2. Chlorophyll content in maize.

In a study on the chlorophyll content of 17 inbred lines and 24 single-crosses, highly significant differences occurred for total chlorophyll, chlorophyll a, chlorophyll b, visual chlorophyll ratings, $C_a:C_b$ ratios, and yield in pounds per plant both among inbreds and among hybrids. Highly significant correlations of r = -.76** for inbreds and r = -.69** for hybrids occurred for total chlorophyll and visual rating.

Total chlorophyll of the hybrid was in all instances characteristically greater than the mean total chlorophyll of the inbred parents. Thus, heterosis for chlorophyll was present. In fact, a high correlation (r = .93**) was found between hybrids that exhibited high heterosis for yield and those that showed a high heterosis for total chlorophyll.

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3. A combined source of resistance to maize dwarf mosaic virus and corn stunt virus.

In the 1966 Maize Genetics Cooperation News Letter, GA 209, a white inbred line, was reported as giving excellent ratings of resistance to dwarf mosaic virus in tests in Tennessee and Ohio. Since then, tests in Louisiana and at the Corn Virus Laboratory at Mississippi State University reveal that this inbred also has resistance to the corn stunt virus. Thus, a single inbred is available for use in inheritance studies and in breeding programs as a source of resistance to both virus diseases.

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1. Effect of kernel position on fatty acid composition of corn oil.

Considerable interest has recently been shown in genetic studies of the fatty acids of corn oil. Fatty acid analysis of the oil from individual kernels will be required to obtain the appropriate genetic information. Therefore, the question arises whether single kernels can be selected at random for analysis or whether the location of the kernel on the ear may influence oil composition. If kernels are selected at random and a significant kernel position effect on oil composition exists, then the environmental effect (kernel position) cannot be separated from the genetic effect.

The effect of kernel position on oil composition was studied on 12 inbred lines and 2 single crosses grown in 1965 and on 4 of these inbreds grown again in 1966. Five oil samples (4 single kernels and a bulk oil sample from 6 kernels) from each of 3 positions (base, middle, and tip of ear) for 5 ears of each inbred and single cross were analyzed by gas-liquid chromatography. Only a brief summary of the results and conclusions will be given in this report and representative results from several of the inbred lines. Stearic and linolenic acids make up a small proportion of the total oil. Out of 12 inbred lines, only 2 inbreds (GE84 and P121) showed a significant effect of kernel position for stearic and 1 inbred (GE80) for linolenic. Kernel position influenced oleic and linoleic more consistently and to a greater degree than palmitic acid. However, all inbred lines did not show a significant effect of kernel position on oil composition. Mp428 and R196 showed no effect of kernel position on any of the 5 fatty acids. The combined analysis of variance for 12 inbred lines showed an increase in palmitic and linoleic and a decrease in oleic progressing from the base of the ear toward the tip. Results of 4 inbred lines and the average of all 12 are given in Table 1. Although not always significant, the oil from the tip kernels was lowest in oleic and highest in linoleic for 11 of the 12 inbred lines. Data for linoleic acid are shown in Table 2 for individual ears of R196 and Tx39-16. R196 shows no consistent effect of kernel position on linoleic acid. However, every ear (5 in 1965 and 3 in 1966) of Tx39-16 showed an increase in linoleic from base to tip of the ear.

Three oil samples from each of 3 kernel positions of 5 ears each of 2 single crosses (Va42 x GE129 and Va42 x GE281) were analyzed for oil composition. Kernel position did not significantly influence oil composition of these 2 single crosses. The data were too limited to conclude whether hybrid ears (F_1 and F_2 ears) are not as subject to kernel position effects as are certain inbred lines. Further analyses on hybrid ears are required to answer this question.

Estimates of variance components were also determined for individual inbred lines and for the combined analysis. The relative magnitude of the different variance components showed the importance of kernel position in certain inbred lines, but not in others. The ear variance component was relatively large for certain inbred lines and would indicate that segregation for oil composition was occurring. Single ear selection may be effective in changing oil composition in some of these inbred lines.

