

Dairy compost influence on weed competition and potato yield

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Dairy compost addition to cropping systems is thought to be a sustainable practice that will increase crop productivity by building soil organic matter and improving soil quality. However, the addition of compost may increase the competitive ability of weeds and reduce crop yield and quality. A field study was established in 2010 and repeated in 2011 at the Michigan State University Montcalm Research Center in Lakeview, MI, to investigate the effect of compost on weed competition in potato. Plots were established (6.1 x 3.4 m), and three rates of cured dairy compost (0 kg C ha⁻¹, 4000 kg C ha⁻¹, and 8000 kg C ha⁻¹) were applied and incorporated to a 10 cm depth in late April. In mid-May, four rows of 'Snowden' variety potatoes (*Solanum tuberosum*) were planted (27 cm seed spacing). Starter fertilizer rate was adjusted based on expected compost nitrogen (N) mineralization. Plots received three N applications in addition to the starter fertilizer applied at planting for a total of 205 kg N ha⁻¹. Plots were irrigated to maintain field capacity. Hairy nightshade (*Solanum physalifolium*), giant foxtail (*Setaria faberi*), or common lambsquarters (*Chenopodium album*) seedlings were transplanted into the center two rows at 5.3 weeds m row⁻¹ at the time of potato cracking. Plant height and biomass were recorded bi-weekly, and weed seeds were counted from four mature weeds per plot. Data was subjected to analysis of variance with significance determined at $\alpha=0.05$. Common lambsquarters produced more biomass than hairy nightshade or giant foxtail, and adding compost did not increase the biomass of any weed species compared to where no compost was applied. Common lambsquarters reduced potato yield by 30-50%; whereas giant foxtail and hairy nightshade reduced potato yield by 5-20%. Adding 8000 kg C ha⁻¹ of compost increased total and marketable tuber yield by 15% when compared to the non-amended treatment, regardless of weed competition in 2010. In 2011, yield did not differ because of compost rate. There were 300 fewer growing degree days accumulated in 2011 (base 4 C). In 2010, under more ideal growing conditions, the 8000 kg C ha⁻¹ compost supplied more potassium than the other treatments, and lower potassium levels may have limited tuber yield at 0 and 4000 kg C ha⁻¹ compost. Soil volumetric water content, measured in 2011, was not influenced by compost addition; moisture holding capacity of the soil was not affected in the year of application. In conclusion, compost added to a potato production system did not affect the competitiveness of summer annual weeds in the year of application. Compost may increase potato yield by providing additional nutrients, including potassium and nitrogen.

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