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GENOTYPIC COMPETITION IN WHEAT FOR GRAIN AND STRAW YIELD

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The general and specific competing abilities of two semi-dwarf varieties, Mexipak and AU 44, and two tall varieties, Dirk and C 273, were evaluated for grain and straw yields at a high level of fertilizer application. Mexipak generally gave an excellent performance when grown in its own neighbourhood and was not competing with anyother variety. The same was true of the other semi-dwarf, AU 44, except that it gave greater grain yield when flanked by Mexipak. The two semi-dwarf varieties had comparable competing ability as indicated by non-significance of the neighbour means. The two tall varieties, Dirk aed C 273, also behaved in the like manner, although Dirk appeared to be more aggressive in competing for grain yield.

INTRODUCTION

Struggle for existence, a universal biological phenomenon, occurs not only among, but also within, species. It is based on the interactive ability of different genotypes in a population competing for the same space and source of food. In wheat as also in several other autogamous crop species like Barley (Rasmussen, 1968), oat (Jensen, 1952), soybean (Mumaw and Weber, 1957, rye (Ellerstrom and Hagberg, 1955), differential response accrues from certain genotypes from grain yield in multilineal plantings. Evidence shows that varietal blends which may not necessarily outperform the elite component tend to afford greater protection against disease and other environmental hazards and thus have a broader adaptation to environmental conditions. Jensen and Federer (1964) have made numerous studies to focus attention on multilineal varieties in cereals. In a later investigation, Jensen and Federer (1965) studied four wheat genotypes representing different levels of plant height and showed that these differed significantly in their competing ability in adjacent rodrow culture.

Recently, some new wheat strains of high potential have emerged

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from various wheat improvement programmes in this country and are being tested for their suitability to grow in pure and blended stands under diverse environments. It was proposed in this study to examine the relative competing ability of some of these promising genotypes for grain and straw yields.

MATERIALS AND METHODS

The five wheat varieties tested for their relative competing ability were AU 49, Mexipak, AU 44, Dirk and C 273. Of these, AU 49 may be classified as dwarf, AU 44 and Mexipak as semidwarf and C 273 and Dirk as tall varieties. All except Dirk, a tip awned variety, are fully awned.

A treatment consisted of a given genotype planted in a single 10-ft. row with plants spaced three inches apart. This row was flanked on both sides by a given genotype planted in rows, spaced one foot apart from the central row, with the same distance between plants as in the central row. Each genotype thus appeared 5 times in the central row in a replicate, corresponding to the five genotypes studied, and thus there were 25 treatments in each replication. The design was randomized complete block with four replications. The experiment was planted on a loamy field in the Department of Plant Breeding and Genetics, University, of Agriculture Lyallpur, and received 120 lbs. of nitrogen. Due to erratic emergence of AU 49 all treatments of this variety had to be deleted and data were recorded on the rest of the treatments. The following observations were taken:

1. Grain Yield. When fully mature, the whole central row was harvested, threshed and grain yield recorded in ounces.

2. Straw Yield. The plants collected from the central row were weighed in ounces before threshing and the straw weight was calculated by substracting the grain weight from the total plant weight.

TABLE 1. *Strain and neighbour means for grain yield (oz.)*

Neighbours	Strains				Neighbour mean
	Mexipak	AU 44	Dirk	C 273	
Mexipak	16.6 a	14.0 b	18.0 a	15.0 b	15.9
AU 44	13.6 b	13.3 b	18.6 a	16.3 c	15.5
Dirk	13.0 b	14.0 b	14.6 b	10.3 c	13.0
C 273	13.6 b	10.3 c	14.6 b	10.3 c	12.2
Strain mean	14.2	12.9	16.5	13.0	

Means having a letter in common are not significantly different.

TABLE 2. *Strain and neighbour means for straw yield (oz).*

Neighbours	Strains				Neighbour means
	Mexipak	AU 44	Dirk	C 273	
Mexipak	31.00 a	28.67 b	38.67 c	41.00 c	34.83
AU 44	27.67 b	31.33 a	45.33 d	40.00 c	36.08
Dirk	26.33 b	25.33 b	33.67 a	33.33 a	29.66
C 273	25.67 b	27.33 b	32.00 a	31.33 a	29.08
Strain mean	27.66	28.16	37.42	36.42	

Means having a letter in common are not significantly different.

The data were analysed by the analysis of variance method, and the treatment means were compared by the Duncan's new multiple range test.

RESULTS AND DISCUSSION

As seen from Table 1, the tall-statured variety, Dirk, gave the highest mean grain yield (16.5 oz) followed by Mexipak (14.2 oz), C 273 (13.0 oz) and AU 44 (12.9 oz). This tall variety appeared to behave as the most aggressive of all, as it showed a clear tendency to outyield the other varieties in comparable environments. The other tall variety, C 273, was not as high yielding, though it competed equally aggressively as shown by the neighbour means for Dirk and C 273 which were not significantly different. A comparative study of the neighbour means indicated significant difference between the tall and the short groups for general competing ability; within group differences were not significant. This suggests a tendency for the tall-statured varieties to be more aggressive than the short ones in such competition.

The varieties behaved somewhat in a parallel fashion in their performance for straw yield. (Table 2). Again, Dirk produced the largest quantity of straw and was closely followed by C 273. There occurred wide differences between the neighbour means for the dwarf and the tall varieties. This fact apparently is indicative of the aggressiveness of tall vis-a-vis short-statured varieties in grain and straw yield development, although all tall or short varieties need not produce comparable yields in the same environment, as yielding ability seems not related to the aggressiveness a variety has shown in competing as a neighbour (Tables 1 and 2).

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