ALTHOUGH admixtures in grain varieties are a bane to many agronomists, very little critical study of grain mixtures has been undertaken. Data already available (3) suggest that the yields of varieties in mixed stands may not be correlated with those from the same varieties grown separately. This fact has a direct application to the bulked population method of breeding. Advocates of that method commonly assume that the forces of natural selection which favor the perpetuation of plants that are best fitted to survive the hybrid mixture will likewise sort out the types that will yield best when grown alone. Doubtless this assumption is correct when the undesired types are being eliminated by cold, disease, or other serious adverse factors, but in the absence of such factors valuable material is likely to be lost as a result of competition.

REVIEW OF LITERATURE

Competition between cereal plants has been studied from various angles. Cardon (1) has shown that grain crop mixtures under irrigated conditions in Montana produce smaller grain or forage yields than when the same crops are grown separately. The importance of rapid early growth in competitive stands of weeds and cereals has been emphasized by Pavlychenko (6). In his experiments wild oats were noticeably more aggressive and damaging in wheat than in the barley which had a more rapid early growth. Klages (4) found that early aggressive growth favored barley in mixtures with oats.

Competition between plants of the same crop and variety, irregularly spaced, has been studied by a number of workers, including Smith (7), who has shown that stand irregularities occurring in mechanically sown fields usually are adequately compensated by differences in tillering, growth, and yield of the individual plants.

Klages (4) reported yields for three stem rust susceptible wheat varieties grown in individual mixtures of different percentage composition with the stem rust resistant variety Mindum in a single season when stem rust was severe. The yields of Mindum in the various mixtures were in direct relationship to the stem rust damage to the susceptible varieties. Barley variety mixtures were tested extensively by Harlan and Martini (3). In experiments with a mixture of 11 varieties of barley grown for 4 to 12 years at 10 stations, they found evidence of early aggressiveness and increasing dominance of the local commercial type at certain stations, particularly Moro, Ore., and Moccasin, Mont. However, at Ithaca, N. Y., and St. Paul, Minn., the locally grown commercial variety in the mixture was depressed and varieties not grown in those localities dominated the mixture after a time. Parallel yield comparisons in pure culture of all varieties that comprised the mixture were not included.