

3. Perennialism attributes from Cuzco flour corn.

In our very long growing season at Greenfield, Calif. we have never seen black spot formation in Cuzco maize as long as growing cultural conditions are maintained. Vegetative senescence is likewise delayed indefinitely, until the intervention of an outside condition. Upon using Cuzco as a parent in crosses to an id/id gt/gt stock and sibbing to recover multiply recessive plants, vigorously perennial, vegetatively totipotent segregates were obtained. A field work thinning error prevented determination of a meaningful segregating ratio, but it is certain that Cuzco carries pe or a factor(s) that can produce the same effect in combination with homozygous gt and id. Anyone wishing to repeat this work should remember that Cuzco Flour Corn is a very heterogeneous population. Good insurance would indicate the use of a population of Cuzco, rather than single plants, in initiating an experiment.

D. L. Shaver

4. Failure to obtain ear-fertile perennial 2n maize.

Even though perennial maize can produce tassel seed (and under certain conditions regularly does so) without undergoing senescence and death of the seed-producing plant, it is regularly ear-barren. Dr. D. E. Johnson (Hamill) only once succeeded in obtaining a normal, many kernel rowed ear from the classical clone, 65-32-1, in a Brookhaven Lab. greenhouse from a very tall, old, potbound propagation of 65-32-1.

It seemed that the major reason for barrenness might simply be related to the fact that all perennial maize is id/id. Homozygous id maize is almost invariably barren, even in a very early background which permits flowering at a time of the summer very favorable for ear formation. Accordingly, a project was undertaken to incorporate id into an early Gaspé-based synthetic in which selection for ear fertility could be practiced. By sibbing with mass selection among the initially infrequent ear-fertile id/id plants a highly (more than 90%) ear-fertile

id/id synthetic was finally derived. However, upon introducing the other two perennialism genes, pe and gt, into this ear-fertile synthetic background, it was found that only ear-barren plants were perennial, while those producing ears never were. The latter were often able to produce more than one successive vegetative generation, but each was successively less totipotent, and inexorably "ran out" in a manner described for the gt-pe phenotype (Shaver, Genetics 50:393-406, 1964). This work indicates that the differentiation of the ear as a floral, rather than as a vegetative, branch imposes difficulties or even precludes vegetative totipotency in maize. It may be that the addition of tassel seed genes to the perennial genotype would be the best way to regularly produce perennials from seed.

D. L. Shaver

5. id/id as a "macromutation" in maize.

Students of speciation have often turned up presumptive evidence for sudden origination of species or biotypes. "Cataclysm" was once a respectable word among taxonomists and paleobotanists. It has often occurred to me that the id gene in maize ought to qualify as a concrete example of how a sudden origination could occur. This one genetic step exerts a profound spectrum of changes in the maize plant: Vegetative development is drastically slowed, though many more plastochrons are eventually completed. An id/id plant is much like sorghum in its ability to tolerate long unfavorable periods and then respond vigorously to the restoration of good cultural factors. New leaf types appear in the form of beautifully regular decussate (opposite and rotated 90°) phyllotaxy. Other plants have regular and equal triphyllous nodes. At the ear-bearing node, either two or three equal ears are formed as axillary branches, depending upon the number of leaves at the node. id/id plants are aphid-susceptible before flowering, but become very aphid-resistant afterwards. The flowering period is made drastically later than in an equivalent non id/id population, and the plant would thus be immediately isolated reproductively from its ancestral form. It would not be difficult to conceive of conditions in nature which might favor a so-different