

## Improving Yield of Second Year Soybeans

### (Interim Report)

#### **Purpose:**

The purpose of this project is to determine the value of a rye or winter wheat cover crop in fields where soybeans follow soybeans. Many growers find themselves in a situation where for cropping, economic or other reasons they plant soybeans in a field two or more years in a row. This results in yield loss and can increase pest and disease pressure in the field.

The rye or wheat is planted immediately following soybean harvest and killed off in the spring prior to planting soybeans. Hopefully enough growth will be generated to provide some benefits to the soil and increase the yield of the succeeding soybean crop. There is some research from Pennsylvania indicating that cover crops can improve soybean yields in these situations. The intent of the project is not to replace a good crop rotation for soybean production but to provide a tool for growers who find themselves growing multiple years of soybeans.

#### **Methods:**

The project sites are established in the St Clair District Soil and Crop Improvement Association area (Essex, Kent and Lambton). Fields are selected which have had one or more years of soybeans previously and will be going into soybeans. Immediately following soybean harvest the winter wheat and rye cover crop is drilled in or broadcast and worked in. Main project sites have both cover crops and secondary sites will have a minimum of one cover crop. Each site will have at least two replications. The cover crop is left over winter and is killed prior to soybean planting.

At cover crop establishment soil samples are taken to determine fertility, organic matter content and soybean cyst nematode levels. Other soil quality measurements may be taken either at establishment, the next season or both. Cover crop growth is monitored. Soybean growth and yield measurements are taken for the treatments.

#### **Results:**

**The 2006/2007** project year (fall '06 to soybean harvest '07) was the startup year for the project. The soybean crop was late maturing and the fall became very wet so plots were only planted in Essex County. One main and two secondary sites were planted in the first week of November. The main site had a corn residue strip in it and two reps of the rye and wheat cover crops. One secondary side had both wheat and rye and the other had just rye. The main plot was on a sandy loam soil growth was slow but uniform in the fall. By the beginning of May the rye had reached a height of 31cm (12") leaf extended and the winter wheat was 26cm (10") tall. Cover crop growth was slow on the two secondary sites due to late planting and clay soils. By early may growth was uneven and generally poor. Fertility, organic matter and soybean cyst nematode (SCN) samples were taken and analyzed. The three sites had adequate fertility and organic matter

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averages about 3.5%. The main site SCN samples were generally in the low to moderate risk range. The two secondary sites had no SCN present. Bait lamina strips were inserted in four treatments of the main site. The strips were inserted into the soil about 8 cm or 3" and had "soil life food" in holes at different depths. They were removed from the soil after 10 days and give an indication of the amount of biological activity in the soil.

### 2007 Soybean Yield Results

Plot	Check Soybean Yield (bu/ac)	Soybean Yield after Rye Cover Crop (bu/ac)	Soybean Yield after Winter Wheat Cover Crop (bu/ac)	Soybean Yield Following Grain Corn (bu/ac)
Main - Kingsville	34.1	46.6	48.5	52.0
Secondary – Amherstburg*	48.1	48.9	---	---

\* Site had poor cover crop growth.

**The fall of 2007** was more favourable for the establishment of a cover crop after soybean harvest. Plots were planted in all three counties, three main plots and three secondary plots. Two of the main plots have a corn residue strip again and one of the main plots had manure applied as an extra treatment. All the plots are on clay or clay loam soils. The plots were soil sampled and the fertility and organic matter levels are moderate to high. One of the main plots had significant levels of soybean cyst nematodes, the other plots had no SCN. The cover crop growth was good going into the winter.

### Summary:

The results from the main site show some promise although it is only one year at one site. The cover crops significantly increased soybean yields compared to the check but were not quite as good as the corn-soybean rotation. If the yield advantage is real, at a 13 bu/ac yield increase the net return would be \$95-\$100 (\$9.50/bu soybeans and \$24-\$29 for seed and planting). The growth of the cover crops on the secondary sites was poor enough that it wouldn't have had an effect on yields.

### Next Steps:

Soybeans will be planted following the cover crops in the spring and yields will be taken in the fall. The rye and wheat cover crops will be planted, on different fields, following the 2008 soybean harvest for another cycle of the project. The St Clair District SCIA has secured funding to complete three full cycles of the project. Bill Deen, University of Guelph has received funding from the OMAFRA Ontario Great Lakes Program to establish research plots at several locations to study cover crop benefits to soybeans.

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