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1. Variability in fatty acid composition of oil in inbred lines.

Long-term inbred lines of corn are generally considered to be homozygous in their genetic constitution. However, in recent years, several studies have shown that variability in quantitatively inherited characters may persist in certain inbred lines. During the past several years, numerous inbred lines have been received from throughout the corn growing region of the U.S. Oil has been extracted from these inbred lines and analyzed by gas-liquid chromatography to determine fatty acid composition of oil. Although most inbred lines are quite uniform in fatty acid composition of oil, many were variable. An ear-to-row selection procedure might be useful within variable inbred lines to obtain near isogenic sublines with different oil composition, but which are uniform in oil composition within sublines. Examples of variability existing in several inbred lines are shown in Table 1. Seed of A96 was received from the University of Minnesota and from Cornell University. Oil composition was similar for the original seed from both sources. Three ears selfed in Georgia from the Minnesota source were uniform in oil composition and similar to the original seed. Five ears selfed in Georgia from the New York source were variable in oleic and linoleic acids. Data for A96 indicate little influence of environment on oil composition; however, this may not be the case with all inbred lines.

Inbred lines Oh43, W9, and B9A had an intermediate amount of variability in oleic and linoleic acids among selfed ears (Table 1). However, selection within these lines should be effective in shifting the composition of oleic and linoleic acids in either direction to obtain an oil with different iodine values (measure of the degree of unsaturation). Much larger differences in oleic and linoleic acid composition among ears were found in B54, CI-19, CI-45, and P40. Progeny from these ears will be grown (ear-to-row) to compare plant type and uniformity in oil composition in subsequent generations.

Table 1

Fatty acid composition of oil among ears within inbred lines

Inbred	Ear No.	Fatty Acid Composition of Oil (%)				
		Palmitic	Stearic	Oleic	Linoleic	Linolenic
A96 Minnesota seed		11.0	1.89	24.1	62.3	.75
Ga. grown	1	11.4	1.75	24.3	61.9	.63
	2	11.4	1.66	22.5	63.6	.84
	3	11.6	1.56	23.3	62.9	.71
New York seed		11.0	1.76	24.1	61.4	.70
Ga. grown	1	11.8	1.97	27.4	57.9	.74
	2	11.6	1.78	27.0	58.8	.69
	3	11.5	1.54	21.6	64.3	.74
	4	11.3	1.61	25.3	60.9	.75
	5	11.7	1.67	23.8	61.8	.83
Oh43	1	13.3	1.68	21.6	62.6	.85
	2	14.5	1.85	20.1	62.8	.78
	3	14.1	1.91	22.4	60.8	.70
	4	15.1	1.74	21.5	61.0	.67
	5	13.5	1.52	18.5	65.7	.84
	6	14.4	1.66	21.2	61.9	.81
W9	1	11.3	.74	20.3	66.6	1.06
	2	12.6	.84	18.5	66.9	1.04
	3	10.8	.90	25.7	61.6	.97
	4	10.6	1.02	25.6	62.0	.81
	5	9.6	.88	27.8	60.9	.83
	6	10.9	.99	30.7	56.6	.77
B9A	1	13.4	1.57	23.6	60.5	.88
	2	12.8	1.22	19.4	65.8	.79
	3	11.9	.97	18.1	68.3	.80
B54	1	11.8	1.11	25.1	61.1	.87
	2	12.4	1.87	39.7	45.0	1.05
CI-19	1	14.8	1.83	40.2	42.6	.59
	2	13.4	2.01	47.5	36.8	.34
	3	12.0	1.68	18.6	67.2	.56
CI-45	1	11.9	1.72	37.7	47.1	1.53
	2	11.8	1.77	20.3	64.7	1.29
	3	11.1	2.07	21.5	64.1	1.20
P40	1	12.9	2.00	23.6	60.3	.79
	2	14.4	1.81	20.9	62.2	.73
	3	13.3	1.79	39.7	44.6	.57

Variability in oil composition of inbred lines may be advantageous if selection can be practiced toward a better oil quality (such as higher linoleic acid percent). However, the variability in oil composition which may be present in inbred lines should be examined before inbred lines are used in studies concerning fatty acid composition of oil. Considerable error could be introduced into genetic studies as well as other studies where uniform genetic material is desired, unless preliminary analyses of oil composition are made. At this Station, individually selfed ears are maintained separately within inbred lines and single-kernel analyses are made for oil composition to determine uniformity before use of a particular inbred in further studies.

M. D. Jellum

2. Plant introductions with high stearic acid composition of oil.

The fatty acid composition of commercial corn oil includes about 2.0% stearic acid. Most inbred lines have oil with between 1 and 4% stearic acid. Approximately 1500 inbred lines of U.S. origin have been analyzed for oil composition over the past several years. Very few inbred lines had stearic acid composition between 4 and 6% and only one inbred line had stearic acid slightly above 6% of total oil.

Early in 1968, kernels of 144 plant introductions from 52 different foreign countries were received from the North Central Regional Plant Introduction Station, Ames, Iowa. Kernels were analyzed individually for fatty acid composition of oil from the original sib pollinated sample and from first generation selfed ears produced in Georgia. Results of five plant introductions in which high stearic acid composition was found are shown in Table 2. Sibbed kernels of P. I. 214124 (Bolivia) were received from the Plant Introduction Station in 1969 and no additional analyses have been made. Original seeds were variable in stearic acid composition and were high in stearic acid as compared with other plant introductions. Original seed of P. I. 175334 (Nepal) had a range in stearic acid of 1.70 to 6.22%. However, the average oil composition of two S_1 ears had stearic acid composition which was considerably higher. The range in stearic acid percent of individual kernels from S_1 ear No. 4 and of S_2