CHANGES IN WEED SEED BANK COMPOSITION AND DENSITY DURING TRANSITION TO ORGANIC PRODUCTION. Isabel Rosa and John B. Masiunas, Graduate Research Assistant and Associate Professor, Department of Natural Resources and Environmental Sciences, University of Illinois, 1201 West Gregory Drive, Urbana, IL 61801.

Farmers transitioning to organic production are concerned about the potential increase in weeds due to difficulties in management and poor soils. Prior to starting transition, many growers have relied on herbicides and have not developed the expertise to use tillage, cover crops, and rotations to suppress weeds. Increases in weed populations during transition can discourage new organic farmers, reduce income, and increase seed banks resulting in future weed management problems. Our research studied the emerged and seed bank weed populations during a four-year transition to certified organic production. Expert organic growers identified our treatments and provided ongoing advice on weed management strategies. We evaluated three management intensity systems combined with three soil improvement treatments as transition strategies. The high management system had a vegetable crop rotation (tomatoes, cabbage and broccoli, and winter squash). This represented a situation where the farmer had limited land and required a large income during transition. The medium management intensity system had an agronomic rotation (soybeans, wheat, and corn). This management system was a common system used by midwestern farmers transitioning to organic production. In the low intensity system we established a perennial ley (clovers, timothy, orchard grass, vetch) and manage it similar to CRP land. In the fourth year all management intensities were planted to tomatoes and peppers. The goal of the soil improvement strategies was to improve the soil characteristics, add organic matter, and supply nitrogen needed for crop growth. The soil improvement treatments were cover crops alone, cover crops and compost, and cover crops and manure. In 2003, the dominant weed species were grasses in the ley system; common lambsquarters and velvetleaf in the agronomic system; and lambsquarters, grasses, and foxtails in the vegetable system. In 2003, the ley system had the most weeds in subsequent years it had fewer weeds than other management intensities. The low weed populations were due to establishment of a vigorous mixture of perennial plants and lack of disturbance in the ley system. In the vegetable system, during the first year we used plastic mulch and straw to control weeds. The straw had seed, so volunteer wheat was a problem. In 2004 and 2005, the grain system had more weeds than the vegetable system. The higher returns for vegetable production allowed hand-weeding which likely reduced weed populations compared to the agronomic system. The effect of soil amendment varied depending on year. In 2004, there were more weeds in the manure amendment and in 2005 there were more weeds in the cover crop only amendment. Weed species composition changed depending on management intensity and year. Common lambsquarters became less frequent, mainly due to later plantings. Amaranthus species (primarily redroot pigweed) became more frequent. Common purslane, a problem weed of vegetables, first was found in Brassica vegetables in 2005. Weed species diversity in the seed bank increased between 2003 and 2005. Species composition of the seed bank was similar to the composition of the emerged weed community with the exception that seed from Amaranthus species were the most common. A managed ley system may be a method for land-rich farmers to transition to organic production without increases in weed populations.

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