U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

BIOENERGY TECHNOLOGIES OFFICE

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

Purpose-Grown Bioenergy Crops, Switchgrass & Miscanthus Biomass Yield, Carbon Storage, and Nutrient Dynamics

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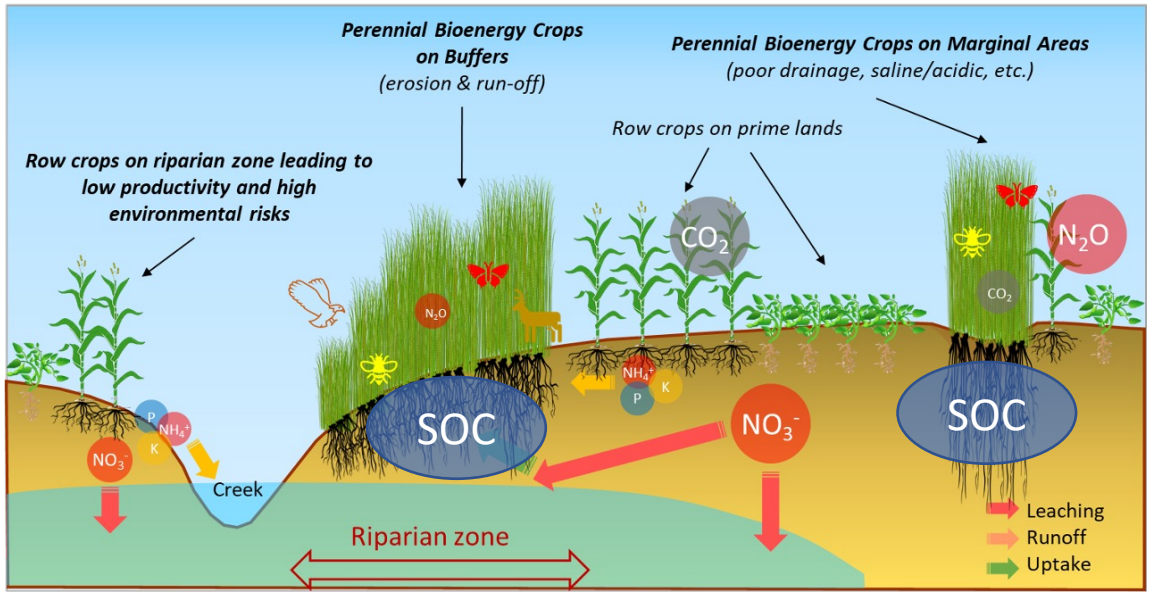
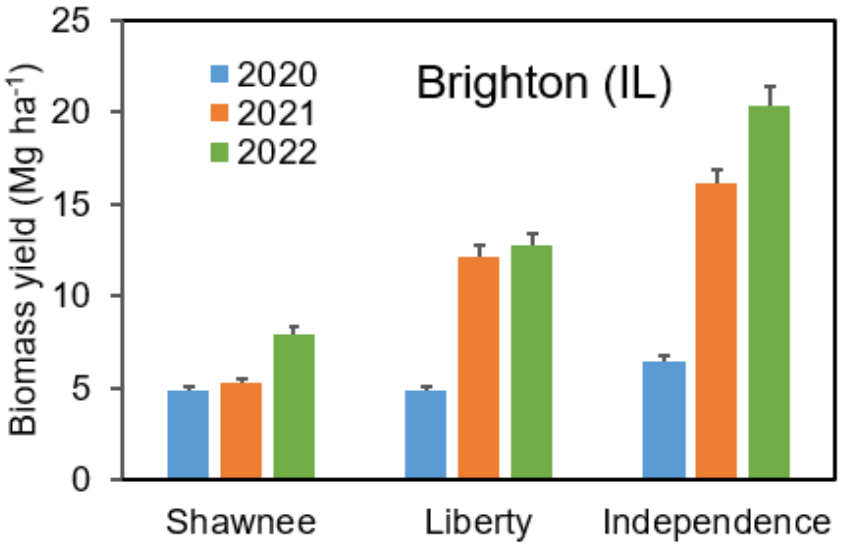
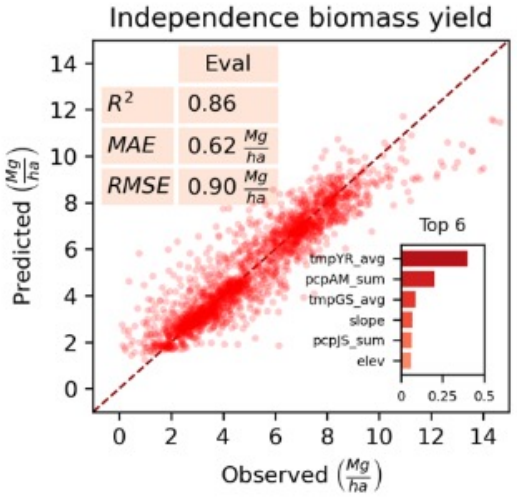
Workshop of Deploying Purpose-Grown Energy Crops for Sustainable Aviation Fuel
Kansas City, Missouri
June 6-7, 2023

