

Effect of Cover Crop Adoption on Nitrogen Use among Conventional and Organic Corn Farms – An Empirical Analysis

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INTRODUCTION

Increased population and changed technologies resulted in changing agricultural practices - multifunctional and organic agriculture.

- Technology Adoption is the major portion of multifunctional agriculture
- Cover crop adoption;

Multiple studies have estimated factors influencing cover crop adoption which include

- Positively affect soil properties and can improve crop development and yield
- Increased soil health
- Control weed population
- Increased productivity

An externality of adoption of cover crops that has not been explored is its potential impact on the amount of nitrogen use by farmers.

OBJECTIVES

Our research focus tries to estimate the following objectives

- To evaluate the factors affecting cover crop adoption among conventional and organic corn producers.
- To analyze the impact on Nitrogen management among farms relative to adoption or non-adoption of this technology.
- To compare adoption rates and changes in chemical nitrogen use among conventional and organic farms

DATA

- The survey conducted in 2009
- Mailed to 932 organic and 2068 conventional producers
- 233 organic & 212 conventional producers completed the survey
- Data for 2008 production year (highest yielding field)
- Organic producers only in this analysis
- 7 states in MRB – IL, IN, IA, OH, MI, MN, and WI
- 2 regions (Corn belt – IL, IN, IA, OH; and Lake States – MI, MN, and WI)



METHODOLOGY

Nitrogen fertilizer used by farmers who adopt cover crops and those who do not adopt cover crops is estimated.

While nitrogen used by farmers is considered as left censored variable, adoption of cover crop is considered as an endogenous dummy variable.

The resulting system is a Limited Dependent Variable (LDV) model defined by the amount of nitrogen used by farmers, with endogenous dummy variable that investigates whether the farmer adopts cover crops.

$$1) Y_2 = \begin{cases} 1 = Z' \beta_2 + v_i = Y_2^* \\ 0 \end{cases}$$

$$2) Y_1^* = X' \beta + Y_2' \gamma + u_i$$

$$3) Y_1^* = \begin{cases} X' \beta + Y_2' \gamma + u_i & \text{if } Y_1 > 0 \\ 0 & \text{if } Y_1 \leq 0 \end{cases}$$

Decomposition of marginal results is applied to understand the effects of changes in the second stage dependent variable (amount of nitrogen used per acre) due to the independent variables

RESULTS

Variables	Estimate (St. Er.)	Marginal Effect
Probit model: Cover crop		
Operator's age	0.04** (0.02)	0.02
Farming experience	-0.131*** (0.05)	0.001
CRP payment	0.54*** (0.34)	0.21
Tobit model: Nitrogen use per acre		
Predicted Cover crop adoption	-116.03** (61.99)	-4.37
Rotation	79.59** (44.16)	3.0
Livestock	77.97***	2.94

- Farmers who receive CRP payments are more likely to adopt cover crops as a nutrient and soil management tool
- For a one acre increase in cover crop adoption there is a 4 percent decrease in the amount of nitrogen from fertilizer and manure used by farmers

CONCLUSIONS / DISCUSSION

- We suggest that farmers will adopt this technology when the marginal utility, governed by profits, from adopting is at least equal to not adopting.
- Our survey shows that there are significant savings in input costs mainly nitrogen due to adoption of cover crops.
- The paper provides evidence on a causality relationship between adoption of cover crops and nitrogen management among farmers in the survey area.
- Policies and outreach efforts geared to promoting adoption of cover crops and its implication on nitrogen use could make probability of adoption among farmers higher.

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