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Incorporating cover crops into organic dry bean production systems

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Michigan is the number one producer of organic dry beans in the nation. With the limited inputs allowed in organic systems, it is essential to maximize the potential benefit of cover crops for increasing weed control, nutrient availability, and ultimately crop yields. The aim of this research is to determine the effect of cover crops on weed suppression, nitrogen availability, and dry bean populations and yields in an organic system. To meet this goal, an experiment was conducted at the Michigan State University Student Organic Farm (East Lansing, MI) and at the Kellogg Biological Station (Hickory Corners, MI) during the 2010-2011 growing season. The cover crops studied included: medium red clover, oilseed radish, and cereal rye; a no cover treatment was also included. Within each cover crop treatment there were four bean varieties: 'Zorro' and 'Black velvet' black beans and 'Vista' and 'R-99' (non-nodulating mutant) navy beans. Weed management was uniform across the experiment following dry bean planting. Weed biomass and populations by species were recorded at two times, 1) V2 bean stage- after early season weed management was complete (i.e. tined weeding and rotary hoeing) 2) R5 bean stage- following final cultivation. Throughout the course of the experiment several methods were used to monitor nitrogen availability, including the use of a chlorophyll meter at numerous stages of bean development (V2, R1, and R5). Dry bean populations were recorded at the V2 stage and at harvest prior to taking yields. There was only a significant difference among covers for weed suppression at the V2 bean stage at the KBS location. Rye (2 kg ha-1) and radish (3 kg ha-1) provided greater weed biomass suppression than clover (23 kg ha-1); no cover (16 kg ha-1) fell in between. At both the V2 and R1 stages, bean chlorophyll florescence was highest in the beans following a clover cover crop, though the difference was not always significant. Beans following an oilseed radish cover crop had significantly higher populations than the no cover treatment at both the V2 stage (both locations) and at harvest (KBS only), with 14-35% more plants. At the Student Organic Farm, bean yields following oilseed radish were higher (2,700 kg ha-1), clover (2,300 kg ha-1), and no cover (2,200 kg ha-1) wgere higher than beans following rye (1,500 kg ha-1). These reduced yields could be the result of the rye reducing soil moisture early in the season and immobilizing nutrients. No differences in yield based on cover crop treatment were observed at the Kellogg Biological Station. Two more field seasons of this research are planned to clarify the impacts of cover crops on organic dry beans.

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