

Observations and data strongly support the three gene hypothesis. At worst, the basis of perennialism cannot be very complex.

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2. Modification of the id/id phenotype.

The id phenotype is commonly thought of as being photoperiod-dependent for floral initiation, and as being almost invariably earless. In a previous report the author has shown that in his stocks, id/id segregates have not been photoperiod-controlled in outdoor experiments since floral induction can occur during the summer solstice and, in winter nurseries, may fail to occur during the winter solstice. In no case has any factor other than simple age of the culm (as a function of the inherent earliness of the specific stock involved) appeared to affect time of flowering in outdoor culture. However, when the author cultured one of his perennial plants as a houseplant during the winter of 1965-1966, by spring it had become highly induced, to the extent that new basal branches were prematurely flowering at a very small size, producing mixed, seed-bearing terminal inflorescences. To all appearances, the plant was "running out" in the manner previously described for the pe/pe gt/gt phenotype. Upon the return of summer weather, however, the plant was reset out-of-doors April 1966 whereupon it immediately resumed producing indeterminate and totipotent growth and continues to do so at the present time, January 1967. It is to be remembered that another propagule of this same clone was grown in the winter nursery concurrently, and showed no signs whatever of premature induction at any time. Since most of the reported work with id deals with greenhouse culture, it is possible that light quality, perhaps UV content, is critical in the expression of id.

Earlessness of id/id maize is obviously of great concern, since all perennial maize is homozygous id. Accordingly perennial maize has never produced ears. The several instances of seed production have been cases of tassel seed formation. However, a homozygous id synthetic has been established by the simple procedure of recombination among rare segregates which were successful in producing ears. The main segment of this population is only in its S_3 generation, but was successful in producing ears on 243 plants in a population of 313, a proportion of nearly 78%. Moreover, the ear fertility of this population was nearly doubled between the S_2 and the S_3 generation. Ear conformation is normal and ear size occasionally exceeds what one might expect from normal plants of this background. It is certain that earlessness of the id/id phenotype is another example of effects that are completely under the control of modifying genes. By inference, the perennial phenotype would produce ears normally if it were transferred to this background.

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3. Decussate phyllotaxy in maize.

Among the id/id segregates of a progeny grown in 1965, several plants had irregular patterns of leaf placement. In one case, a plant had a completely regular decussate phyllotaxis, beginning with the 5th node.