

## **Roots Not Iron: Evaluating Cover Crop Options and Planting Strategies**

### **Thamesvalley SCIA OSCIA Tier 2 Grant Interim Report**

#### **Purpose:**

A recent resurgence in interest with cover crops has many producers wondering what options work best. The hashtag #RootsNotIron has become a popular Twitter category, with a focus on multi species cover crops and planting the next crop into live green growing cover crops, with cover crop kill following the planting process. The impact on yield and any practical field implications has not been well researched. This project will attempt to evaluate these parameters across a range of cropping practices.

Algal blooms in Lake Erie have focused attention on the impact agricultural practices may have on the environment around us. This has put an even higher emphasis on soil conservation practices including cover crops and reduced tillage. It is beyond the scope of this project to measure the impact these practices have on reducing phosphorus losses: but this project will examine the effect that cover crops and reduced tillage have on soil health and crop yields.

In order to build long-term organic matter and not tie up nitrogen, it is important to have some high nitrogen residue (legumes or green leafy cereal plants) to go along with the high carbon residue that is left behind after corn and wheat harvest. This will help to balance the carbon to nitrogen (C:N) ratio and provide a variety of residue to feed a wide spectrum of soil microbes. The living roots of a cover crop also play a vital role in releasing carbon and other compounds into the soil to help feed the microorganisms in the soil for a longer period of time. The cover crop will increase plant biomass and carbon being returned to the soil, which will increase soil microbial activity. The increase in microbial activity will have numerous benefits on soil health including increased soil organic matter, soil structure and soil tilth.

#### **Methods:**

Three wheat, three corn, and four soybean fields (10 total) were selected across the Thames Valley and Heartland Regional Soil and Crop Improvement Association regions during the 2015 growing season. Each field will follow a corn, soybean, wheat rotation for the duration of this project. The three treatments are listed below. Each treatment will be replicated three times.

1. Conventional (No cover crops)
2. Conventional (Clover after wheat, oat if clover fails to establish)
3. RootsNotIron (Continuous cover crop, multi species if possible, strip till or no-till)

The RootsNotIron treatment will have a rye mixture inter-seeded into the corn crop which will not be terminated until spring. The rye mixture will be planted at a rate of 46 lbs/ac (40 lbs cereal rye, 4 lbs ryegrass, and 2 lbs crimson clover). Soybeans will be planted following a single spring strip till pass or no-tilled directly into the cover crop. Once the

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soybeans are harvested wheat will be no-tilled into the soybean stubble. After wheat harvest a multi-species cover crop will be planted in treatment 3. The multi-species cover crop will be planted at 110lbs/ac (30 lbs oats, 30 cereal rye, 20 sunflower, 20 peas, 4 ryegrass, 2 radish, 2 clover, 2 phacelia). The multi-species cover crop will be left till spring when corn will be planted directly into the cover crop or following a single strip till pass.

Tillage will be done on treatments 1 and 2 following the co-operators normal practice but treatment 3 will not receive any tillage for the duration of this project. All other variables (i.e. starter, nitrogen, manure) will be the same for all three treatments following the co-operators normal production practice.

Soil samples were taken from each location to determine baseline soil health levels. At the completion of this project each treatment will be soil sampled to determine the effect each treatment has on soil health.

### Results:

The initial year of this study has been completed. The yield results from the three corn sites are shown in table 1. The yield results from several other farmer-conducted trials with the same treatments have been added to supply additional results.

**Table 1: Corn Yield Results from Inter-Seeded Rye (bu/ac)**

Location	Check	Rye Interseeded
Arthur	192.3	193.1
Glencoe	137.1	145.1
Rodney	171.3	171.0
Woodstock	194.5	195.3
Strathroy #1	220.0	218.0
Strathroy #2	220.0	202.0
<b>Average</b>	<b>189.2</b>	<b>187.4</b>

At four of the 6 sites there was no significant difference in yield whether rye was inter-seeded or not. Two locations really stand out in Table 1. There was an 8 bu/ac yield increase at the Glencoe site when rye was inter-seeded, while Strathroy #2 lost 18 bu/ac by inter-seeding rye. Both of these trial results need to be used with caution: Glencoe was only one replication, and Strathroy #2 was not what the farmer considered to be a “perfect test”.

All sites had good to excellent rye establishment during the 2015 growing season. Annual ryegrass appeared to be the species that survived best seeded into the corn. Picture 1 shows the excellent rye growth that occurred at the Arthur location in 2015. These results are encouraging: if no yield loss occurs, and cover crops can be established, additional root growth and biomass should improve soil health in the future.

No yield data is available from the soybean or wheat sites. Due to the late start with this project clover had already been established at two of the three wheat sites. Once the

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wheat was harvested the clover was burned off in treatments 1 and 3. Once the clover was burned off the multi-species cover crop was planted in treatment 3. At the third wheat site which did not have clover applied, an oat and pea mix was planted after harvest to replace the clover cover crop in treatment 2.

**Image 1: Rye after corn harvest (Nov 16, 2015)**



**Image 2: Multi-Species mix (Oct 14, 2015)**



Clover stands were excellent following the 2015 wheat crop. Perfect stands and great growing conditions well into the fall resulted in lots of growth. The multi-species cover crop establishment was also excellent at two of the three wheat locations. At the third location, rough, uneven ground conditions resulted in variable seeding depth which, combined with inadequate rainfall, resulted in a variable stand shown in Image 3.

### **Summary:**

The first year of this project has been completed. Cover crop establishment was excellent across sites and crops. Inter-seeding into an existing corn crop showed annual ryegrass to be the most successful species, with no significant yield loss to the interseeded cover crop at all but one location. Sites are in excellent condition for year two of this project. No conclusions can be drawn yet from the limited dataset generated.

**Next Steps:**

This trial will be continued for at least the next 2 years to complete the corn, soy, wheat rotation at all locations.

**Image 3: Uneven cover crop growth**



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**Location of Project Final Report:**

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