INFLUENCE OF COVER CROP AND N RATE ON YIELD AND PLANT NUTRIENT STATUS OF CORN

H.J. Mascagni, Jr. and J. Caylor

AUTHORS: LSU Agricultural Center Northeast Research Station, St .Joseph, LA 71366. Corresponding author: H.J. Mascagni (hmascagni@agctr.lsu.edu).

INTERPRETIVE SUMMARY

Corn acreage has increased in recent years in Louisiana. Some of this corn is grown on loessial silt loam soils of the Macon Ridge. These soils have low plant-available water due to a shallow rooting zone and low organic matter content. Rooting depth is limited by an argillic plow-pan and/or fragipan along with a very acid subsoil.

Although limited tillage research has been conducted in Louisiana, no-till and minimum tillage research for cotton on the alluvial clays of the Mississippi River and Macon Ridge have shown promise when compared with the more traditional tillage practices. The inclusion of winter cover crops in combination with conservation tillage was found to be an important component of the systems. Minimum-tillage systems reduce soil erosion, especially on the sloping silt loam soils of the Macon Ridge; increase soil organic matter; reduce soil moisture evaporation; and modify soil temperature. The use of a leguminous cover crop, i.e. crimson clover, contributes biologically fixed N, thus reducing the N fertilizer requirement and the potential for polluting ground water with nitrate-N.

Some of the water pumped from aquifers on the Macon Ridge has high salt content. The high salt content, in some years, may be detrimental to corn yield. This is borne out by a consistent relationship between yield and the quantity of imgation water applied, with lowest yield occurring in *dry* years when large quantities of water are applied. If cover crops enhance soil moisture, fewer irrigations may be required for maximum yield. This is not only important for soil moisture conservation but also will minimize the accumulation of salt in the soil profile.

An experiment was conducted in 1999 on a Gigger silt loam (fine silty, mixed, thermic Typic Fragiudalf) at the Macon Ridge Research Station near Winnsboro, LA, to evaluate the influence of cover crops, including a no cover crop control, and N rates on the yield performance of corn. The cover crops evaluated were wheat, Austrian winter pea, native vegetation, and a weed-free control. Nitrogen rates were 0,100, and 200 lb N/acre injected as 32% N-solution at the five-leaf growth stage. Cover crops were killed with herbicides approximately 3 weeks prior to planting. Pioneer hybrid 3167 was planted on April 14 at about 28,000 seed/acre. The experimental design was a randomized complete block with five replications. Grain yield and yield components were determined from each plot. SPAD (chlorophyll intensity) measurements were collected during early grain fill.

There was a significant cover crop by N rate interaction for yield. When no N was applied, yields were highest when corn followed the Austrian winter peas or weed-free control treatments. Yields for the wheat and native vegetation treatments were 45% lower compared with the Austrian winter peas and weed-free control. Yields among cover crop treatments were similar for the 100 and 200 lb/A N rates, with maximum yield occurring between 100 and 200 lb N/A. Yield responses were due to both increased kernel weight and increased number of kernels/ear. Differences in SPAD readings among treatments followed the same trends as yield responses, indicating that proper N nutrition is critical to performance of no-till corn following winter cover crops.