5. Chimera in maize.

A corn plant, 6-601-7, was accidentally found in the corn field of the Blandy Experimental Farm, University of Virginia, in the summer of 1956 which possessed chimerical branches on its tassel. The normal diploid branches had the 2n number 20, while the chimerical branches were tetraploid, having 40 chromosomes in their pollen mother cells.

A detailed meiotic study was made on the tetraploid branches. Tetravalents in the form of rings, chains, or figures-of-8 were frequently found in diakinesis and first metaphase of the pollen mother cells. There was only one case out of 50 cells observed which had no tetravalent. One hexavalent, two octavalents, and two crosses-of-4 were found, which indicates that a reciprocal translocation is involved.

A morphological comparison between 6-601-7 and its sister plants was made. No gross morphological differences were found, but the spikelets and the florets of the tetraploid branches were slightly larger than those of the diploid branches.

15 seedlings, siblings of plant 6-601-7, were examined cytologically; all had somatic numbers of 20. The ear resulting from selfing of plant 6-601-7 had a full set of kernels. The progeny will be tested in 1957.

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1. Effects of the genes du and su_2 in sweet corn at eating stages.

These two genes have been introduced, separately, into several inbreds including P39A; P51B; Iowa 45, 2000, and 3001; Conn. 22 and 68; Maine 23 and 41; and into the varieties Hayes White and Luther Hill. Most of the lines have been carried through 4 backcrosses and 3 or 4 selfing generations. Studies of carbohydrate balance at eating stages in several of these inbreds indicate that the gene effects vary with the background. Table 1 shows the sucrose, water-soluble polysaccharide, and starch levels found at 5 sampling dates. On P39A background, sucrose was higher at each date when du or su_2 was homozygous than when they were absent; on the Connecticut 68 background these genes made little consistent difference in sucrose levels.

Table 1. (Data given in mg. per whole kernel.)

Genotype	Purdue 39A background: Days after pollination 16	19	22	25	28	Connecticut 68 background: Days after pollination 16	19	22	25	28
					Sucrose					
su_1	2.5	6.8	9.3	7.8	5.5	5.3	5.4	7.5	9.1	6.9
su_1 du	4.1	8.6	10.7	13.5	9.0	7.2	6.8	7.2	7.2	7.7
su_1 su_2	6.6	9.7	14.1	13.1	10.7	7.0	5.7	8.5	9.4	7.2
					Water-soluble Polysaccharides					
su_1	9.6	17.6	24.5	31.8	36.9	7.5	15.6	21.4	29.7	36.3
su_1 du	9.5	21.6	22.9	34.2	38.1	8.3	16.8	24.2	30.7	39.1
su_1 su_2	10.5	21.6	26.7	35.3	41.6	7.9	17.2	23.0	31.1	35.5
					Starch					
su_1	8.9	13.1	17.3	21.6	26.4	5.7	8.5	16.2	20.5	27.8
su_1 du	2.6	4.7	6.1	9.6	13.2	2.8	4.9	8.3	12.4	16.5
su_1 su_2	3.5	5.0	5.8	10.1	14.0	2.7	4.1	6.7	11.5	9.8

There was little difference in content of water-soluble polysaccharides in either inbred, due to the addition of du or su_2, although the trend was to slightly higher quantities in P39A. There was a marked effect, however, on starch accumulation in both inbreds, with both the du and su_2 lines showing much lower starch content at every sampling date. This is in line with earlier assays of mature seed of various backgrounds, by Dunn et al., and by Cameron, which showed that final starch content was lower when du or su_2 was homozygous. Present assays of these genotypes on backgrounds of P51B, Maine 41, and Hayes White show the same trend toward lower starch at eating stages, expecially in P51B.

Samples on the Hayes White background at 19 days after pollination were tested after immediate preservation at picking, and after preservation following 30 hours storage at room temperature. Table 2 shows the behavior of the carbohydrates.

The su_1 su_2 combination was the most effective in slowing the loss of total sugars, and likewise in slowing the accumulation of starch. Both du and su_2, in combination with su_1, appeared to condition greater increases of water-soluble polysaccharides during storage than did su_1 alone.

Table 2. (Hayes White background. Data given in mg. per whole kernel.)

Genotype	Immediate preservation	Stored 30 hours at room temp.	% loss or gain
		Total Sugars	
su_1	14.3	6.8	-52.4
su_1 du	14.6	8.0	-45.2
su_1 su_2	22.4	19.1	-14.7
		Water-Soluble Polysaccharides	
su_1	14.4	17.2	+19.4
su_1 du	17.8	22.9	+28.7
su_1 su_2	11.8	17.0	+44.1
		Starch	
su_1	5.7	6.6	+15.8
su_1 du	6.0	6.4	+ 6.7
su_1 su_2	4.5	4.7	+ 4.4

Hybrids among several of these converted lines have been grown and evaluated for eating quality. Taste tests were arranged by presenting each taster with a sibbed ear from each of the following four F_1 plant types: su_1su_1 dudu Su_2Su_2; su_1su_1 DuDu su_2su_2; su_1su_1 Dudu Su_2su_2; su_1su_1 DuDu Su_2Su_2. The four members of each such F_1 hybrid background and all ears were the same age from pollination. Of a total of 42 such taste trials on cooked corn, involving 8 F_1 hybrid sets and about 14 tasters, hybrids homozygous for su_1 su_2 were rated better than su_1 in 40 trials, and were rated best of the four types in 20 trials. Genotype su_1 du was rated better than su_1 in 28 trials, and best of all in 5 trials. The rating was based on a combination of sweetness and/or tenderness.

Tenderness tests on raw corn with a Chatillon tenderness gauge did not indicate a consistent effect of du or su_2 on pericarp tenderness.

Ear mold on field-matured seed ears of su_1 du and su_1 su_2 was not significantly worse than on su_1 ears in 1956, except where earworm was present. In areas of higher humidity and frequent summer rains the mold problem might be different, however.

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