Multiline Superiority in Cereals

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MULTILINE varieties are re-constitutable composites of phenotypically similar, genetically dissimilar lines; the characteristics of such populations are described under the heading "The Multiline Variety" (3). Line-forming techniques (5) and consideration relative to standard cereal breeding programs (6) have been discussed. Practical applications of the concept to variety development programs have been made (1, 2) and many reports of composite performances have been published. This paper reports on extensively documented cases of (I) general yield superiority of composites over the mean yield performance of component lines, and (II) specific multiline superiority in yield over the mean yield performance of component lines and commercially available single-line varieties.

MATERIALS AND METHODS

I. General case of composite superiority. In 8 years of the period 1953-1964 the New York regional oat nurseries included composites as entries. These composites were of 3 kinds, namely, (a) 43 "Test Mixture" composites made up from equal amounts of seed of the other primary entries, usually 10 to 16 in number, (b) 64 composites made up of 4 lines having common similar characteristics such as height or maturity, and (c) 17 composites made up of 5 lines having generally dissimilar characteristics. These rod row nurseries were grown at widely dispersed locations in the state in randomized complete block arrangements, replicated 4 to 10 times per location. A total of 124 paired yield comparisons of composites with their component lines are available from 73 nurseries (locations); the discrepancy between pairs and nurseries is due to more than 1 composite entry per nursery in 3 of the 8 years.

II. Specific case of multiline yield superiority. In ten (New York) oat nurseries were sown in the counties of Cortland, Allegany, Seneca, Schuyler, Cayuga (2 locations), and Tompkins (4 locations). Thirteen entries were sown in a randomized complete block design with 8 replications at each location; plots were single rows (1 x 15 feet). One entry was a composite made from equal seed amounts of 5 component lines, these component lines were "Russell", "Tioga", "Garry", Sel. 51, and Sel. 70. The other 7 entries were "Mohawk", "Niagara", "Oneida", Sel. 8, Sel. 13, Sel. 25, and Test Mixture.

RESULTS

I. General case of composite superiority. The paired yield comparisons of the 124 composites and component line means are shown by year in Table 1. The 8-year period show the composite 72 pounds per acre (3.23%) advantage over the average yield of the component lines' means.

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