Mississippi Corn Promotion Board
2020 Progress Report

Title: Potential for Rapeseed (Canola) as a Winter Cover Crop in a Corn/Soybean Rotation System that Includes Hairy Vetch

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Project Summary

The hottest buzzword in the mid-south agricultural community is 'soil health', a term that can be defined in many ways but generally as the continued capacity of the soil to function as a vital living ecosystem. Associated with soil health issues are cover crops taking on many varied forms that include crops such as wheat, rye, clovers, vetches, and tillage radishes. While the primary benefit afforded these crops come in the term, soil health, many other situations can arise that may not complement the current growing systems. Crop rotations are beneficial in most production systems allowing for the rotation of herbicide modes of actions and chemistries. On the downside are the cost of potential cover crops and the problems with controlling pests that may overwinter or appear as a result of a non-traditional crop. Currently, the most predominant winter crop grown for profit is wheat. Most of the research or demonstrations currently being cited have no economic component and the most common question from producers is "How do I pay for it and what is my profit potential?" Rapeseed offers a potential alternative that could be grown during the same time frame as wheat (or harvested earlier) and could work in a double-crop/cover-crop scenario and provide a harvestable crop and potentially profitable crop. Several southern states including Alabama, Georgia, and Kentucky have shown promise for winter rapeseed production. Corn/soybean rotations appear all across the Mississippi Delta and Mid-South as grain crop production has become more economical and cotton production has declined. Also during recent years, soil health has become a catch phrase that many are looking at inquisitively. The use of cover crops in row crop production is not a new concept by any means and has been used in conservation systems for centuries. A lot of emphases has been placed on "selling" the practice to producers with little data on the economic as well as ecologic advantages to cover crops. Much of the Mid-south row-crop production occurs on beds that are necessary for getting water off and on the field and are less conducive to planting winter crops. Also in the last several years, the persistence of herbicide-resistant weeds has made fall and winter weed control essential for controlling troublesome weeds in the following crop. Crop rotations are beneficial in most production systems allowing for the rotation of herbicide modes of actions and chemistries.

Project Results/Outcomes

A corn/soybean 1:1 rotation system was used for the layout of the treatments. Due to extreme weather conditions with high precipitations and saturated soils, corn was planted late on April 27, 2020. Pre-emergence herbicide Lexar EZ was applied on May 1, 2020, at 3 qt/ac. Lexar EZ has a label restriction of not rotating with a broadleaf in fall due it its residual activity if applied late in the season. Corn was harvested on Sept. 15, 2020, using a Kincaid 8xp plot combine, and grain samples were collected to determine grain harvest moisture, and bushel test weight. Since no cover crops were grown in fall 2019 therefore it was expected there should not be any differences in corn yields among plots (Table 1). After harvesting corn at the Delta Research and Extension Center (DREC), field site was disked twice to incorporate corn residue. A bedder roller which is a single-pass operation to make beds was used for bed preparation. A four-row grain drill with a row spacing of 8 inches was calibrated to a 6 lb/ac seeding rate of canola. The depth of drilling was set to ¼ inch and canola was planted on 10/2/2020. Unfortunately, a 2-inch rain event occurred a day after planting which resulted in burying/washing canola seed from the seedbeds. The second site selected for this trial was located at National Center for Alluvial Aquifer Research (NCAAR), Leland MS. Field preparations were similar to the DREC field site. Canola at this research site was planted at a 6 lb/ac seeding rate on 10/6/2020. This site received a 5-inch rain event and again resulted in seed washing and poor stand. Therefore, canola was replanted on 10/16/2020 at the same seeding rate at the same location but in a different field. The third attempt at planting canola was successful and resulted in a good stand (Figure 1). Additionally, we calibrated the grain drill to 10 lb/ac canola seed and planted it in two more fields at NCAAR, Leland MS on 10/23/2020. The three-site located at NCAAR have been established well (Figure 1). For hairy vetch cover crop treatments, we calibrated grain drill to 20 lb/ac rate and planted at ½ inch depth.

