Evaluation of Cover Crop Nitrogen Calculator as an Adaptive Nitrogen Management Decision Support Tool

Cover crops can supply part of the nitrogen (N) needs of subsequent cash crops. However, predicting the amount of nitrogen mineralized or immobilized from decomposing cover crop residues has been difficult due to multiple interacting factors influencing residue decomposition rates. In our previous work, we have developed the Cover Crop Nitrogen Calculator (CC-NCALC)- a web-based decision support tool for predicting cover crop N credits or debits to the following cash crops. This present study aimed to evaluate CC-NCALC as an adaptive N management decision support tool in no-till corn production systems in middle Tennessee. Field experiment was established in a split-plot randomized complete block design with cover crops as the main plot factor and N rates as the sub-plot factor. Cover crop treatments consists of ; (a) winter fallow (control), (b) 100% cereal rye, (c) 100% crimson clover, and (d) a 50:50 rye-clover mixture. Each cover crop main plots were further split into three N sub-plots: zero, standard (202 kg N ha-1), and adaptive (i.e., standard N after accounting for cover crop N credits or debits) N rates. Cover crops are established using a no-till drill with appropriate seeding rates. Prior to termination, aboveground cover crop biomass were sampled and analyzed for carbon and nitrogen concentrations, as well as carbohydrate, holo-cellulose, and lignin content using near-infrared spectroscopy. Across all cover crop treatments, corn yield was significantly lowest in the zero N subplots. However, corn yields between standard vs adaptive N rates were not significantly different. These results provide evidence for tool's efficacy as an adaptive N management tool in cover crop-based no-till corn production systems.

Keywords: decision support tool, adaptive nitrogen management, cover crop nitrogen calculator, nitrogen credit and debit, cover crop nitrogen cycling