

Based on normal recombination values (15%) between su₁ and gl₄, the data indicate that glossy-4 is proximal to the breakpoint in inversions 4j, 4d and probably 4a. Glossy-4 is probably distal to the proximal breakpoint in inversion 4e, 4f and 4i. The recombination value between su-gl₄ (6.31%) for inversion 4a is lower than expected. This may be the result of the proximal breakpoint reducing crossing-over in the su-gl₄ region. Additional material will be analyzed to determine the frequency of the inversion in the crossover classes to obtain a more precise location of glossy-4 in relation to the inversions.

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4. Inheritance of linoleic acid in corn.

Gas-liquid chromatographic analyses were made on individual kernels of R84, Illinois High Oil, and the F₁, F₂ and backcross progenies. Oil was extracted with petroleum ether, esterified and then dissolved in approximately 1 ml petroleum ether. Three μ l of the solution was injected into the chromatograph. All analyses were made on an Aerograph Hi-Fi 600 using the standard diethyleneglycol succinate-chromosorb W Column. A flame ionization detector was used.

The frequency distributions in the backcross populations strongly suggest monohybrid inheritance for oleic and linoleic acids, i.e., low linoleic is dominant to high, and low oleic is recessive to high. The F₂ data were less convincing, although individual F₂ ear analyses revealed that the ratio in only one ear out of six was quite deviate, presumably because Illinois High Oil was heterogeneous with respect to the alleles in the system. Segregation in only one of the six F₂ ears is shown in Figure 1.

Table 1
Mean Linoleic and Oleic Acid Content of Individual
Kernels of Parents, F₁, F₂ and Backcross Generations

Population	Percent of Total Oil		
	Linoleic ¹	Oleic ²	Sum
R84 ♂	61.3	24.5	85.8
IHO ♂	48.8	35.3	84.1
F ₁ (R84 ♀)	52.2	31.3	83.5
F ₁ (IHO ♀)	47.6	36.1	83.7
BC R84	54.3	29.1	83.4
BC IHO	51.2	32.5	83.7
F ₂	51.5	32.3	83.8

¹Standard deviation = $\pm 1.32\%$

²Standard deviation = $\pm 0.78\%$

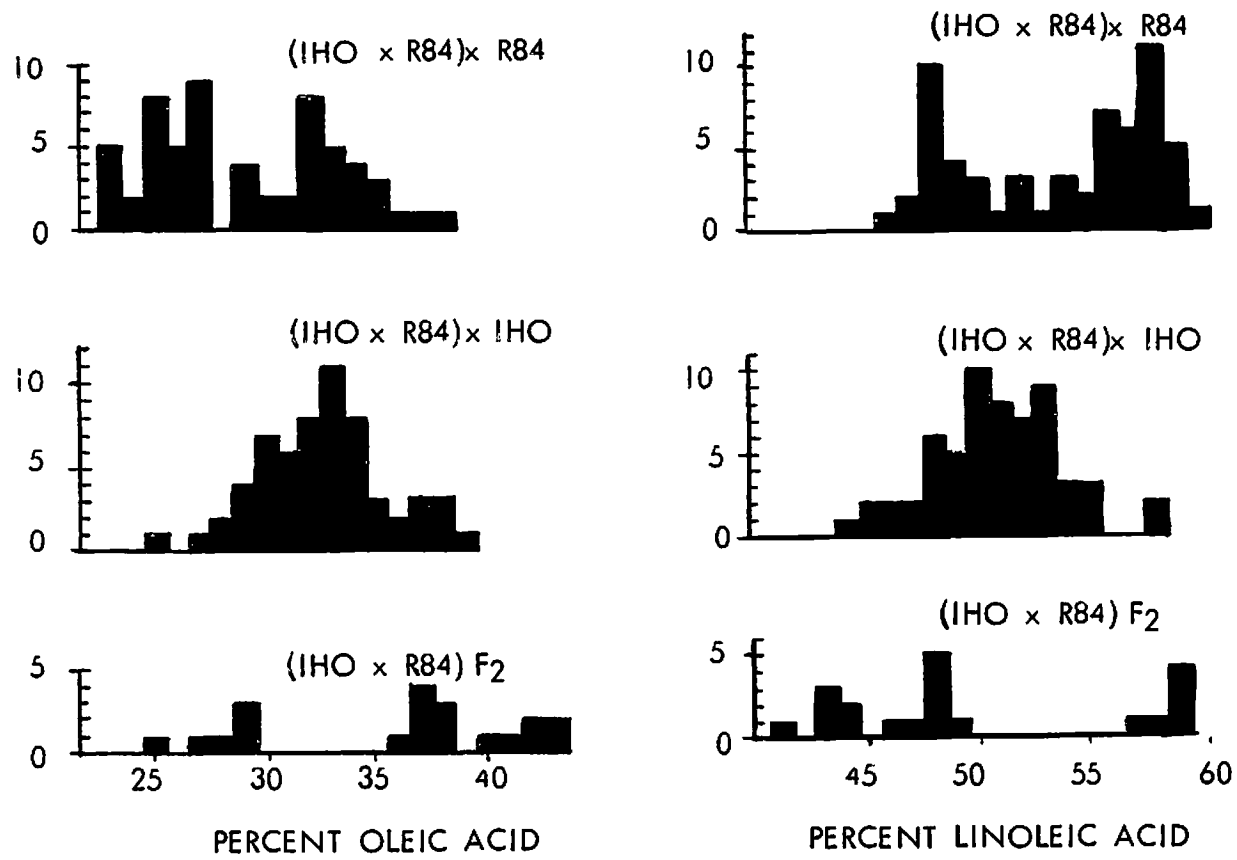
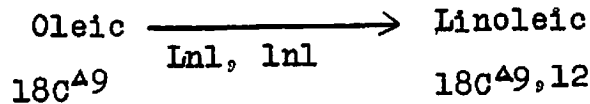


Figure 1
 Frequency distributions of linoleic and oleic acid content of individual kernels

In corn, Jellum and others, found a high negative correlation between oleic and linoleic acids. In our studies involving analysis of individual kernels, (1) low linoleic acid content was always associated with high oleic acid content and vice-versa, and (2) the genetic models for the control of amount of each acid are "mirror images". The data suggest that the two are closely related in the unsaturated fat bio-synthetic pathway.

It has already been suggested by others that oleic acid is the precursor of linoleic acid in higher plants. Our evidence supports this proposal, that is:



If Lnl is present, desaturation at the 12-13 position proceeds so that the oleic-linoleic pool maintains an approximate 35:49 ratio, whereas if the genotype is lnl/lnl, a ratio of approximately 25:61 is maintained. That is, if Lnl is present, net desaturation is lower, bringing about an accumulation of oleic acid, whereas in lnl/lnl individuals, net desaturation is higher, thus increasing the linoleic pool and decreasing oleic.

Further genetic studies are underway, involving newly-discovered strains possessing 42 percent linoleic acid.

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1. Location of Ht in the long arm of Chromosome 2.

In the 1963 Maize News Letter, the symbol Ht was proposed to designate the dominant gene in Inbred GE440 for chlorotic-lesion resistance to Helminthosporium turcicum. Data were reported showing that in plants heterozygous for Inversion 2a (2S.7; 2L.8), recombination between gl₂ and Ht was about 17 percent.