



Mississippi Corn Promotion Board 2021 Progress Report

Project Title: Incorporating Cover Crops into Successful Corn Production Systems

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Project Summary (Issue/Response)



Cover cropping is an up-and-coming agricultural topic primarily driven by the goal of improving soil health and water quality. However, despite producing soil, water and conservation benefits, grower acceptance and adoption of cover crops remains quite low. Grower adoption is limited because cover crops produce nominal monetary return, and often reduce profitability of the primary cash-crop grown thereafter. Cover crops may hamper productivity of the subsequent crop due to impairing planting and stand establishment, introducing allelopathy and pest issues, and confounding nutrient availability. Corn is especially vulnerable to any of these issues because it is the first crop planted in the spring, is well-known to be responsive to early planting, and is also extremely sensitive to plant stand variability. The abundant spring rainfall common in our region further amplifies already significant challenges, because it severely restricts planting date opportunities and complicates issues with stand establishment and growth disparity documented by previous MCPB sponsored research to substantially reduce corn productivity. This research documented 18% loss from emergence disparity, which is equivalent to losses produced by a 40 percent stand loss or 20 day planting delay. Thus, identifying beneficial practices and molding them into effective systems to mitigate these challenges could produce big dividends for Mississippi corn producers.

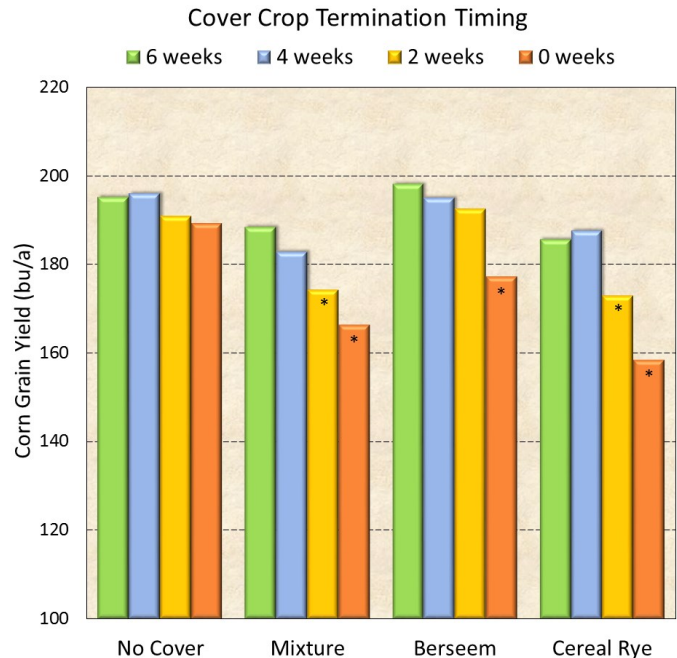


Project Results/Outcomes

This research will help identify factors and management practices needed to successfully integrate cover crops into Mid-South corn production practices without sacrificing economic returns or increasing production risks. Two separate studies are being conducted focusing upon cover crop termination timing, and planting methods intended to alleviate cover crop issues associated with corn seeding and establishment. Various cover crop grass and legume species and mixtures are being evaluated, including cereal rye, black oats, and berseem clover, based upon positive research, expert and NRCS recommendations, and plant characteristics capable of achieving objectives. These cover crops must effectively stabilize soil, produce supplemental biomass, enhance soil nutrition or health, and are adapted to Midsouth climate. The seeding method study will include strip tillage and other methods intended to relieve cover crop density and potential interference in the corn row. All studies will incorporate raised beds, which are very beneficial for corn establishment in our high rainfall climate, and are rarely evaluated in most cover crop research. Cover crop trials were established in the fall and are planted to corn and grown for performance evaluation. These studies assess factors which affect corn seedling establishment, growth and development, and ultimately corn productivity, compared to traditional production systems. These objectives comprise the research program of a MSU graduate student pursuing a Master's Degree in Agronomy.

Project Results

This research indicates cover crop termination timing has a dramatic impact on corn productivity when integrated with cover cropping systems. Various seeding methods affecting cover crop distribution, including strip tillage, had little influence on corn production systems. However, the presence of living cover crops stunted corn growth and development when they were not terminated by herbicides applied at least two weeks prior to planting. This interference reduced corn grain yield compared to where no cover crops were grown, or cover crops which were terminated at least four weeks in advance of planting. Results indicate these issues occurred due to abundant plant vegetation shading the soil, reducing soil temperature and promoting soil saturation, which stunted corn seedling establishment and early vegetative growth. Growing a well-adapted legume species as a cover crop, such as Berseem clover, did improve corn response compared to a monoculture cereal cover crop. Persian clover also demonstrated outstanding potential for use as a cover crop adapted to grow in Mississippi.



Cover crop termination timing relative to corn planting date dramatically affected productivity.

Project Impacts/Benefits

These findings indicate that growing cover crops can certainly hinder our ability to produce corn and implement early planting systems, if not managed appropriately. Abundant, lush vegetation produced by cover crops will shade the soil, restricting solar radiation from warming the soil, limiting planting opportunity and most importantly, impeding corn seedling establishment and growth. Thus, growers seeking to gain benefits associated with growing cover crops must use herbicides to terminate cover crops at least a couple weeks in advance of planting in order to maintain corn productivity associated with early planting systems tailored for high rainfall, southern climates.



Cover crops not terminated prior to planting can limit corn growth and productivity.



MS AGRICULTURAL AND FORESTRY EXPERIMENT STATION



EXTENSION