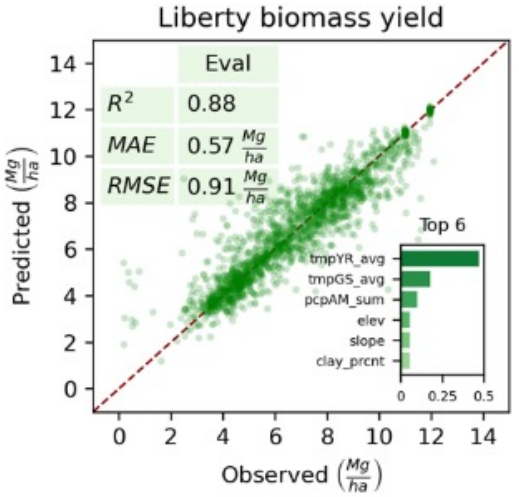


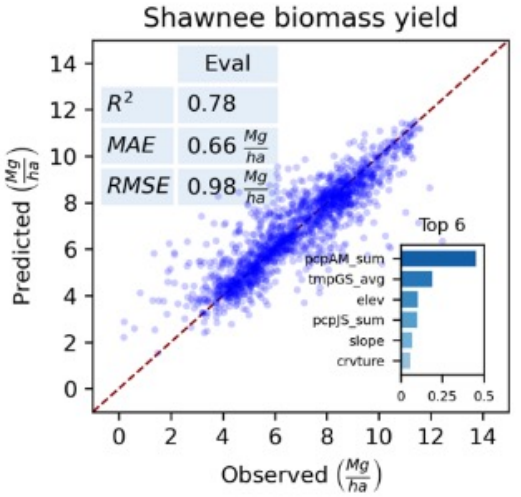
Next-Generation Feedstock for the Emerging Bioeconomy supported by DOE-BETO ASEC Program

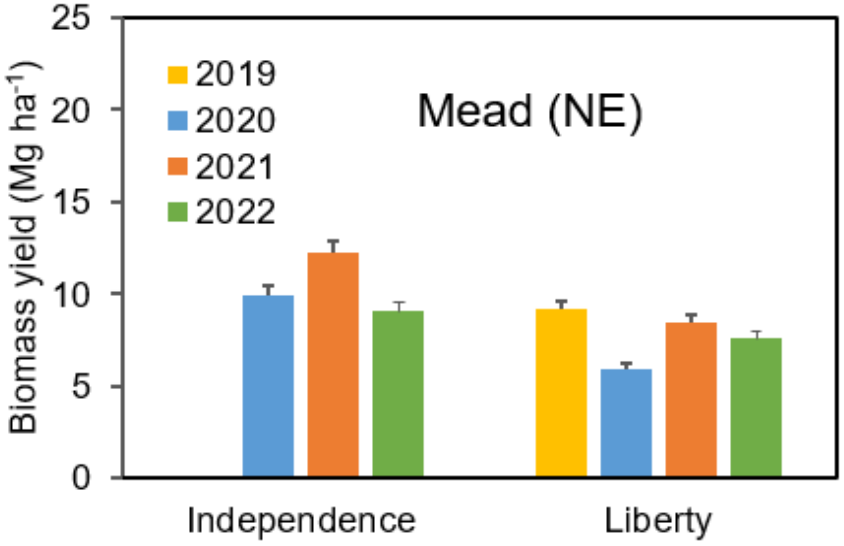
Purpose-Grown Energy Crops; Biomass Yield





