The impact of interseeding cover crops into Ohio corn systems on competition for water and nutrient resources and on the surface soil physical properties

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Introduction and Objectives

Establishing effective cover cropping strategies in Ohio has become increasingly important following the 2014 drinking water quality crisis in Toledo. Growing degree-days are insufficient to establish highly effective cover crops post-harvest following corn or soybean in Ohio. An emerging alternative to planting cover crops after corn harvest is to interseed the cover crop in between the rows of corn. This can be done any time from the day of planting (DOP) up to the V7 corn growth stage, creating a wide window of opportunity to plant into corn. In order to recommend the best time to interseed, it is important to consider the competition for resources amongst the corn crop and the cover crops; these resources include water and nutrients.

The main objective of this study is to evaluate the effect of cover crop species and planting date on resource allocation and soil physical properties.

Research Questions

1. What is the interseeding date effect on water and nitrogen resources?

2. How will interseeding date and cover crop species impact the soil physical properties?

3. What is the effect of different interseeding dates on corn yield?

Experimental Design

Field dimensions: 600ft x 160ft
Plot dimensions: 15ft x 50ft (6 corn rows)
Treatments: (15 treatments x 4 reps)

This experimental design has two treatment factors: **Planting date** (DOP, V_5 , V_7 , R_3 , Post-harvest) and **Cover crop species** (rye/clover/none).

Figure 1. The InterSeeder™

T1= Corn Only Control (No Cover Crop)
T2= Annual Ryegrass (v. CCS Tillage RootMax) Control (No Corn)
T3= Corn DOP x Annual Ryegrass Interseeded
T4= Corn V3 x Annual Ryegrass Interseeded (Not Seeded)
T5= Corn V5 x Annual Ryegrass Interseeded
T6= Corn V7 x Annual Ryegrass Interseeded
T7= Red Clover (v. Cinnemon PLUS) Only Control (No Corn)
T8= Corn DOP x Red Clover Interseeded
T9= Corn V3 x Red Clover Interseeded (Not Seeded)
T10= Corn V5 x Red Clover Interseeded
T11= Corn V7 x Red Clover Interseeded
T12= Corn R5 x Red Clover Broadcast
T13= Corn R5 x Annual Ryegrass Broadcast
T14= After Corn Harvest Red Clover Drilled
T15= After Corn Harvest Annual Ryegrass Drilled

Figure 2. Annual ryegrass interseeded into corn on DOP.

Figure 3. Red clover interseeded into corn on DOP.

Materials and Methods

•Baseline samples were collected for all 60 plots for the following properties: aggregate stability, aggregate size distribution, soil nitrate, texture, and bulk density.
•Gravimetric soil moisture content, temperature, and soil nitrate are assessed regularly (weekly to biweekly). Soil plant analysis development (SPAD) readings and corn height measurements are taken periodically throughout the growing season.
•Post-harvest measurements will be taken for the following parameters: corn yield, cover crop biomass (above ground dry weight and C:N ratio), and cornstalk nitrate

Preliminary Data

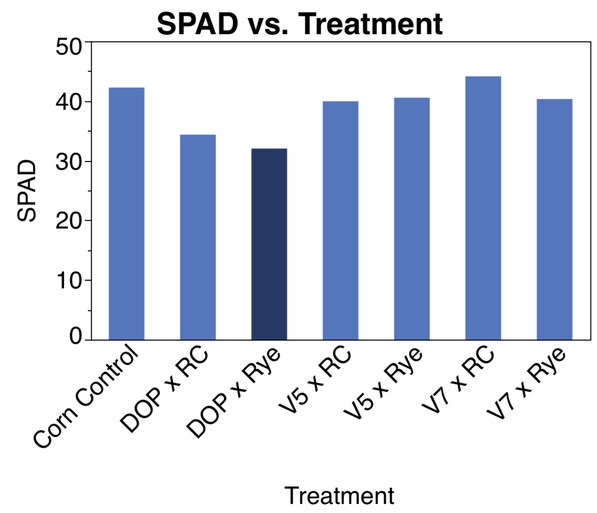

Figure 4. SPAD for corn control, DOP, V5 and V7 interseeded treatments for both cover crop species.

