows were added to a plot of a given length the variability tended to increase. Conversely, as the plot was lengthened with a given plot width, the variability decreased. From this he concluded that the long, narrow plot was less variable than a square plot of the same area.

The use of the incomplete block design in small grain trials was studied by Goulden (3). Using barley uniformity data he obtained gains of from 0 to 18% with various plot shapes within almost square replicates. Wheat uniformity data of Wiebe (9) he found in efficiency of 77% for a simulated experiment in entries in plots 15 x 3 feet arranged in replicates.

Cochran (1) discussed the use of lattice designs applied to wheat trials, and reported on gains as ascertained on six North Dakota wheat experiments. Gains ranged from none to 56% in these.

A study of oat uniformity data by Johnson and Murphy (4) encompassed plot size, replicate shape, and design. Variability was consistently reduced as replicates were used, with replicate shape changed from a square to an elongated rectangle. On the other hand, the effective error of the lattice design remained about constant, regardless of replicate shape. Gains in efficiency for the latter were equivalent to one or two added replicates in randomized complete block designs. A summary of triple lattice and lattice square field trials displayed gains up to 55%. These utilized 3-row plots with 16 feet of the center row harvested for yield; all trials were laid out keeping the replicates as square as possible.

Torrie, et al. (8) gave a summary of efficiencies found in 22 field trials of oats, barley, and winter wheat. Gains ranged from zero to 73%, with an average of 9%. These utilized 3-row plots with the center row harvested for yield; all trials were laid out keeping the replicates as square as possible.

An examination of the standard errors of 523 experiments conducted in Saskatchewan from 1925 to 1946 has been presented by Ma and Harrington (5). Eighty-one incomplete block experiments of 8 crops were applied to the 4 crops wheat, oats, barley, and flax. The mean coefficient of variation for 37 wheat experiments using assorted incomplete block designs was reduced by a weighted mean gain in efficiency for the