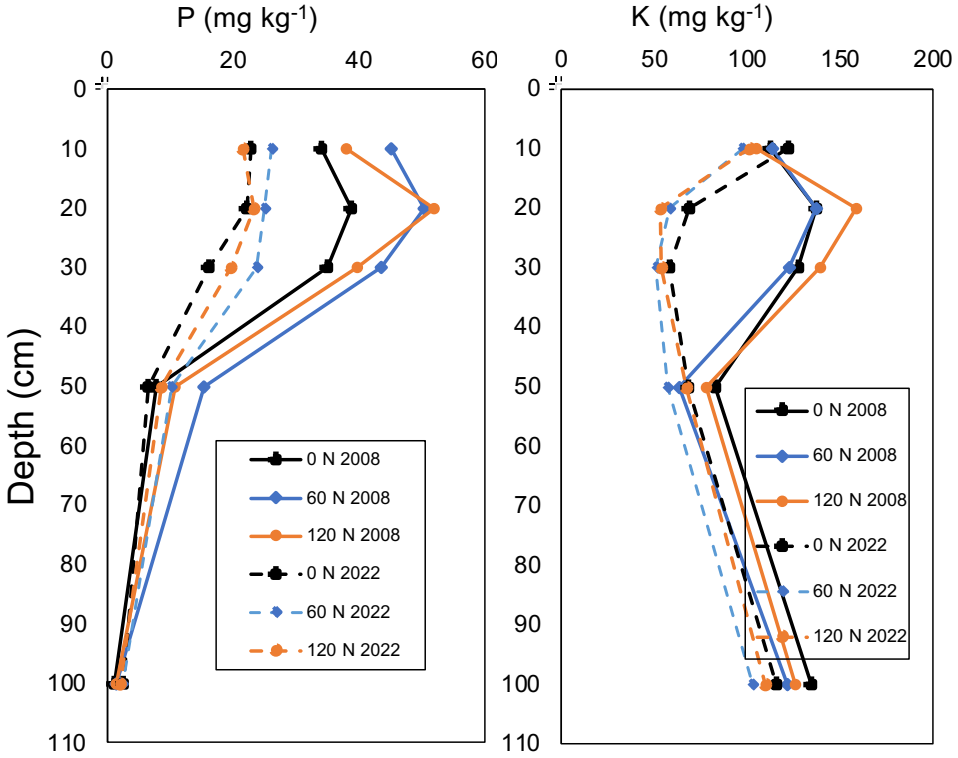


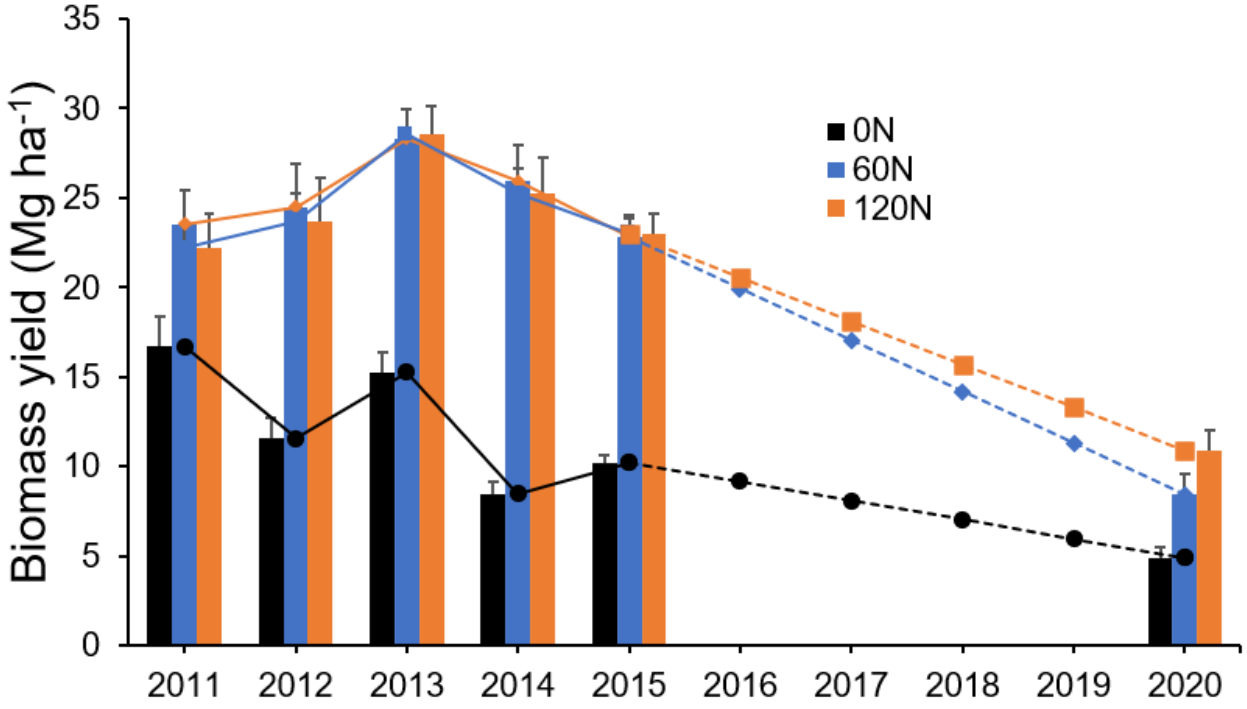


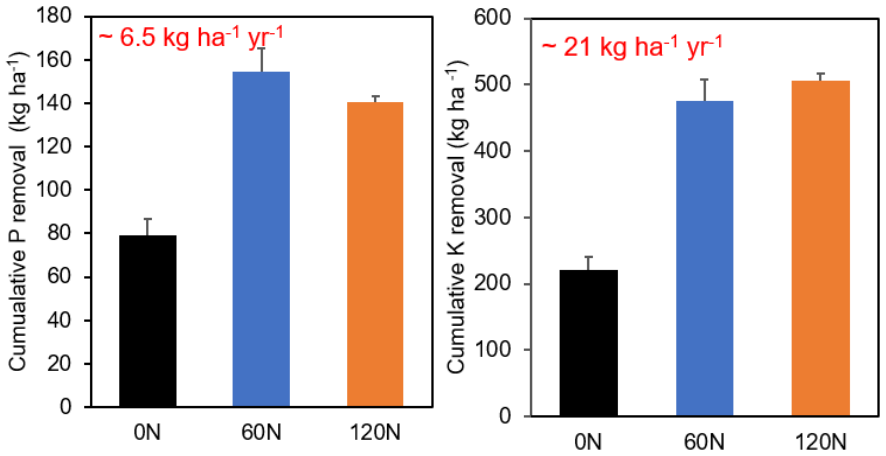


- Biomass yield is the key aspect of sustainable energy production; high-yielding cultivars and better agronomic management practices are important factors in biomass yield.
