Raising Non-Rotation Soybean


University of Wisconsin-Madison
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Background

• At least 95% of the soybean crop is grown in rotation

• Higher demand in 2001
  – An expected increase in acreage
  – Lower input costs compared to corn
Wisconsin Soybean Acreage
1961 to 2000

\[ y = 92.213e^{0.0596x} \]

\[ R^2 = 0.91 \]
Crop Rotation

“A cropping sequence on a particular field that includes more than one crop over a particular period of years”
Crop Rotation

- Benefits have been known for several years
  - Reduced pest and pathogen populations
  - Nutrient benefits
  - Improved soil structure
  - Increase density and activity of beneficial microorganisms
  - Allelopathy effects
Crop Rotation

...the “rotation effect” is still not fully understood
Brown Stem Rot
Soybean Cyst Nematode
Green Stem
White Mold
Sudden Death Syndrome
Unknown Virus
Diaporthe - Phomopsis Complex
Soil pH
Nutrients
Phytophthora
Organic matter

UW MADISON AGRONOMY
Objective

To determine the rotation effect on corn and soybean and its interaction with tillage system and row spacing
Material and Methods

• From 1998 to 2000 at UW - Arlington ARS
• AG 2301 (moderate resistant BSR variety)
• A RCB in a split-split arrangement with 4 replications
  – Two tillage systems (no-till vs. conventional tillage)
Material and Methods

- Rotation sequences (since 1986)
  - 1st year soybean
  - 2nd year soybean
  - 3rd year soybean
  - 4th year soybean
  - 5th year soybean
  - Corn/soybean rotation
  - Continuous soybean
Material and Methods

- Three row spacings (7.5”, 15”, and 30”). Soybean was planted at 225K, 175K, and 125 K acre⁻¹
Effect of Rotation Sequence on Soybean Yield, 1998-2000

LSD 5% = 3 Bu acre\(^{-1}\)

<table>
<thead>
<tr>
<th>Rotation (Years of Soybean)</th>
<th>Yield (Bu acre(^{-1}))</th>
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<tbody>
<tr>
<td>1</td>
<td>65</td>
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<tr>
<td>2</td>
<td>62</td>
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<td>3</td>
<td>58</td>
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<td>5</td>
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<td>Cont.</td>
<td>59</td>
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<td>C/S</td>
<td>63</td>
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Interaction of Rotation Sequence and Tillage on Soybean Yield, 1998-2000

LSD 5% Tillage = 1 Bu acre⁻¹
R x T = 3 Bu acre⁻¹

Yield (Bu acre⁻¹)

Rotation (Years of Soybean)

No-till
Conv. Tillage

1 2 3 4 5 Cont. C/S

66 64 62 62 59 57 62 62 61 61 61 63 62
Row Spacing Effect on Soybean Yield, 1998-2000

Yield (Bu acre\(^{-1}\))

<table>
<thead>
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<th>Row Spacing</th>
<th>Yield</th>
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<tr>
<td>7.5&quot;</td>
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</tr>
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<td>30&quot;</td>
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</tr>
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LSD 5% = 1 Bu acre\(^{-1}\)
Effect of Tillage on BSR Severity, 2000

BSR Severity (0-11) *Horsefall-Barratt Scale

No-Till: 3.7
Conv. Tillage: 3.1

LSD 5% = 0.4
Effect of Rotation Sequence on BSR Disease Incidence

AUDPC

1st year soybean
C/S rotation
Cont. soybean

Conv. Tillage
No-till

(unpublished data, 1997-1999)
Summary

• 1\textsuperscript{st} year soybean and soybean rotated annually with corn yielded greater than continuous soybean

• There was an interaction of soybean yield with rotation sequence and tillage system

• Averaged over all plots soybean yields were greater with no-till than with conventional tillage
Summary

• Row spacing had an effect on yield. Soybean yield increased as row spacing decreased from 30” to 7.5”
• Tillage had an effect on BSR severity. The highest BSR severity was found in the no-till system
• Other factors are causing the rotation effect as well
Conclusion

• If raising non-rotation soybean:
  – Use moderate to resistant varieties
    • No-tillage
    • 7.5” row spacing