Types of Crop Rotations

- Monoculture:
  - This is not a rotation
  - Continuous production of a single crop
- Short Rotation
  - A simple rotation consisting of 2 or 3 different crops grown, (Example= Corn-beans, or corn-wheat-double crop beans)
- Extended Rotation
  - Refers to multiple crops grown over many years (example=corn-oat-wheat-beans- corn-canola)

Crop Rotation Intensity

- Intensity is a relative term.
- I will refer to systems that produces more than one crop per year as being intensified
- 3 crops in 2 years
  - Wheat-double crop- full season summer crop
- 4 crops in 3 years
  - Canola-wheat-double crop- full season summer crop
- There are a great many options in Oklahoma

Benefits of Crop Rotation or Detriments of Continuous Cropping

- Soil structure
- Soil erosion
- Nutrient management
- Disease and pest management
- Crop performance
- Water utilization
- Distribution of labor and equipment
  - However, complexity of system increases management requirements

Soil Structure

- Rotation can benefit soil structure in no-till cropping systems
- Inclusion of high biomass crops provides
  - Surface residues for prevention of erosion and surface crusting
  - Increased organic matter
- in contrast, monocultures of low residue crops such as cotton or soybeans can be detrimental
- Deep tap rooted crops can extend biopores deep into the profile and improve permeability of soil profile

Erosion Reduction Through Crop Rotation

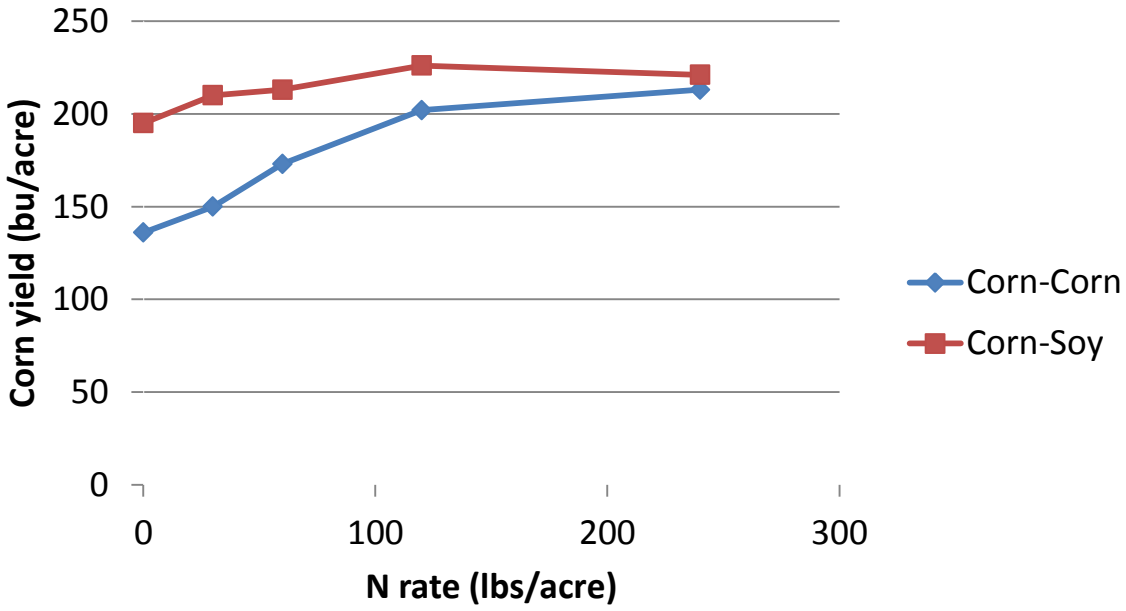
- Crop rotation provides for improved success of no-till and reduced tillage system
- Rotating high residue crops with low residue crops provide for reduce erosion potential compared to continuous production of low residue crops
  - Soybeans rotated with wheat or corn is an improvement compared to

Nutrient Management

- Inclusion of deep rooted crops in rotation provides a potential for translocation of nutrients from subsoil
  - This is a theory with little research that quantifies the effect.
- Intensification of crop rotation can improve utilization of residual N.
- Inclusion of legumes in rotation provides the most evident benefits

Rotating Corn with Soybeans can Decrease Fertilizer N Requirements.

