5. A classical test for allelism of id (indeterminant growth habit = photoperiodic) in teosinte and maize.

Three hybrids between maize which is homozygous id and teosinte were found to be indeterminant. They flower, however, in response to a photoinductive regime of 9 hrs. of light and 15 hrs. of dark.

This finding is a successful partial repetition of the work of Langham (Genetics 25:88-107, 1940), and is a partial reconfirmation of his contention that the inheritance of this difference between maize and teosinte is simple (monogenic).

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1. Growth effects of gibberellic acid on dwarf-1 and normal maize seedlings.

One approach to the basic problem of the role of hormones in normal plant growth is to use artificial applications of hormones to plants in which the usual amount of native hormones is assumed to be reduced by mutant gene action. In maize a "growth series" can be set up using the mutant, d_1, and artificial applications of the hormone, gibberellic acid (GA_3), which has been demonstrated to normalize expression of this gene (Phinney, 1956, Nat. Acad. Sci. 42:185-189). The series is:

1. Normal phenotype (D_1D_1 and D_1d_1) untreated, assumed to be within the normal range of native hormone content.
2. Dwarf phenotype (d_1d_1) untreated, has shown evidence of reduced native hormones (Van Overbeek 1938 Plant Physiol. 13:587-598; Phinney 1961 Iowa State U. Press, pp. 489-501).
3. Normal treated with GA_3 -- normal native hormones and added GA_3.
4. Dwarf treated with GA_3 -- reduced native hormones plus added GA_3.

The maize kernels used in the present study were from the maize breeding program of Dr. E. C. Abbe of the Department of Botany, University of Minnesota. These kernels, segregating for d_1, were produced by back-crossing the mutant gene for several generations to University of Minnesota Station Inbred A188 to achieve a homogeneous background for the mutant gene. In the experiment daily applications of a 0.01% solution of GA_3 were applied to half the normals and dwarfs as soon as the dwarfs could be identified. Measurements of the first five leaves (which is about the life span of the treated plants) in maximum length and width of the leaf blade were made every other day until maturity of the leaves.

Three distinct patterns of growth could be detected from this growth series: