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## EFFECT OF CROP ROTATION ON CORN AND SOYBEAN YIELDS

J.H. Herbek, L.W. Murdock and T. Gray

Yield of both corn and soybeans has been shown to increase when grown in a rotation as compared to continuous cropping of either of the two crops. These yield improvements are commonly associated with fewer disease, insect and weed problems; better soil tilth; and in the case of corn, a nitrogen contribution from the preceding soybean crop. One or a combination of these factors are believed to have an effect. In the past few decades the yield benefits of rotations were often overlooked as fertilizers and pesticides were used as a substitute for crop rotation. However, research has shown that regardless of all the management inputs, even beyond optimum levels of fertility and pest control, that there is still a yield advantage for rotation from some unknown factor(s) that hasn't been adequately explained. This is commonly called the "rotation benefit".

In order to determine the potential benefits of crop rotation in Kentucky, an experiment using minimum tillage was established in 1980 on a Zanesville silt loam soil at the UK Research and Education Center at Princeton and continued for eight years. In the rotated portion of the experiment, soybeans were grown in even number years and corn in the odd number years. Nitrogen, as ammonium nitrate, was applied to the corn crop each year after planting at rates of 0, 50, 100 or 200 lbs/acre.

Table 1 shows a yield advantage for corn grown after soybeans as compared to corn grown after corn. The greater yield advantage for the rotated corn at the lower nitrogen rates can be attributed, at least in part, to a nitrogen contribution from the previous soybean crop. Although there was yearly variation in the amount of nitrogen contributed by the soybean crop in this study, the average was equivalent to about 30 lbs. of N/acre. However, a 30 lb/acre reduction in the nitrogen recommendation may not be justified since corn yields in a rotation were greater than those of continuous corn at all nitrogen rates. Even at the two highest rates of nitrogen, the rotated corn

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still yielded more than the continuous corn. This suggests that beneficial factors, other than the nitrogen contributed by the soybeans, also existed. Since there were no apparent fertility differences or noticeable pest problems (diseases, insects, or weeds) in the continuous corn that would account for the yield advantage of corn following soybeans, the yield advantage is attributed to the "rotation benefit".

Table 2 shows a similar yield advantage for the rotation of soybeans after corn as opposed to continuous soybeans. This yield advantage occurred even though there was no measurable differences in fertility, disease, insect or weed control between the rotated soybeans and the continuous soybeans.

Crop rotation is an economical production practice that will improve yields and reduce costs. The "rotation effect" is a proven benefit.

Table 1. The Effect of Rotation on Corn Yields (3-Yr. Avg.)\*

Previous Crop	N Rate (lb N/acre)			
	0	50	100	200
	-----bu/ac-----			
Corn	34	104	133	138
Soybeans	78	123	145	142
Rotation Advantage	+44	+ 19	+ 12	+ 4

\*1981, 1985, and 1987 data. Data not reported for 1983 due to a drought which severely limited yields.

Table 2. The Effect of Rotation on Soybean Yields

Previous Crop	1982	1984	1986	3-Yr. Avg.
	-----bu/ac-----			
Corn	52.6	43.5	28.3	41.5
Soybeans	45.8	39.1	25.0	36.6
Rotation Advantage	+6.8	+4.4	+3.3	+4.9

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