

Effect of tillage and annual ryegrass cover crop on corn yield

Michael Plumer
Natural Resource Management Educator
University of Illinois Extension

The site for this project was Ralph Upton farm, 10 miles south of Interstate 64 and about 20 miles from the Indiana border. This site was chosen because the soil is representative of large areas of Missouri, southern Illinois, Indiana and Ohio. The soil type (*Bluford silt loam, fine, smectitic, mesic Aeric Fragic Epiaqualfs*) is a moderate claypan soil, low in organic matter with acid subsoil. Further, the land is typically eroded and exhibits poor internal drainage, restricted crop rooting and is often highly-variable in yields. The Upton site was classified as a C3 with 6-8" of top soil over highly acidic subsoil; it had been no-tilled for 9 years.

Results and Discussion:

The winter weather patterns in the Midwest were highly variable during the three years of the trial. In the first year, 2005-2006 weather was fairly typical with some cold conditions.

The second year, 2006-07, had very large temperature fluctuations with temperatures varying more than 60 degrees Fahrenheit over 2 - 3 day periods. This occurred five times, resulting in severe plant desiccation and dieback. Frequent regrowth and freezing depleted the plants' nutrient reserves. The 2007-08 growing season was similar to the average temperature, but had 300% greater rainfall than normal,

Yield Advantages:

One of the main selling points of the use of annual ryegrass as a cover crop is its benefits to soil quality and the resulting increase in crop yields. After three years of replicated trials, the following tables show that effect on highly eroded Bluford soils on the Upton farm. Yield differences varied by year depending on soil type and rainfall.

**Yields at Upton Farm– Conv. till vs No-till with ARG
2005 - 06**

Treatment	mean yield in bushels/acre
no-till w/ ARG	155.7
conventional tillage	102.0
LSD 0.05	12.3
LSD 0.1	9.9

conventional tillage, disk
in fall, disk field cultivate
spring
ryegrass planted Sept 29,
2005 at 15#/a

corn planted May 4, 2006, at 30,000, harvested Sept. 18, 2006
Rainfall–was 2.6 inches April to October
Trial was 9 replications

**Yields at Upton Farm– Conv. till vs No-till with ARG
2006- 07**

Corn Harvested 8-24-07

Treatment	mean yield bushels/acre
No-till	79.0
Conv. till. fall 06/spring07	52.5
Conv. Till 06/no-till 07	61.5
no-till ryegrass cover	121.0
LSD 0.05	16.3
LSD 0.1	13.4

Ryegrass tillage trial -- ryegrass planted Sept.28, 2006 at 13#/a. .
Soil type Bluford C3. Plot has been in no-till since 1995.
Corn planted April 15th, at 32,000, Dekalb 63-81. rainfall was
approximately 3 inches May to October.

Fertility, popup, starter, 150# N. sidedressed mid May
Trial was 8 replications

**. Yields at Upton Farm– Conv. till vs No-till with ARG
2007- 08**

Corn Harvested 9-24-08

Treatment	mean yield bushels/acre
No-till	128.4
Conv. till. fall 06/spring07	102.3
no-till ryegrass cover	130.9
	LSD 0.05 14.7
	LSD 0.1 12.2

**Ryegrass tillage trial -- ryegrass planted Sept.7 & replanted Nov. 1, 2007 at
13#/a. .**

**Soil type Bluford C3. Plot has been in no-till since 1995.
Corn planted April 15th, at 32,000, Dekalb 63-81. rainfall was
approximately 21 inches May to October.**

Fertility, popup, starter, 150# N. sidedressed late June
Trial was 9 replications

