



# Cover Crop Impacts on Soil Health Properties in Indiana

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Holland (Holly) is an ESE student in the Agronomy Department. She is originally from central Iowa. She attended Grinnell College for her undergraduate studies, where she double-majored in Biology and English. During her time as a graduate student at Purdue, Holland has served as the Agronomy Senator in the Purdue Graduate Student Government and a Graduate Justice on the Purdue Student Supreme Court. Upon graduating from Purdue, she plans to begin law school in the fall.

Across the Midwestern United States, an increasing number of agricultural producers are recognizing the importance of a healthy soil to profitable, sustainable cropping systems. In contrast to conventional tillage, no-tillage management has been shown to increase soil organic matter and build soil structure over time. Cover crops have shown promise as favorable additions to no-tillage systems. The use of cover crops can benefit soil health by enhancing soil organic matter, scavenging nutrients, building soil structure, and reducing the potential for soil erosion. Common concerns regarding the use of cover crops include N immobilization, prohibitive establishment costs, and lack of knowledge on proper management. The Conservation Cropping Systems for Soil Health and Productivity (CCSSHP) Project was initiated in the fall of 2012 and ended in the fall of 2015. This project sought to quantify the impacts of cover crops and no-tillage on the biological, chemical, and physical properties of soil health in Indiana. Seven field sites were established across Indiana, representing a range of soil types and topography. Three of the sites were based in Purdue University Agricultural Center Research Farms, and the remaining four were fields of farmer cooperators. Established in no-tillage corn-soybean (*Zea mays* L. – *Glycine max* L. Merr.) rotations, a variety of cover crop treatments were compared with no cover controls, as well as a conventional tillage to no-tillage comparison at one location. Measurements included cover crop above-ground biomass and biomass N, soil nitrate-N and ammonium-N, soil aggregate stability, soil penetration resistance, soil water retention, soil bulk density, soil moisture, soil temperature, and several cash crop parameters including yield. This thesis reports on the third year of data from the project. Given late cover crop planting in fall 2014, no differences in fall biomass production were observed among treatments. Spring biomass differences were attributed to cover crop treatment and the 2014 cash crop. Biomass amounts tended to inversely correlate to spring soil nitrate-N concentrations. Soil physical parameters tended to vary by depth but not by treatment, with nearly all differences occurring in the single tillage comparison as opposed to comparisons of cover treatment. Cash crop performance was not affected by cover crops in 2015. Results indicate longer-term research could lead to significant cover crop treatment effects on physical parameters associated with soil structure and texture.