

# Long Term Corn and Soybean Rotation Study

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## Objectives

This study was designed to evaluate different corn/soybean rotation programs over multiple years on soils of northwest Ohio.

## Background

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Crop Year:	2008	Herbicides (continued):	
Cooperator:	Farm Focus/Marsh Foundation	POST(June 13):	SOYBEANS- Roundup WeatherMax at 22 oz/A + AMS at 17 lb/100 gal
County/Town:	Van Wert/Van Wert	LPOST (July 1):	SOYBEANS- Roundup WeatherMax at 22 oz/A + AMS at 17 lb/100 gal
Soil Type:	Hoytville silty clay loam, Haskins loam	Insecticide:	CORN- Poncho 250 on seed
Drainage:	Non-systematic tile	Corn Hybrid:	Dekalb DKC 61-19 VT3
Previous Crop:	Variable- See Methods	Soybean Variety:	Asgrow AG3705
Tillage:	CORN & SOYBEANS- Fall disk/ripper, spring field cultivate (2x)	Row Width:	CORN- 30 inches SOYBEANS- 15 inches
Soil Test (2005):	pH 6.6, P 62 ppm, K 159 ppm	Planting Rate:	CORN- 31,200 seeds/A SOYBEANS- 200,000 seeds/A
Fertilizer:	CORN- 145 lb./A 14-14-14 2x2 banded at planting; 150 lb nitrogen/A sidedressed as UAN (June 9) SOYBEANS- No fertilizer	Planting Date:	CORN- May 7, 2008 SOYBEANS- May 29, 2008
Herbicides:		Harvest Date:	CORN- October 11, 2008 SOYBEANS- October 10, 2008
PRE (May 20):	CORN- Harness X-tra 5.6L @ 1.5 qt/A		
POST(June 13):	CORN- Roundup WeatherMax at 22 oz/A + AMS at 17 lb/100 gal		

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## Methods

This on-farm study was designed with six crop rotation treatments replicated three times in a randomized complete block design. The field used for this trial was previously used for a crop rotation trial with three treatments in 2007 with each plot 90 feet wide by 1030 feet in length. In order to accommodate three additional treatments in 2008 plot size was reduced to 45 feet wide by 1030 feet in length. The rotation schedule is as follows:

<b>Treatment</b>	<b>2007 Crop</b>	<b>2008 Crop</b>	<b>2009 Crop</b>
1) continuous soybeans	soybeans	soybeans	soybeans
2) 2 years of soybeans followed by corn	soybeans	soybeans	corn
3) corn/soybean rotation	corn	soybeans	corn
4) continuous corn	corn	corn	corn
5) soybean/corn rotation	soybeans	corn	soybeans
6) 2 years of corn followed by soybeans	soybeans	corn	corn

Corn plots were planted with a six row John Deere 7000 Maxemerge planter. Soybean plots were planted with a John Deere 7000 Maxemerge planter with a five row splitter attachment. All seed used was Roundup Ready in order to minimize potential damage to the adjacent crops from glyphosate herbicide applications.

Harvest populations for corn (October 8) and soybeans (September 30) were estimated by counting the number of plants at three different locations in each plot on each side of a measured 17 feet 5 inch measured distance and 10 feet measured distance, respectively. For both corn and soybeans, the average of the number of plants counted per length was converted to plants per acre. Yield information was collected for each plot by harvesting the whole plot with a John Deere 6620 combine equipped with a calibrated AgLeader PF3000 yield monitor. Grain weights were measured with a calibrated weigh wagon. Plot moistures were measured with the yield monitor. Soybean and corn yields reported in this study have been adjusted to 13% and 15% moisture, respectively.

## Results

Table 1. Soybean rotation harvest population, moisture and yield means.

Treatment	Harvest		
	Population (plants/A)	Moisture (%)	Yield (bu/A)
Continuous soybeans	140,600	12.1	51.1
2 <sup>nd</sup> year of soybeans following corn	133,400	12.1	52.7
Soybeans/corn rotation	148,500	11.9	54.1
	LSD (P=0.05)	NS	NS
	CV (%)	4.2	1.7
			3.3

Table 2. Corn rotation harvest population, moisture and yield means<sup>1</sup>.

Treatment	Harvest		
	Population (plants/A)	Moisture (%)	Yield (bu/A)
Continuous corn	29,400	15.7	165.8 b
Corn/soybean rotation	29,200	15.9	188.8 a
1 <sup>st</sup> year of corn following soybeans	27,300	15.9	182.6 a
	LSD (P=0.05)	NS	15.7
	CV (%)	3.03	2.2
			3.9

<sup>1</sup> Means followed by the same letter in the same column are not significantly different from each other based on Fisher's protected LSD.  
NS = not significant

## Summary

2008 is the first year of this study designed to evaluate yield differences between six different cropping rotations. In 2008, there were no statistical differences among the soybean treatments. Based on results of this one-year trial, there may not be an economic advantage to soybeans following corn in a corn/soybean rotation. However, there is ample evidence to suggest that a monoculture leads to increased disease and insect pressure over the long term. However, we did not find evidence of increased disease or insect pressure in the continuous soybean plot or the 2<sup>nd</sup> year soybean plot this year.

There was a statistically significant difference in yield for the corn crop rotation treatments, with the continuous corn producing a lower yield than the other two corn rotation treatments. This may be due to the fact that a uniform rate of nitrogen was used on all corn plots, regardless of previous crop. As a result, we did not increase the nitrogen rate in the continuous corn treatment to offset the lack of having soybeans as a previous crop. The continuous corn plot was at an economic disadvantage due to the lower yield. For the continuous corn treatment to yield comparably with the other two corn rotation treatments, we would likely have to add 30 lbs/A of additional nitrogen to the continuous corn plots. As such, the continuous corn plots would remain at an economic disadvantage when compared to the other corn rotation treatments with regards to total cost of production.

## **Acknowledgement**

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