Rotation Effect on Brown Stem Rot and Soybean Yield

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Background

• Brown Stem Rot (BSR) is caused by the fungus *Philophora gregata*

• Was first reported in Illinois in 1944

• Is found in all soybean producing areas of Wisconsin and the Midwest

• Yield losses can be up to 40%
Disease cycle

- BSR survives in soybean stem residue and in organic matter in the soil
- Host range is limited to azuki bean, mung bean, and soybean
- Severity of BSR is related to inoculum densities in previous season soybean residue
- Severity of BSR increases at cooler temperature (64-75°F)
Symptoms

- Appear late in the growing season (early pod set (R3-R4))
  - **Leaf symptoms** (vary - may not develop in some environments)
  - **Stem symptoms** (a dark reddish-brown discoloration of the stems vascular elements and pith)
Management

- Crop rotation
- Resistant varieties vs low/high yield environment
- Monitor field if a no-till system is used
- Planting date, row spacing, and maturity group → BSR benefit to high yield management practices
- Soil pH
Crop rotation

- Nonhost crop (corn, small grains, forage legumes) should be grown for 2 years or more.

- Annual rotation of soybean with nonhost crops does not provide long-term reduction in the incidence and severity of the disease → other management practices are needed.
Material and Methods

• Rotation sequences
  – 1st year soybean
  – 2nd year soybean
  – 3rd year soybean
  – 4th year soybean
  – 5th year soybean
  – Corn/soybean rotation
  – Continuous soybean

• Conv. tillage and no-till tillage system

• Row spacing (7.5”, 15”, and 30”)
BSR Resistant vs. Susceptible Variety

![Graph showing yield bu/a for 1st year soybean, Corn/Soybean rotation, and Cont. soybean.](image)

- 1st year soybean: Susceptible 62, Resistant 68
- Corn/Soybean rotation: Susceptible 54, Resistant 64
- Cont. soybean: Susceptible 49, Resistant 61
BSR Disease Incidence
(Resistant vs. Susceptible Variety)

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1st year soybean
Corn/Soybean rotation
Cont. soybean

Susceptible
Resistant

32
58
74
3
4
5
Soybean Yield in Different Rotation and Tillage Systems

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<th>Conv. Tillage</th>
<th>No-Till</th>
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<td>1st year soybean</td>
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<tr>
<td>Corn/Soybean rotation</td>
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<td>56</td>
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<td>Cont. soybean</td>
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BSR Disease Incidence
(Conv. Tillage vs. No-Tillage System)

AUDPC

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Conclusion

• Use a multifaceted approach:
  – Nonhost crop should be grown for 2 years or more to minimize the risk of yield loss caused by BSR
  – Use resistant cultivars (if necessary)
  – Less tillage increases the risk of yield loss caused by BSR
  – BSR can negate the benefits of management practices intended to maximize soybean yield