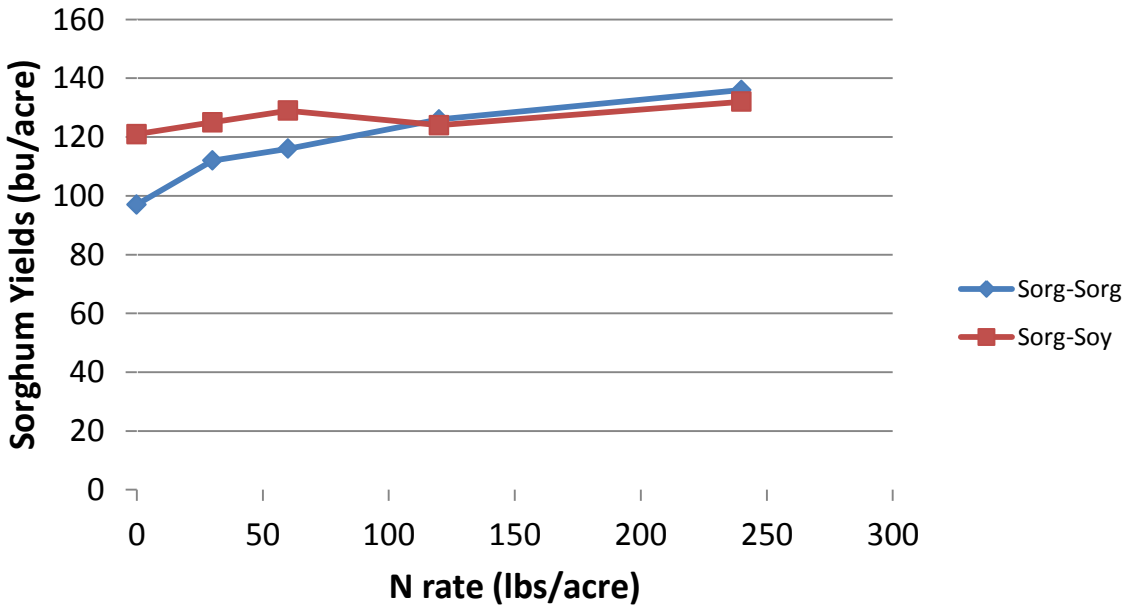
- Irrigated corn-soybean rotation in Western KS
- N requirements for corn were greatly reduced after soybeans
-



Schlegal et al

Rotating Corn with Soybeans can Decrease Fertilizer N Requirements.

- Similar effects were observed for sorghum-soybean rotation.



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Rotational Benefits to Pest Management

- Rotation breaks weed, insect, and disease cycles
- Rotations will allow for a diversification of weed control chemistries
- Alternating crops can remove hosts plants and/or residues need for insect and disease life cycles.
- However, it is important to evaluate pest lifecycles when developing a rotation in order to realize this benefit

Reductions in Weed Pressures

- Most often monocultures rely on 1 or 2 classes of weed control chemistries.
- Resistance can rapidly develop in a no-till system.
- Alternating the time of year for fallow periods and crops can increase the number of weed control options and minimize genetic and species shifts in weed populations
- Rotating the mode of action is critical to the prevention of weed population shifts.

Canola-Wheat Rotation As an Example

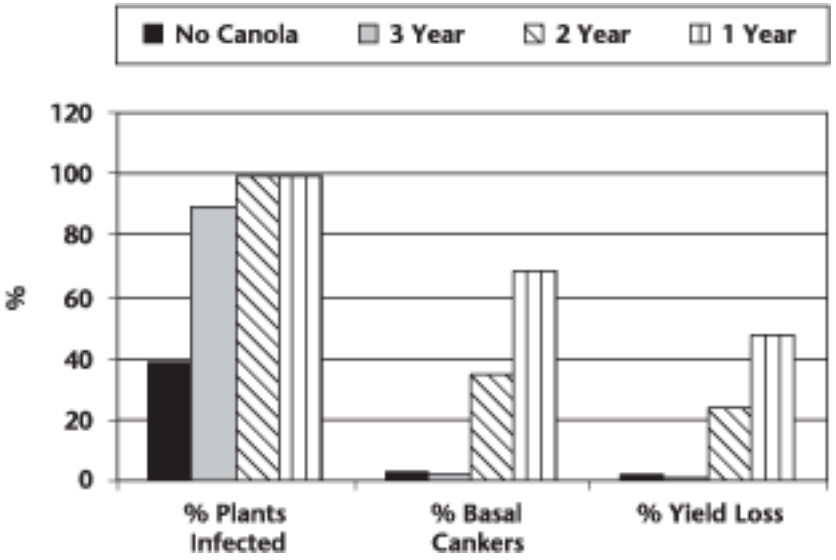
- Canola and wheat share very few common disease problems.
- Glyphosate resistant Canola allows producers to kill winter annual grasses.
- An ACCase inhibitor can be used during wheat production.

Disease Host Range

Disease	Wheat	Canola
damping off	✓	✓
rusts	✓	X
smuts & bunts	✓	X
tan spot	✓	X
head scab	✓	X
Septoria blotch	✓	X
powdery mildew	✓	✓
viruses	✓	✓
Rhizoctonia root rot	✓	✓
take-all root rot	✓	X
common root rot	✓	X
black leg	X	✓
Sclerotinia stem rot	X	✓

Effect of Crop Rotation in Spring Canola

Effect of Rotation on Blackleg Disease (Saskatoon, SK 1986)



Effect of Rotation on the Incidence of Blackleg Disease in Canola(Manitoba 1999)