their separating and assuming a spherical shape. This is illustrated in Fig. 5—a stage where complete dissolution of the middle lamella had occurred, resulting in the centripetal progression of abscission.

The hypothesis that auxin inhibits abscission through its effect on the maintenance of membrane-integrity was further supported by experiments in which 1 percent IAA in lanolin-water emulsion was applied distally on debladed petiolar stumps. Hand sections of these petioles, 3, 5, and 10 days after deblading, revealed a continuity of air in the intercellular spaces traversing the abscission zone.

A similar mechanism may be operative, attending a drop in auxin level, during tissue senescence in certain fleshy fruits as well as in abscission of determinant organs in other plants.

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References and Notes

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2. This investigation was supported by a summer (1956) research award from the Lalor Foundation and was conducted in Kerckhoff Biology Laboratories, California Institute of Technology, Pasadena, where I hold an appointment as research fellow. During the course of the investigation A. J. Haagen-Smit offered suggestions and encouragement, for which I express my sincere thanks.
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25 March 1957

Differential Responses to Population Pressures by Normal and Dwarf Lines of Maize

Dwarf or semidwarf variants in such species as sorghums, apples, beans, and peas are of economic importance. Suggestions have been made that one of the numerous, genetically different, semidwarf mutants of maize might also be useful agriculturally. The rationale has been that the shortened stalk of such dwarf types would markedly reduce the incidence of stalk breakage and root lodging which make machine harvesting difficult. Therefore, these types would be acceptable if their yield were equal to or only slightly below normal. Leng (*1*) recently reported that single crosses made from inbreds which had been converted to the recessive mutant *brachytic* 2 were satisfactory in yield.

Field observations in our laboratory of dwarf types had indicated that they might actually possess yielding ability beyond their normal counterparts. These observations motivated the start of a testing program in 1954 designed to characterize the response of both dwarf and normal types to population pressures at high levels of fertility and with adequate water available. Work during the past 3 years has shown that at least one recessive semidwarf mutant *compact* (*ct*) has a significantly different response to population pressures from the normal inbred Hy or two other semidwarf mutants *reduced* and *brachytic* 2 (*2*).

The *compact* mutant arose by spontaneous mutation in a stock of Hy2 and has previously been designated as Hy2 (*dwarf*). It has been compared for 3 years in replicated yield tests to the normal Hy inbred, for 2 years to a Hy conversion to *reduced*, and for 1 year to a Hy conversion to *brachytic* 2. Thus all types under test were inbreds which had roughly comparable genotypes except for the loci conditioning plant height. Data on grain and stover yields, leaf areas, mineral content of the leaves, flowering dates, and ear characteristics were collected for each strain at various population levels. Figure 1 shows the yield in bushels per acre at four populations for 1956, the only year in which all four genetic strains were compared. Note the attainment of a yield optimum at 26,000 plants per acre by the *compact* strain and only slight decreases in yield at the higher populations; this is in marked contrast to the other types tested. Note, too, that at 26,000 plants per acre, the *compact* strain yields more than the normal strain yields at 13,000 plants per acre. Such a superiority in yield for the *compact* strain at higher populations over the normal strain at any population tested was also noted in the 1954 and 1955 tests.

The test reported here was made with inbred material, Hy, and various semidwarf mutants inserted into a Hy background. It would be unwarranted to extrapolate from the responses of inbreds to population pressures to the responses of hybrids. Other tests have shown, however, that normal hybrids with Hy as one parent react similarly to Hy with regard to population increases. Further, *reduced* hybrids respond in much the same manner as *reduced* Hy while *brachytic* 2 hybrids are similar to *brachytic* 2 Hy.

The *compact* strain clearly has a different response to high populations from three other comparable strains carrying other genes affecting plant size. This response enables *compact* to yield slightly more at high populations than the normal type yields at any population tested. Further, inbreds and hybrids carrying the same dwarfing gene (either *rd* or *br*2) react similarly to population pressures. These findings suggest that yield increases over normal hybrids can be obtained by the use of hybrids converted to the *compact* gene. Preliminary tests of partially converted hybrids will be made in 1957 (*3*).

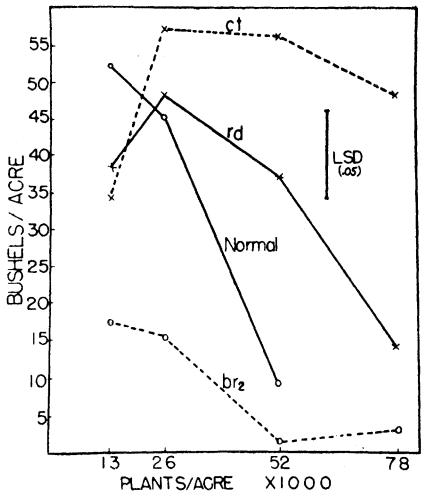

Fig. 1. Yields in bushels per acre for four inbreds which are genetically similar except for major genes that affect plant size (1956).

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References and Notes

1. E. R. Leng, *Abstr. Am. Soc. Agron.* (1956), p. 69.
2. We are indebted to W. R. Singleton for seed of the *reduced* types and to E. R. Leng for seed of the *brachytic* types.
3. This article is journal paper No. 1101 of the Purdue University Agricultural Experiment Station.

15 March 1957

Selective Blockade of Excitatory Synapses in the Cat Brain by γ-Aminobutyric Acid

γ-Aminobutyric acid (GABA) has been identified (*1*) as an active principle in the inhibitory substance (factor I) that can be extracted from the mammalian brain (*2*). Both the extract and the compound have been tested, chiefly on the crayfish stretch receptor (*1–3*), and both diminish the depolarizing electrogenesis caused by stretch of its mechano-sensitive dendrites. GABA also appears to augment the inhibitory postsynaptic potential of the receptor (*3*). On the dog brain, both "excitatory" and "inhibitory" effects by GABA and other amino acids have been reported (*4*).

The mode by which a synaptic drug exerts its overt effects in the central nervous system is often difficult to determine (*5, 6*). For example, although