MODERN plant breeding methods are designed to preserve, control, and utilize genetic variability. One of the objectives of controlled genetic variability is to obtain maximum, beneficial response of the variety to its environment — i.e., to establish relatively wide climatic and geographic adaptations. The concept of a broad adaptation base for agricultural varieties is by no means new. Pre-Mendelian plant breeders often used mass selected stocks and maintained desired types by frequent reselection. For a time after the rediscovery of Mendel’s work and Johannsen’s announcement of the “pureline” theory, the progeny row method of breeding was widely employed. Several of the present cotton varieties were developed, in part, by this method; but when the method is followed blindly — especially when selection for one plant character is practiced at the expense of all others — deterioration is the almost invariable result. Modern cotton production and marketing methods serve only to emphasize the biological advantages of widely adapted commercial varieties. A broad adaptation base may be provided by the maintenance of a certain amount of heterozygosity or heterogeneity, or both. In cotton, which is usually self fertilized, there is a definite tendency toward inbreeding during the process of developing a variety. Under such conditions, the preservation of broad adaptation usually is accomplished by propagating, as varieties, mixtures of strains which are similar in major agronomic characteristics but which presumably differ in their environmental responses. Thus, broadly adapted strains of cotton usually are composed of mixtures of relatively inbred biotypes.

The amount of heterozygosity or heterogeneity to be maintained in a variety, and the climatic conditions and geographic area to which a variety is to be adapted are decisions the plant breeder must make. Mixtures may occur at different biological and taxonomic levels. Ramiah and Panse (4) stated that commercial Malwa cotton in India was a stable mixture of Gossypium arboreum var. neglectum and G. hirsutum. Mixtures of pure and mixed strains, certain of which were stocks, and produced lint of superior spinning quality. In this similar experiment, Sawhney and Narayana (5) that “the sole justification for adopting the pure line method is followed blindly — especially when selection for one plant character is practiced at the expense of all others — deterioration is the almost invariable result. Modern cotton production and marketing methods serve only to emphasize the biological advantages of widely adapted commercial varieties. A broad adaptation base may be provided by the maintenance of a certain amount of heterozygosity or heterogeneity, or both. In cotton, which is usually self fertilized, there is a definite tendency toward inbreeding during the process of developing a variety. Under such conditions, the preservation of broad adaptation usually is accomplished by propagating, as varieties, mixtures of strains which are similar in major agronomic characteristics but which presumably differ in their environmental responses. Thus, broadly adapted strains of cotton usually are composed of mixtures of relatively inbred biotypes.

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