Effects of a Cereal Rye (*Secale cereale* L.) Cover Crop on Soil Properties and Crop Productivity in Southeast Indiana

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Introduction and Rationale

Cover Crops in the Midwest:

- May improve soil health and crop productivity
- May increase resiliency to climate stresses in corn-soybean systems

Work is Needed in the Midwest:

- To quantify benefits and risks of cover crops, including soil organic matter, nutrient cycling, soil health measures, and crop productivity
- Sustainable Corn Team includes 10 cover crop locations

New Site Established in 2011 in Indiana:

- Southeast Purdue Agricultural Center (SEPAC)
- No-till corn-soybean rotation
- With and without cereal rye cover crop

Materials and Methods

Cover crop biomass sampling

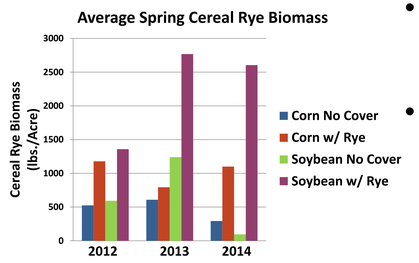
Soil aggregation; wet sieving method

Cereal Rye cover vs. no cover (weeds)

- Cereal rye cover crop at termination before corn vs. termination before soybeans (2-3 weeks later in 2013 and 2014)
- Rye grown longer before soybeans because a) more growth provides greater soil improvements, and b) rye management is easier before soybean than before corn

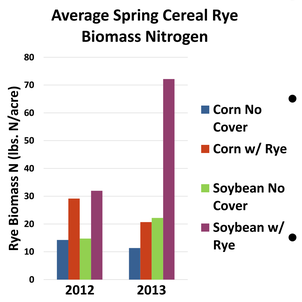
Results and Discussion

1. Cereal Rye Growth



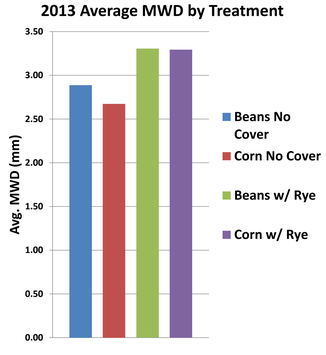
- Determines potential build-up of soil organic matter
- Rye was grown longer in plots preceding soybean in 2013 and 2014 (see photo)

2. Cereal Rye Biomass Nitrogen



- Determines scavenged nitrogen that otherwise could have been lost to potential leaching
- Biomass nitrogen can contribute to building soil organic matter or be provided to the subsequent cash crop
- Increased nitrogen content in 2013 due to 2012 drought and residual soil nitrogen

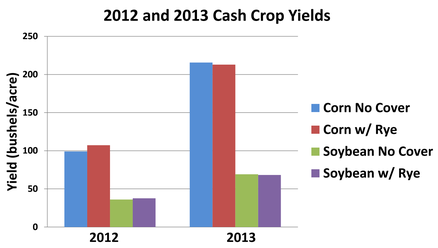
3. Soil Aggregate Stability
   - A soil quality indicator based on how well soil aggregates resist breakdown by water
   - Units in MWD (Mean Weight-Diameter) of soil aggregates



- Treatments with cover have consistently higher MWD values than those without
- Better soil structure leads to greater water infiltration, increased water-holding capacity, less erosion, decreased surface crusting, and greater plant rooting ability ➔ Greater Resilience

Results and Discussion

4. Cash Crop Yield



- Yields have not shown statistically significant differences between treatments

Limitations of this Study

- These data are from the first three years on this project – but, benefits from cover crops accrue over longer time periods
- Cereal Rye was used to fit the entire geographical region of this project, however other species could be more suitable for specific locations

Cover Crop Recommendations and Resources

1. Good management is key – know details before implementing cover crops:
   - Cover crop species, cropping system, soil type, landscape, climate, available equipment
   - Cost and labor – more management needed than no cover
2. Consult Resources:

- Midwest Cover Crops Council (http://www.mccc.msu.edu/)
  - Cover Crops Pocket Field Guide
  - Cover Crop Selector Tool
- State Land Grant Universities
- Local and State NRCS and Extension

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