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An Economic Analysis of Cover Crop Utilization in Georgia Cotton and Peanut Production

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Abstract

Georgia is the second largest producer of cotton and largest producer of peanuts in the United States. These crops add more than \$1.5 billion to Georgia's economy annually. As natural resources become scarcer, cotton and peanut industries have faced increasing challenges to improve environmental sustainability. Previous studies have documented the environmental benefits of cover crop utilization in cotton and peanut production systems. However, only a small portion of farmland devoted to cotton and peanut is planted with winter cover crop. One of the major barriers is the conflicting information regarding its economic impact.

This paper will utilize focus groups, farm surveys, and partial budgets to identify the individual cost and revenue changes resulting from cover crop use. Data collected will be used to estimate how cover crop impacts farm profitability. A similar methodology was used in three recent publications (Plastina et al. 2018 a,b,c) and we plan to adapt those methods to reflect production conditions in the cotton/peanut cropping systems in Georgia. This research will seek to identify the benefits and challenges of using cover crops in production systems and the changes to cultural practices that a farmer considers when adopting cover crops.

Introduction

Cover crops have long been known to yield numerous agricultural production benefits as well as positive externalities to society. Reduced nitrogen leaching into groundwater is one of the environmental benefits of cover crop use (Meisinger et al. 1991). Other benefits include weed suppression, increased moisture infiltration and improved soil fertility. Culpepper et al. (2010) found that rye cover crop had the potential to reduce Palmer Amaranth emergence by 94% in the middle areas between rows. Truman, Shaw, and Reeves (2005) demonstrated that cover crops in no-till conservation systems increased moisture infiltration by 54% compared to a conventional no cover crop treatment. Cereal rye has been reported to collect between 20 to 100 pounds of nitrogen per acre that can be utilized by the following summer crop (Gaskin, Cabrera, and Kissel 2016). However, according to the 2012 United States Department of Agriculture (USDA) Census of Agriculture, only 10% of harvested cropland in Georgia was planted with cover crops (USDA 2012).

These environmental benefits of cover crops have the potential to provide economic benefits to agricultural producers. However, cover crops can also increase farm production costs and have varying impacts on crop yield (Shurley, Culpepper, Smith, and Nichols 2014). Many producers are faced with seemingly conflicting economic information regarding the benefits of cover crop adoption (Sustainable Agriculture Research and Education 2012; Boyer et al., 2017). Producers are concerned that by implementing cover crops in their production practices, it might bring more economic uncertainty in their farming operation. This dilemma often results in producers relying entirely on traditional production practices. This research is

intended to provide producers with the necessary information to make informed decisions about the economics of adopting conservation production practices such as cover crops.

Plastina et al. (2018) examined the economics and motivations of cover crop use in corn and soybean production in the Midwest. This study found out that most farmers view winter cover crops favorably (Plastina, Liu, Miguez, and Carlson 2018). However, the results indicated that adding cover crops to a production system often decreased net farm returns per acre, except for farmers who utilize cover crops for winter grazing (Plastina, Liu, Miguez, and Carlson 2018). Farmers who utilize cover crops for winter grazing were able to increase their profitability (Plastina, Liu, Miguez, and Carlson 2018). By using this information, farmers were able to adopt production practices to reduce the uncertainty and improve profitability formerly associated with cover crop use in the Midwest. However, for Georgia row crop producers, limited research is available which focus on examining the comprehensive economic effects of cover crops in cotton and peanut production systems. As a result, most producers chose not to adopt cover crop to reduce the uncertainties to their farming operations. This knowledge gap also results in Georgia farmers continuing relying on conventional production methods without cover crops that place a strain on the state's natural resources.

This research will examine the individual benefits and costs of cover crop use in Georgia cotton and peanut production. Economic analysis conducted in this study will provided growers with improved information to help them make informed decisions regarding winter cover crop usage. Since all farm management decisions are not always solely based on maximizing profitability in a single year, this project will seek to identify all variables that a farmer considers when making production system decisions. The primary objectives of this study are to explore

farmer motivations and obstacles to planting cover crops. We will further examine the cost and revenue changes associated with conventional production systems compared to production systems with cover crops. This observed cost and revenue changes will be reflected in partial budgets and give producers the ability to estimate how the use of winter cover crop may affect farm profitability.