In general, the composition of the oil of kernels from the middle portion of the ear was intermediate in the majority of inbred lines. Therefore, sampling of kernels should be restricted to the middle of the ear in certain studies where kernel position effect on oil composition is not desired. No explanation is apparent why certain inbreds show a kernel position effect and others do not. Also, a reason has not been determined why the oil of tip kernels is different from oil of base kernels. Several questions remain unanswered and will require further research.

Table 1

Average fatty acid composition of oil from 3 positions on the ear of 4 inbreds and the combined average of 12 inbred lines

Inbred	Kernel position	Fatty acid composition (%)				
		Palmitic	Stearic	Oleic	Linoleic	Linolenic
GE84	Base	11.25 a	2.63 a	32.65 ab	52.07 ab	1.42 a
	Middle	10.76 b	2.33 b	34.78 a	50.71 a	1.38 a
	Tip	11.18 a	2.55 ab	31.26 b	53.61 b	1.36 a
R196	Base	13.65 a	1.66 a	16.01 a	67.55 a	1.11 a
	Middle	13.26 a	1.64 a	16.24 a	67.66 a	1.21 a
	Tip	13.28 a	1.59 a	15.90 a	68.06 a	1.17 a
T202	Base	14.33 a	2.04 a	44.07 a	38.12 a	1.43 a
	Middle	14.56 ab	2.12 a	41.08 b	40.88 b	1.35 a
	Tip	14.86 b	2.09 a	39.31 b	42.38 b	1.34 a
Tx39-16	Base	15.27 a	2.37 a	35.24 a	45.71 a	1.34 a
	Middle	15.54 ab	2.51 a	33.27 b	47.39 b	1.27 a
	Tip	15.73 b	2.53 a	32.01 c	48.40 c	1.29 a
Combined Analysis	Base	13.89 a	2.31 a	33.30 a	49.26 a	1.20 a
	Middle	13.97 ab	2.36 b	33.00 a	49.47 a	1.17 a
	Tip	14.11 b	2.36 b	31.47 b	50.85 b	1.17 a

Averages followed by the same letter are not significantly different -- Duncan's Multiple Range Test (5% level).

Table 2
Kernel position effect on linoleic acid of individual ears of R196 and Tx39-16 inbreds

Kernel position	Ear 1	2	3	4	5
			R196 - Linoleic - 1965		
Base	67.58	66.99	68.51	67.97	66.69
Middle	68.51	66.80	67.96	68.52	66.49
Tip	67.73	67.08	67.98	70.05	67.48
			Tx39-16 - Linoleic - 1965		
Base	45.26	45.32	45.11	45.50	47.36
Middle	47.58	47.29	47.02	47.62	47.44
Tip	48.30	47.54	49.38	49.00	47.78
			Tx39-16 - Linoleic - 1966		
Base	48.16	45.94	46.48		
Middle	48.88	46.51	48.02		
Tip	50.63	49.47	50.43		

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1. Cryptic genes for tripsacoid characteristics in Latin-American maize varieties.

One of the most common effects of the experimental introgression of teosinte or *Tripsacum* into maize is the induration of the tissues of the rachis and lower glumes. These characteristics are found in many Latin-American varieties and can be transferred to U.S. inbred strains by repeated back-crossing accompanied by selection. We have assumed that they are the product of previous introgression of teosinte or *Tripsacum* in these varieties but have never had direct proof of this.

The experiments reported here are concerned with an attempt to determine whether chromosomes extracted from modern Latin-American varieties, which affect induration of the tissues of the rachis and lower glumes, also carry genes for other characteristics such as distichous spikes and solitary pistillate spikelets which were derived from teosinte or *Tripsacum* introgression but whose effects are ordinarily concealed because they