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1. Location of wilted (wi) on chromosome 6.

Crosses were made between a series of translocation stocks in which waxy (wx) was used as a marker for the chromosomal interchanges and a wilted (wi) Wx stock. These F_1 plants were then selfed and the waxy kernels from the resulting progeny were planted.

Expected ratios (25%) of wilted were obtained with all translocations except T6-9b. Progenies involving T6-9b, which has break points on the short arm of chromosome 9 between the centromere and waxy (.37) and on the long arm of chromosome 6 near the Y locus (.10), gave 6% wilted plants. It is therefore apparent that wilted is located on chromosome 6 near the Y locus. Further testing will be carried out to establish the position of wilted in regard to other genes on chromosome 6.

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2. Possibility of a new allele at the ga_1 locus.

At the present date we have evidence of the presence of three alleles Ga^S , Ga and ga at the ga_1 locus on chromosome 4. Plants Ga/Ga are fertilized by ga/ga. The advantage of Ga^S pollen over ga is almost 1 on Ga^S/ga silks. Ga^S and Ga do not have an advantage over ga on ga/ga silks.

Nelson (1952), in studies of several popcorns, found a percentage of sugary kernels ranging from 13.9 to 15.5 in F_2 crosses of P51 (ga su/ga su) x the popcorns. In this experiment Schwartz D139 (Ga^S) was included. He concluded that there is a possibility of different alleles of the same type as Ga^S in these popcorns.

The popcorns 845, 1001, 4524, 401, 4519, and 4541, the genetic stock Ga and Schwartz's D139 were used in this experiment. In order to have a common genetic background, they were backcrossed five times to the dent corn Hy. In each backcross generation a test for the presence of Ga^S was made. The recovered plants were crossed onto P51 (ga su/ga su); these F_1 's were selfed and intercrossed in all possible combinations, in pairs reciprocally. The results of these selfs and crosses are in table 1.

TABLE 1

The percentages of sugary kernels in the F₂'s and paired reciprocal intercrosses of F₁'s that are obtained by crossing P51 (ga su/ga su) times derivatives of various popcorns or genetic stocks.

♀ ♂	DL39	845	1001	4524	24	401	4519	4541	Ga	Total
DL39	13 4,655 13.83	4 1,719 14.36	2 756 11.50	2 883 14.84	1 483 12.84	1 524 15.46	6 2,605 14.94	1 477 13.63	2 896 13.73	32 12,998 14.24
845	2 998 16.53	18 7,769 13.89	2 884 13.57	2 988 13.87	2 1,061 14.89	3 1,088 14.34	4 1,453 17.34	2 1,026 12.38	2 877 12.77	37 16,144 14.38
1001	2 722 15.37	2 876 17.24	21 8,678 15.30	2 602 19.77	2 856 14.02	2 858 15.62	3 1,286 12.87	2 804 16.79	2 915 14.43	38 15,597 15.46
4524	2 821 12.91	2 951 13.67	2 740 12.70	18 6,246 15.26	2 887 14.21	2 819 15.02	4 1,252 20.26	3 1,390 14.03	2 829 13.27	37 13,935 14.37
24	3 1,285 13.23	2 683 14.79	2 942 15.81	2 856 18.22	18 7,709 15.40	2 904 14.38	4 1,271 17.16	3 1,330 13.76	4 1,796 15.37	38 16,293 15.38
401	3 1,070 14.02	3 1,139 16.07	2 733 14.87	2 930 16.02	2 905 16.80	13 5,585 18.28	3 1,371 15.17	2 851 19.39	2 776 16.75	32 13,360 16.19
4519	4 1,718 26.66	5 1,753 26.15	4 1,498 24.85	3 1,354 24.36	4 1,834 24.98	4 1,588 25.37	42 17,389 26.54	4 1,851 25.86	7 2,598 25.59	80 31,583 25.59
4541	2 845 14.20	2 839 15.38	1 353 16.15	2 905 13.03	1 314 17.52		3 1,404 15.49	18 7,355 14.26	2 853 14.77	31 12,868 14.75
Ga	1 190 16.32	2 1,008 13.59	2 852 15.73	2 857 16.92	2 767 16.56	2 812 15.27	4 1,862 15.06	3 1,297 14.03	21 9,270 14.11	39 16,835 15.33
Total	28 10,586 14.65	35 14,984 15.01	34 13,939 14.33	32 12,267 16.10	30 12,982 15.26	25 10,580 15.01	70 28,641 17.20	34 14,530 14.86	37 16,212 14.44	

All the crosses except the ones that involve 4519 had the expected reduction in sugary kernels, namely to about 15 percent when crossed as a male, female or selfed. When 4519 was used as a female or selfed the percentage of sugary kernels was 25 or more - no reduction. Used as a male, the percentage of sugary kernels was reduced to 15 as observed before.

Since 4519 derivatives in paired pollinations give 25 percent sugary when used as females, but 15 percent sugary when used as males, it suggests the presence of a new allele at this locus. This allele seems to be different from those known up to now since the action of this gametophyte factor is confined to the male gametophyte.

Another explanation of these results would be the existence of a fertility factor F closely linked to Ga , 4519 being $F Ga$ and all the other popcorns $f Ga$. This F factor in dominant condition nullifies the action of the gametophyte factor, by removing the selectivity of the silks for Ga pollen. Then both ga and Ga pollen have the same chance of effecting fertilization. The inclusion of this fertility factor would give 25 percent sugary kernels when 4519 is used as a female. All the other popcorns would be carrying f and as a consequence Ga/ga silks will screen ga pollen and this would account for the 15 percent sugary kernels observed when 4519 was the male.

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3. Association of recombination and mutation to colorless and near-colorless aleurone in plants heterozygous $R^R R^{st}$.

It has been observed that in $R^R R^{st}$ plants mutations occur to colorless and to near-colorless aleurone, and that some of the mutants carry both the red plant color characteristic of R^R and the paramutagenic action characteristic of R^{st} (Ashman, Genetics 45:19). This finding suggests that such mutants result from intragenic recombination at the R locus. To obtain information bearing on this possibility a second test was made utilizing genetic markers on either side of the R locus. The following cross was made in the latter test:

$$\begin{array}{c} + \quad R^R \quad + \\ \hline g \quad R^{st} \quad M^{st} \end{array} \quad X \quad \begin{array}{c} g \quad r^g \quad + \\ \hline g \quad r^g \quad + \end{array}$$

Golden (g) is 14 units proximal to R , and M^{st} , a modifier of the stippled phenotype, is 6 units distal to R . Ears from the above cross were scored for colorless and near-colorless kernels. The kernels selected were planted and the resulting plants were scored for golden and for plant color; the ears produced on the plants were pollinated