INCREASING COVER CROP DIVERSITY AND WEED SUPPRESSIVENESS OF SOILS IN ORGANIC CROPPING SYSTEMS. Sam E. Wortman, John L. Lindquist, Rhae A. Drijber , Mark L. Bernards and Charles A. Francis, Graduate Student, Associate Professor, Professor, Assistant Professor and Professor, Department of Agronomy and Horticulture, University of Nebraska – Lincoln, Lincoln, NE, 68583-0915.

Many studies have demonstrated the weed suppressive potential and fertility contributions of individual cover crop species, but the value of diverse cover crop mixtures and soil biota have received less attention. The objective of this study is to determine the effects of cover crop diversity and termination method on weed populations, soil microbial community structure, soil nutrient availability, soil water content and grain yield in a certified organic cropping system. A split-plot RCBD field experiment was initiated in 2009 near Mead, NE. Spring-sown mixtures of 2, 4, 6 and 8 cover crop species were included in a sunflower – soybean – corn crop rotation. Cover crops were terminated in late-May using a field disk or sweep plow undercutter and summer annual crops were planted six days later. Cover crop or weed biomass/cover, soil nitrate and soil microbial communities were sampled three times throughout the season and soil water content was measured four times to a depth of 8 cm. Cover crop biomass was greatest in the 6 cover crop mixture (318 g m^{-2}) and lowest in the 2 cover crop mixture (114 g m^{-2}). Compared to the disked treatment, weed suppression and soil moisture were greater in response to the undercut treatment for cover crop termination. The increased level of weed suppression due to undercutting the cover crops may be explained by two possible hypotheses: 1) physical interference of residue reduced weed seed germination or 2) greater soil moisture increased the competitive advantage of the crop. Despite the use of many cover crop species with demonstrated allelopathic effects, the lack of weed suppression in the disked treatment indicates a lack of phytotoxic activity in the soil. Soil N levels did not affect weed suppression and the influence of the soil microbial community is currently being analyzed. Late in the growing season broadleaf weed cover was greatest in the weed/cover crop free control treatment (28.7%) and lowest in the 8 cover crop mixture (20.0%), indicating a general decrease in broadleaf weed cover as diversity of the cover crop mixture increased. Crop yield was reduced in the disked treatment presumably due to reduced levels of early-season soil moisture and weed suppression.

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