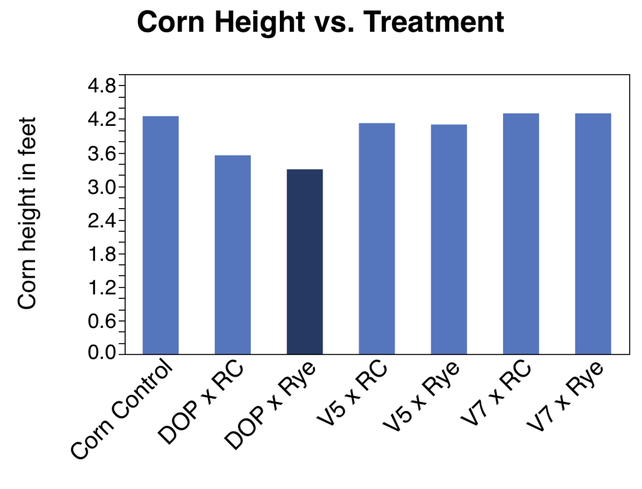

Figure 5. Corn height for corn control, DOP, V5, and V7 interseeded treatments for both cover crop species.

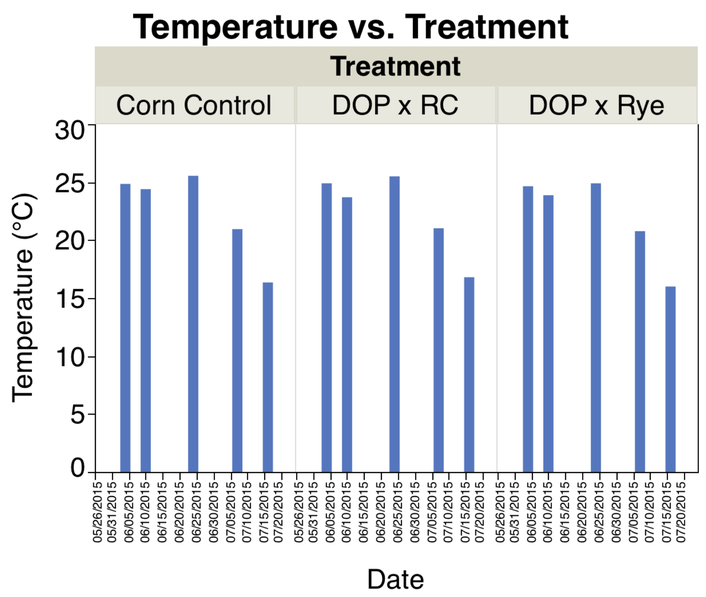

Figure 6. Soil temperature taken at 5 cm depth for the DOP treatments with and without cover crops.

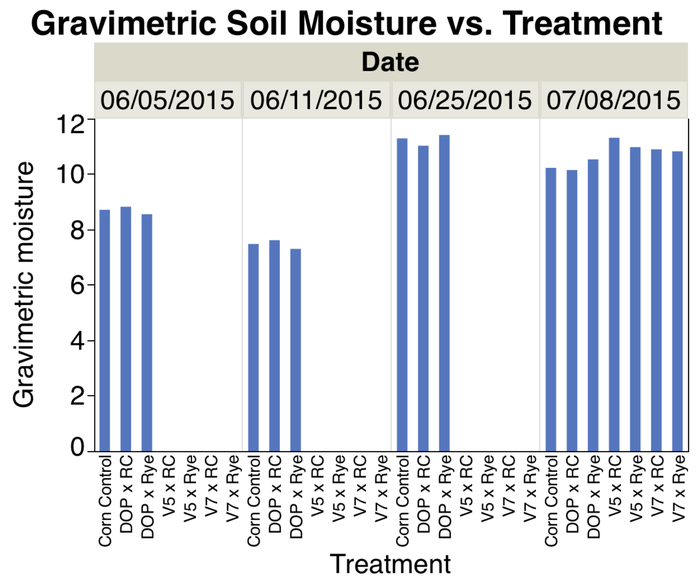

Figure 7. Gravimetric soil moisture content at 0-20 cm depth for corn control, DOP, V5 and V7 interseeded treatments for both cover crop species.

Rationale

The benefits of cover crops for enhancing soil physical properties are well-established in the scientific community, yet only a small percentage of cropland utilizes cover crops. Several surveys have been distributed to farmers in the U.S. corn belt and results have shown that a major barrier of implementation is the short window of opportunity for planting cover crops after harvest. New equipment, such as the InterSeeder™, provides a solution to this problem. A question of concern is the competition for resources amongst the corn and cover crop seedlings. The goal of this study is to better understand the system dynamics between the corn crop, cover crop, and resources and to provide guidance to land managers on the optimum time to interseed into corn.

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