

ABSTRACT

THESIS: Soil Water Content and Corn Yield Response to Grass and Grass-Legume Mixture Winter Cover Crops in East Central Indiana

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Cover crops may be used as a management tool in modifying soil water content, helping lower agriculture's impact on water quality and lead to greater crop yields. During the 2012 growing season, a field study was conducted in Albany, IN to determine: 1) the impact of cover crops on soil moisture throughout the growing season and 2) cover crops' influence on corn (*Zea mays*) yield. Treatments of a monoculture of annual ryegrass (*Lolium multiflorum*) (AR), a mixture of annual ryegrass (*Lolium multiflorum*), crimson clover (*Trifolium incarnatum*), and groundhog radish (*Raphanus sativus*) (MIX), were compared with a no cover crop control (CTRL) in a randomized complete block design, with blocks positioned in moderately well drained (MWD) and poorly drained (PD) soils. Cover crop treatments were similar to each other in accelerating moisture removal before the corn growing season, resulting in soil profiles that were 47% drier in the MWD soil and 22% drier in the PD soil than controls. Abnormally hot and dry weather conditions made water availability a limiting factor and decreased the relative importance of soil nitrogen while corn was growing. In the MWD soils, corn grown after MIX treatments had 21% higher yields than CTRL treatments and 11% higher yields than AR treatments due to increased subsoil water usage. Corn grain yields in PD soils were related to surface moisture conservation, leading to 3-5% higher yields in MIX and AR treatments. Implications for improved field trafficability, reduced runoff and tile drainage flow, and enhanced water availability to crops are discussed.