Early cover crop planting effects on crop yields and environmental benefits

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Rationale

- **Farmers in Iowa specifically name cover crop fall establishment as a major management challenge**
- **There is often very little time post corn or soybean harvest to establish a cover crop that will grow enough to survive the winter or for a producer to deem it worthwhile of the effort and costs**

Objective

To determine how <u>earlier cover crop planting dates impact</u> cash crop yield, cover crop growth and subsequent environmental benefits

Results

Average for five locations over 2002-2013	No Cover Crop	Cover Crop Plant Late Sept	Cover Crop Early Plant Sept 1
Avg corn yield bu/acre	187	187	186
Avg soybean yield bu/acre	43	43	44
Rye cover crop lb/acre		1890	3925
% Organic carbon improvement in topsoil	-	4%	9%
% Erosion prevented	-	14-22%	23-32%
% Reduction in Nitrate loss	-	11%	24%

Summary

- **Only minor to positive cash crop yields were predicted with a cover crop**
- **We also did not observe major differences in cover crop impacts across different soil types, climates and slopes in Iowa**
- ***How much erosion can be prevented with the use of cover crops?* <u>14-32% depending on planting date and other factors</u>**
- ***What planting dates are needed to achieve those growth levels?* <u>Earlier is better: planting the cover crop about three weeks earlier (by early September) doubled the average biomass over a 12 year period</u>**
- **Improved management options and technologies are needed to achieve optimal cover crop growth**

Experimental Design

We utilized a computer simulation that represents the dynamics of agricultural fields. Such models are predictive tools that help understand complex systems such as crop and soil interactions with the weather. Below is a simple diagram of how the model operates.

Equations represent:

Plant growth

Soil processes

Inputs

Predictions tell us:

Crop yield

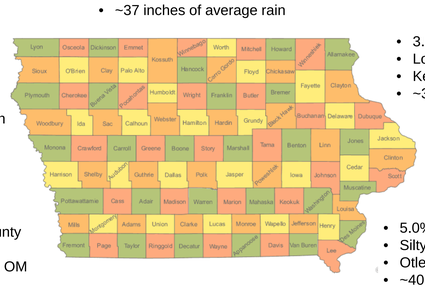
Nitrate loss

Outputs

We chose five different locations in Iowa to try to detect differences in cover crop impacts. The below descriptions represent a few of the input values we used in the model.

Boone County
- 1.0% slopes
- Fine-loamy ~3% OM
- Nicollett soil series
- ~37 inches of average rain

Ida County
- 3.5% slopes
- Silty clay loam ~2%OM
- Galva soil series
- ~34 inches of average rain



Bremer County
- 3.5% slopes
- Loam ~2% OM
- Kenyon soil series
- ~36 inches of average rain

Taylor County
- 5.0% slopes
- Silty clay loam ~3% OM
- Colo soil series
- ~37 inches of average rain

Mahaska County
- 5.0% slopes
- Silty clay loam ~2% OM
- Otley soil series
- ~40 inches of average rain

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