

Tillage, Drainage & Row Spacing Effect on Soybean Production

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Objective

To evaluate the effect of tillage system, soil drainage and row spacing on soybean production.

Background

| | | | |
|----------------|----------------------|----------------|------------------------------------|
| Cooperator: | O.A.R.D.C. NW Branch | Variety: | Pioneer 93Y10 |
| County: | Wood | Planting Date: | 5-29-10 |
| Nearest Town: | Hoytville | Planting Rate: | 200,000 seed/ac |
| Drainage: | see below | Row Width: | see below |
| Soil type: | Hoytville, clay | Herbicides: | Canopy, 2,4-D, Glyphomax xtra, AMS |
| Tillage: | see below | Harvest Date: | 10-01-10 |
| Previous Crop: | corn | | |

Methods

The entries were replicated three times in a randomized complete block design. Entries were on drained and undrained ranges. Plot size- 10 feet x 60 feet each entry. Harvest data collected from center 13 feet of 20 feet entries. The same crop was planted on all treatments on the same day, using the same variety, fertility, and herbicide. This plot has been in the same tillage treatments for over 20 years in a corn / soybean rotation. Tillage treatments remain in the same location throughout this time.

Drained plots have subsurface tile drainage spaced 20 feet apart compared to undrained plots which do not have subsurface drainage. Both sets of drainage plots contain two identical row spacing treatments which are either 7.5 inch or 30 inch spacing between soybean rows. Both sets of drainage plots contain four identical tillage treatments which were conducted during fall 2009 in corn residue.

1. No-till (Continuous no-till)
2. Chisel Plow (followed by fall power harrow finish tool)
3. Zone Tillage – a 12 to 18 inch deep straight shank subsoiler
4. Rotation Strip-till – strip tillage prior to corn; zone tillage prior to soybeans

Rainfall at this location:

| | 2010 | long term average (28 year) |
|--------|---------|-----------------------------|
| June | 3.96 in | 3.7 in |
| July | 2.37 in | 3.8 in |
| August | 1.68 in | 3.0 in |
| Total | 8.01 in | 10.5 in |

RESULTS

2010 Soybean Yields - bushels / acre

| Drainage | Row spacing | Tillage | Yield | Significance P = (.10) |
|-----------|-------------|------------------------|-------|------------------------|
| Drained | 7.5 in | No-till | 57.0 | NS |
| Undrained | 7.5 in | No-till | 57.4 | |
| Drained | 7.5 in | Chisel Plow | 43.9 | NS |
| Undrained | 7.5 in | Chisel Plow | 44.3 | |
| Drained | 30 in | Chisel Plow | 40.5 | NS |
| Undrained | 30 in | Chisel Plow | 39.3 | |
| Drained | 7.5 in | Zone Tillage | 46.5 | NS |
| Undrained | 7.5 in | Zone Tillage | 47.7 | |
| Drained | 7.5 in | Rotation Strip Tillage | 54.7 | A |
| Undrained | 7.5 in | Rotation Strip Tillage | 48.2 | B LSD = 3.0 |
| Drained | 30 in | Rotation Strip Tillage | 53.4 | NS |
| Undrained | 30 in | Rotation Strip Tillage | 50.7 | |

Summary

In 2010 soybean yield as influenced by drainage and was significantly better only with drainage and 7.5 inch row spacing in the Rotation Strip Tillage treatment.

Because of an extremely wet May, soybeans were planted later than usual (May 29) and the soil moisture was essentially at field capacity below planting depth. Then rainfall during the growing season was 2.5 inches below normal. A drier growing season tends to negate the usual yield advantage resulting from good subsurface drainage.

Historically, subsurface drainage increased soybean yields about 5%, far less than for corn.

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