Data and Methods

This research utilizes the same research methodology and survey instrument as Plastina et al. (2018) and adapts it to fit the uniqueness of Georgia cotton and peanut production systems. The individual costs and benefits associated with cover crop use in Georgia have been identified for cotton and peanut production.

This research incorporates the use of farmer focus groups, farm surveys, and partial budgeting analysis. Focus groups were conducted in multiple locations across Georgia with farmers who employ both conventional practices without cover crops and practices that incorporate winter cover crops into their production methods. Interviews were conducted in Sylvester, Vienna, and Waynesboro of Georgia with cotton and peanut producers that represented six Georgia counties across the state. In each interview location, two to six producers were interviewed. In total, 12 farmers were interviewed. During the focus group discussions, farmers were asked general questions related to how implementing cover crops alters production variables that affect farm profitability. Farmers were also asked to describe some of their obstacles with cover crop usage and how they manage their winter cover crops. Upon completion of the farmer focus groups, the findings from these discussions were carefully

analyzed and examined. These findings will be crafted into more precise survey questions that will be distributed to the focus group participants to find specific cost and benefit changes associated with the use of cover crops versus conventional practices). Cost and revenue changes resulting from the use of cover crops will enable the production of partial budgets that directly compare the economic impacts to farmers in conventional and conservation cover crop systems (Plastina, Liu, Miguez, and Carlson 2018).

Results

Focus group participants from across Georgia each had unique perspectives and methods of utilizing cover crops in their farm operation. Preliminary findings indicate that cover crop use rarely influenced herbicide, insecticide, and fungicide application decisions in cotton and peanut production. Increasing soil water holding capacity, reduced erosion, and need for cultivation were commonly expressed as major benefits of planting cover crops in cotton and peanut production systems.

Cover crop management decisions varied from farm to farm, including the type of cover crop planted, termination technique, and methods of establishment. Rye, oats, wheat, vetch, and crimson clover are all types of cover crops that were reported as being used in cover crop systems. Herbicide burn-down was the most commonly reported method of terminating cover crops. Some farmers expressed that during years of excessive rainfall, they were unable to access their fields mandated the use of match and flame to terminate cover crops. Broadcasting and drilling seeds into the ground were found to be the two dominant methods of establishing cover crops. However, one farmer reported that his/her crimson clover reseeded itself each year eliminating the need to replant a cover crop annually.

The primary reported additional costs resulting from cover crop use are the costs of seed, fuel during planting, and burn-down herbicide. Several farmers did explain that they did not view the cost of a burn-down herbicide application as an additional cost for cover crop because they apply a spring burn-down herbicide even if they do not plant cover crops to eliminate winter weeds. Reduced field cultivation and required number of irrigation applications are the two major cost reductions reported that result from cover crop use. Similarly, although the cost of erosion is difficult to quantify, erosion prevention was the leading motivation for planting cover crops among farmers. Reported additional revenue sources resulting from planting cover crops are payments from the Conservation Stewardship Program (CSP) and the Environmental Quality Incentives Program (EQIP).

Conclusion

Qualitative data collected from focus groups provides an insightful view of how cover crop utilization affects farm profitability by identifying the costs and revenue changes caused by this conservation practice. Learning that controlling soil erosion, reducing annual irrigation requirements, and eliminating the necessity of intense field cultivation are critical factors in a farmer's decision to plant cover crops were some of the major benefits identified in these focus groups. Similarly, the major cover crop expenses identified were the additional cost of seed, fuel for planting, herbicide application, and labor. These findings will be valuable information in determining how cover crops influence farm profitability. However, to determine exactly how cover crops affects profit potential it will be necessary to use the information collected in the focus groups to fine tune farm surveys that aim to collect quantitative data. After these surveys

are completed by farmers, it will be possible to use this survey data to make estimations about how cover crop utilization influences farm profitability.

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