

GEORGIA EXPERIMENT STATION  
Experiment, Georgia

1. Recovery of loose pericarp in the F<sub>2</sub> progeny from crosses between inbred lines.

In our previous reports (Jour. Heredity 49: 128-131, 158; 51: 15-18, 1960) it was postulated that, in addition to the effect of the amount and the position of hard and soft starches in the endosperm of corn, loose pericarp may be involved in bringing about various degrees of denting or roughness of grain.

The results of 1960 seemed to support this assumption.

The following inbred lines were used: Inbred NClF11 has rough grain resembling that of Gourdseed, and which is classified as grade 4. Ears of inbred lines GE54, P111, and NCAS21A are smooth except for prominent silk scars which make them prickly to the touch and are classified largely as of grade 2. Inbred CI21 have perfectly smooth ears of grade 1.

The ears of the F<sub>1</sub> progeny from the cross of NClF11 with other inbred lines are largely of grade 4, and the F<sub>2</sub> progeny segregated for grades 1 to 6 (Table 1).

Table 1. Frequency distribution for pericarp grades in the F<sub>2</sub> from crosses of NClF11 inbred line with other inbreds.

Cross	Progeny pericarp grades						Total
	1	2	3	4	5	6	
GE54 x NClF11	7	34	64	66	3	2	176
P111 x NClF11	35	40	79	15	1	-	170
CI21 x NClF11	37	14	61	56	2	-	170

The ears of the F<sub>1</sub> progeny from the cross of GE54 with other inbred lines are largely of grade 2, and the F<sub>2</sub> progeny segregates for grades 1 to 5. (Table 2).

Table 2. Frequency distribution for pericarp grades in the F<sub>2</sub> from crosses between GE54 and other inbred lines.

Cross	Progeny pericarp grades					Total
	1	2	3	4	5	
GE54 x P111	48	59	11	-	2	120
GE54 x NCAS21A	50	99	28	5	3	190
GE54 x CI21	37	77	5	-	-	119

-20.7  
-16.5  
-21.8  
-15.7  
-5.4

Somewhat different results were obtained from the Flint - Gourseed varieties cross. The smooth grain of Flint is dominant over rough grain of Gourseed. In the F<sub>2</sub> progeny several ears were of grades 2 to 4 (Table 3).

Table 3. Pericarp grades in the F<sub>2</sub> of Flint - Gourseed cross.

Cross	Progeny pericarp grades						Total
	1	2	3	4	5	6	
Flint x Gourseed	153	2	6	3	-	-	164

The appearance of ears with pericarp grades 5 and especially of grade 6 seemed to support our assumption that the genes for loose pericarp are not uncommon, and that the rough grain is the result of interaction of denting (genes for hard and soft starches?) and for loose pericarp.

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1. Further data on the compound nature of the tunicate locus.

In a previous News Letter (No. 34) we reported that "mutations" from Tu to tu<sup>h</sup> were accompanied by crossing over between Su and Gl<sub>3</sub>, genes on either side of the Tu locus. An additional population was grown in 1960 and in the three years since this experiment began a total of 10,248 plants have been classified. Of these, 5273 were tunicate and 4975 were nontunicate. The significant deficiency of nontunicate plants is probably due to the linkage of tu and su and the poorer germination of sugary seeds as compared to starchy in 1960 when poor stands were obtained.

Of the 5273 plants classified as some form of tunicate, four were definitely half tunicate. All four of these plants proved to be crossovers, two of the genotype Su gl<sub>3</sub> and two su Gl<sub>3</sub>. This indicates that the "mutations" are due to crossing over within a compound locus and that the rate of crossing over is one in 1318 or .08 per cent.

Three additional plants classified as possible mutations but representing the noncrossover genotype, Su Gl<sub>3</sub>, proved upon testing to be not mutations to half tunicate but phenocopies. This evidence, though negative in nature, provides a further indication that mutations from Tu to tu<sup>h</sup> are the product of crossing over.