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1. Maternal effect on oil content and fatty acid distribution.

Twelve agronomic inbreds were reciprocally crossed to produce 18 F_1 's. The hybrids were analyzed by wide-line NMR for oil content and two were analyzed for fatty acid content by gas-liquid chromatography.

The conclusions that were drawn are:

- a. Substantial maternal effects were observed.
- b. Heterosis for total oil was observed in 15 of the 18 hybrids. The mean of the F_1 was higher than the mean of the high parent in 8 of the hybrids.
- c. The genotype of the embryo primarily determines fatty acid distribution, i.e., the maternal sporophyte did not appear to have an appreciable effect.

Vernon Reich
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2. Accuracy of wide-line NMR analysis of oil in corn.

Samples of dried kernels are placed between pole pieces of a permanent magnet. A radio beam is interposed and the field strength simultaneously modified electromagnetically. Resonance for protons in the liquid phase in the kernels occurs in concert. Protons in solids resonate throughout the shift in field strength and are disregarded.

Accuracy of analysis was estimated by the standard deviation from the regression line of NMR signal on careful gravimetric analyses. The mean of two 30-second sweeps on 25 g. samples was found to fall within $\pm 0.12\%$ of the oil content 95% of the time. Approximately the same error, in terms of oil percentage, was found for single seeds.

D. E. Alexander
Luis Silveira S.
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Ralph Rodgers

3. Application of wide-line NMR to breeding high oil corn.

NMR was used to non-destructively analyze 3,800 individual kernels coming from 38 ears of the third cycle of a high oil synthetic. The ten higher, the ten lower and ten intermediate oil kernels from each ear were planted and the resulting plants were self-pollinated. NMR analyses were made of oil content of each selfed ear.