

Western Illinois University's Allison Organic Research and Demonstration Farm

Summary report of rye as a cover crop prior to 2003 organic soybeans

By Dr. Gerald Vigue (Project Supervisor) and
Mr. Andrew Clayton (Research Associate)

Winter rye was grown at the Allison Farm with the expectations that it would benefit our organic operation in several ways including soil and nutrient conservation, soil tilth, and weed suppression. This farm also has poorly drained soil that we hoped might benefit from the rye using up some of the excess moisture in the spring.

A certified organic Aroostook cereal rye was broadcasted on 12/3/02 at a rate of 2 bu/ac (112#/ac) and culti-mulched with the teeth up about a week later to ensure good seed to soil contact. On 5/8/03, a small section of the 16" to 18" tall rye was flail mowed down to the height of 8". On 5/19/03, we got back into the field and flail mowed both, the previously mowed section and the untouched section. The majority of the field had not been previously mowed and was between 36" and 42" tall, while the previously mowed section had grown back to about 20" to 24" tall. We feel that one flail mowing instead of two was sufficient. It should be noted that rye will grow fast in the spring, so be prepared to incorporate it before it gets too difficult to handle.

The next steps were to incorporate the rye into the soil to prepare for the seed bed. On 5/28/03, the ground was disked at a depth of about 5". The rye had grown back to about 24" tall at this point. The next day the ground was disked again at the same depth. Then on 6/5/03 and 6/16/03 a soil finisher was used to work the ground. There was still a moderate amount of rye residue on the soil surface, but not enough to hinder planting.

Soybeans were planted into the rye residue on 6/16/03 in 30" rows at a rate of 189,000/acre. These beans were rotary hoed on 6/25/03 and 7/2/03 using an M&W high residue rotary hoe. The first rotary hoeing brought up a significant amount of rye residue from underneath the soil surface. This may have helped suppress weeds even more, while conserving moisture as the weather became dryer. The beans were then cultivated with a Buffalo cultivator on 7/14/03 and 7/24/03 using 18" wide sweeps and disk hillers, which were set at 8" apart on the first cultivation and 9.5" on the last cultivation.

Weed pressure, by the time of the last cultivation, was light in the west half of the field, which is devoted to commercial organic fertilizers (fert. Sec. 1) The east half of the field, which is devoted to hog manure for fertility (fert. Sec. 2), had a light to moderate amount of weed pressure. Note: An adjacent pesticide-free field, that receives conventional fertilizers (fert. Sec. 3) and is farmed for comparisons, had a moderate amount of weeds. One noticeable benefit that was observed during cultivation was the increased soil tilth. The soil flowed much easier, which allowed it to cover more small weeds in the rows. In previous years we encountered a lot more problems with the soil forming slabs. The rye seemed to help correct this condition.

There were also smaller portions of the fields that had soybeans drilled on 6/17/03 at a rate of 233,000/ acre. They were drilled in all three fertility sections for comparisons. Strips of these sections were rotary hoed, while the rest was not to see if the rotary hoe would make a difference. Rotary hoeing some of the drilled beans may have made a difference for a few weeks, but did not seem to have a significant benefit by the end of the season.

Grass and broadleaf weed populations were scored near the end of the growing season to determine whether there were any significant differences among treatments. Yield differences were also noted among treatments.

It was obvious for several weeks, after rye incorporation, that the rye had alleopathic effects upon the weeds. This allowed the soybean crop to get a head start and compete better with the weeds. In 30" rows we observed significant differences in weed reductions where rye had previously been incorporated. The drilled sections had problems with weeds that emerged by mid-season and did not give satisfactory results.

The results that the rye provided in terms of weed control and soil improvement were impressive enough to conclude that rye can have an important role in organic farming. Our soybean yields in 30" rows that previously had rye and were organic were reasonably good (avg. 41 bu/ac.) even though it was a poor year for soybeans and we were not able to plant until mid-June. In comparison, soybean yields in 30" rows that did not previously have rye and were grown in conventionally fertilized fields (pesticide-free/non-organic) yielded an average of 31 bu/ac.