



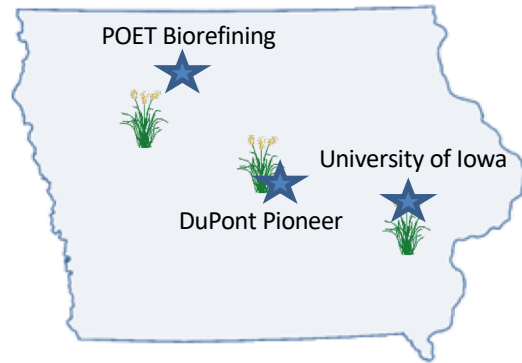
Long-term Assessment of *Miscanthus* Productivity and Sustainability



What? LAMPS is a multi-site, replicated **chronosequence** field trial investigating the effects of stand age and nitrogen fertilizer on *Miscanthus* (*Miscanthus x giganteus* 'Freedom').

When? Randomized, replicate blocks of *Miscanthus* were planted in three consecutive years (2015-2017) in this **chronosequence** experiment, thus allowing investigators to consider stand age independently of growing season.

Where? In order to gain as much regional experience as possible, there are LAMPS locations (🌿) in Northwest, Central, and Southeast Iowa. These areas also correspond to **emerging bioeconomies** (★) and processing facilities.



LAMPS replication 1 (of 4)

Plot1	Plot2	Plot3	Plot4	Plot5	Plot6	Plot7	Plot8	Plot9	Plot10	Plot11	Plot12	Plot13	Plot14	Plot15
Corn														
100	300	300	0	200	300	0	300	200	100	300	200	400	0	100
lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac
2015 - Old					2016 - Mid					2017 - Young				
100	300	400	0	200	400	0	300	200	100	300	200	400	0	100
lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac	lb/ac

One of four blocks of the LAMPS design (above). Nitrogen fertilizer (5 rates; 0-400 lbs/ac; 300 lbs/ac max in the corn) are applied to corn and *Miscanthus* each spring. **Corn** is planted annually, while *Miscanthus* was planted in 2015 (old), 2016, (middle), and 2017 (young).

Why? *Miscanthus x giganteus* has been shown to **yield** 2-3 times more than switchgrass, and as a perennial, it does so with **minimal inputs (e.g. fertilizer)**. Although *Miscanthus* is a bioenergy crop frontrunner, we highly recommend a **diverse portfolio** of crops and fuels.



LAMPS

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Impacts and Activities

Emerging bioeconomy

Miscanthus growing on >1,100 (With an eventual goal of 2,500) Iowa acres is set to supply 10% of **University of Iowa** energy by 2020, offsetting fossil purchases and keeping **\$10 million/y** in Iowa. LAMPS is specifically designed to answer the questions stakeholders **need to know**.



Research

focuses on *Miscanthus*:

- productivity
- nutrient cycling
- landscape integration
- [soil and water quality](#)
- Economics
- Life-cycle and technoeconomic analysis.



Training students and public outreach is a major part of LAMPS. To date, LAMPS has been a part of >25 students' training, and has been the subject of >50 outreach events.

Supporting sustainable communities

By burning Miscanthus instead of coal the UI will annually:

- Keep **\$10 million in Iowa** by buying biomass instead of out-of-state coal
- Reduce **nitrate leaching and soil loss by ~90%** while building soil and providing wildlife habitat
- **Provide farmers ~\$200/acre**, similar to Conservation Reserve Program (CRP payments)
- **Directly displace >50,000 tons of fossil CO₂**, (>20 tons CO₂ per acre from >4 tons coal per acre)



Who?

Led by **Iowa State University** with partners AgGrow Tech and the **University of Iowa**, the LAMPS team is working to inform and improve *Miscanthus* management and productivity (Dr. Emily Heaton), investigate perennial nutrient cycling (Dr. Ashley Keiser), model ecosystem impacts of *Miscanthus* production (Dr. Andy Vanloocke), quantify the soil fertility benefits of *Miscanthus* (Dr. Marshall McDaniel), and analyze greenhouse gas emissions changes between annual and perennial cropping systems (Dr. Steven Hall).