Project Results

Nitrogen treatments to canola were split applied at 30 lb N/ac as urea on 11/9/2020 and the remaining N will be applied in late January 2021 (Table 2). All canola treatments that received N also received PKS fertilizer at 20-80-20 lb PKS/ac as triple superphosphate, muriate of potash, and Tiger-S. Roundup-ready winter canola variety star 930W was used for planting at all locations. Winter weeds were managed using a post-emergence spray of roundup at 22 oz/ac in a 15-gal tank-mix applied on 12/10/2020. At R. R. Foil Plant Science Research Center, Starkville, canola was planted on 11/6/2020. The first fertilizer applications to treatments were made on 12/11/2020. Data on stand count, canola biomass nutrient N uptake, residual soil fertility for the main crop, and canola harvestable yield and oil content will be collected in spring 2021. Additionally, at all locations, early group 4 soybean variety will be planted and data on stand count, soybean yield, test weight, harvest moisture, and soybean grain quality will be collected at harvest in 2021. Economic analysis of the rotations in the study will be performed at the end of the first cycle of crop rotation.

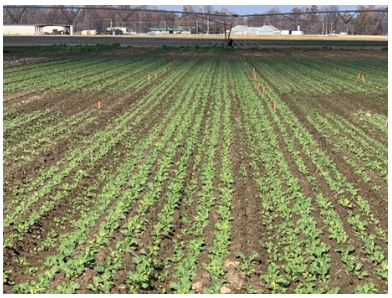

Figure 1. The pictures represent canola planted at National Center for Alluvial Aquifer Research, Leland in two different fields.

Crop Rotations	Grain Moisture %	Bushel Test Weight lb/bu	Corn grain yield bu/ac
Corn-Soybean	11.58a	53.88a	191a
Corn-Vetch-Soybean-Vetch; terminate cover crop	11.97a	54.21a	187a
Corn-Canola-Soybean-Vetch; terminate cover crop	12.07a	53.75a	182a
Corn-Canola-Soybean-Vetch; Harvest N-P-K-S-0-20-80-20	11.67a	53.47a	182a
Corn-Canola-Soybean-Vetch; Harvest N-P-K-S-60-20-80-20	11.87a	53.77a	192a
Corn-Canola-Soybean-Vetch; Harvest N-P-K-S-90-20-80-20	11.70a	53.37a	186a
Corn-Canola-Soybean-Vetch; Harvest N-P-K-S-120-20-80-20	11.52a	53.25a	178a
Corn-Canola-Soybean-Vetch; Harvest N-P-K-S-150-20-80-20	11.67a	53.10a	186a
p-value	0.6383	0.5282	0.4558

Table 1. Means represent treatment effects for grain moisture at harvest, bushel test weight, and corn grain yield. Means followed by the same letter within a column or a row do not differ significantly at P<0.05.

Project Impacts/Benefits

Results from a successful study will be vital to the potential adoption of the crops and offer a potential income source that can come directly from the crop being grown. Most studies look at the agronomic and ecological aspects of practice but fail to identify the economic factors that a producer must have to assess whether that practice can be adopted for his operation. With no yield advantage in many cases, the producer must have a way to cover the cost of the cover crop including, land preparation, seed cost, planting, burn-down, and potential insect and disease issues associated with having a green crop in the non-crop season. For years, the Mid-South US had a vast array of covers commonly referred to as “winter weeds”. Little information has been made available as to the importance of the free cover crop. Unfortunately, the appearance of herbicide-resistant weeds that need to be controlled in the fall, has led to extensive and expensive weed control options in the fall. If some weeds are not controlled at a very early stage, they are not controlled at all. This proposed study is designed to evaluate the potential for growing a cover crop that can be harvested without delaying too much the following agronomic crop, soybean. Allowing a cover to go to seed pushes corn planting outside the optimum window.

Project Deliverables

Corn yield data showed no differences among the treatments. First years data on canola will be collected in spring 2021 and data analysis will follow. The economic feasibility analysis will be conducted after harvesting soybean in 2021. The goal is to provide information to producers and help them with decision-making process and allow for significant input with a probability of economic success.

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