

Regional Feedstock Partnership Highlights—Miscanthus

Established in 2008 in Urbana, Illinois; West Lafayette, Indiana; Lexington, Kentucky; Mead, Nebraska; and Adelphia, New Jersey, this trial is evaluating *Miscanthus x giganteus*, a sterile hybrid grass having *M. sinensis* and *M. sacchariflorus* as parents. This study determines the effect of three different spring nitrogen treatments on biomass production, soil organic matter, and inorganic N leaching at five sites in the eastern U.S., and N₂O and CO₂ emissions at one site (Illinois).

Productivity: A native of Japan, *Miscanthus x giganteus* can be highly productive in the east central temperate U.S. Over the 2009-12 growing seasons, biomass productivity has been related to water availability (Table 1); other than in VA, *Miscanthus x giganteus* yields in 2012 dropped due to dry conditions. Yields in VA increased due to being planted in 2010. There were no N fertilizer effects in KY, NE, NJ, and VA in 2012. There were N fertilizer effects in 2012 in IL, however, as the plots receiving 0 kg N ha⁻¹ produced significantly less biomass than the plots receiving 60 kg N ha⁻¹ or 120 kg N ha⁻¹.

Sustainability Results: Fertilizer treatments did not affect CO₂ flux during the five years of measurements at the Illinois site. From 2010 on, N₂O emissions were greater on the fertilized plots. During the 2012 and 2013 growing seasons, potentially mineralizable N was found to increase across all fertilizer treatments and sites in the 0 – 10 cm soil depth. Inorganic N leaching (at 50 cm depth) was significantly greater in fertilized plots compared to the unfertilized plots every year after 2009 in Illinois and across all sites in 2012. The 120 kg N ha⁻¹ plots had the greatest nitrate leaching (ranging from 10 to 39 kg N ha⁻¹ yr⁻¹). Overall, from 2009-2012, N fertilization of *M. x giganteus* increased environmental losses of N through N₂O releases, increased fluxes of inorganic N (primarily NO₃⁻) through the soil profile, and increased harvested N without a significant increase in biomass production at any site except IL in 2012.

Location	2009	2010	2011	2012
Nebraska	15.6	27.4	31.2	23.7
Illinois	3.0	15.6	20.6	10.0*
Kentucky	17.1	19.0	19.0	12.8
New Jersey	16.9	9.7	18.6	15.9
Virginia	-	-	9.4	16.7

Table 1. 2009-2012 *Miscanthus x giganteus* Yields (Dry Mg ha⁻¹). Yields are averaged across all N fertility levels.



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