- Biomass yield prediction and potential supply forecasting are necessary steps for sustainable biorefinery.

Purpose-Grown Energy Crops; Nutrient Dynamics

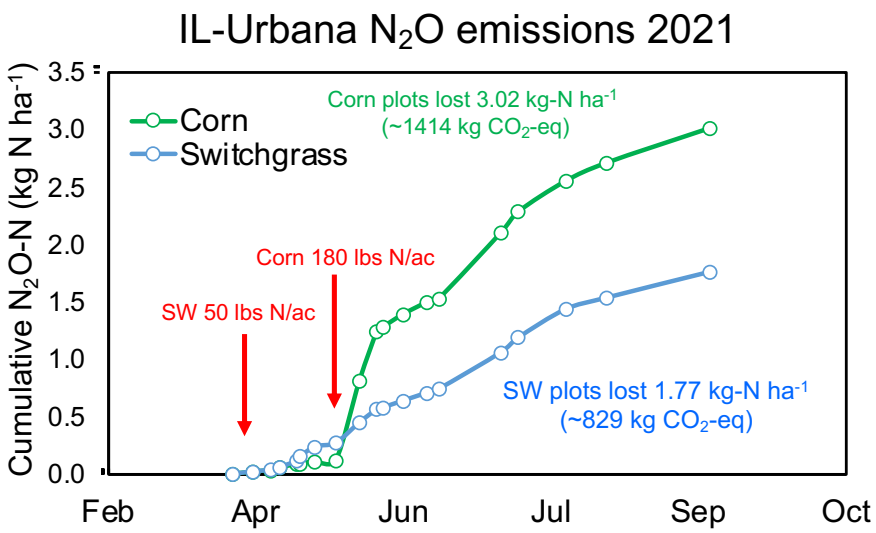


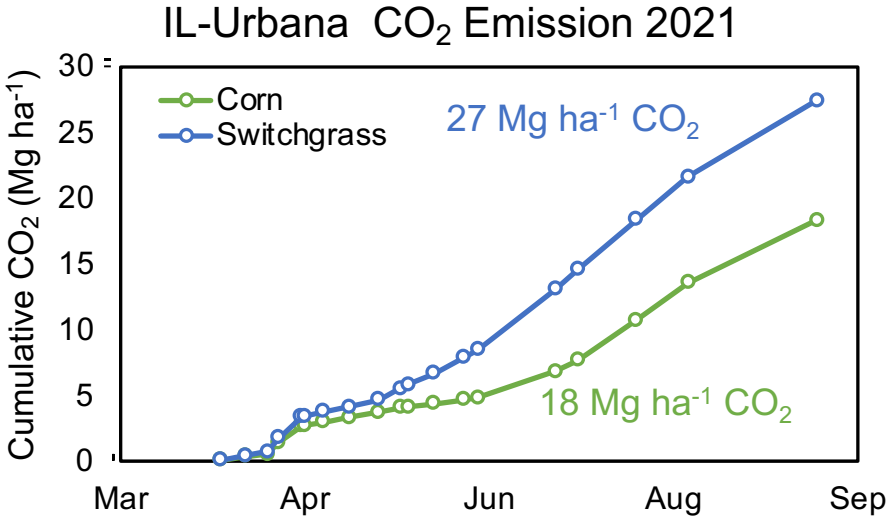


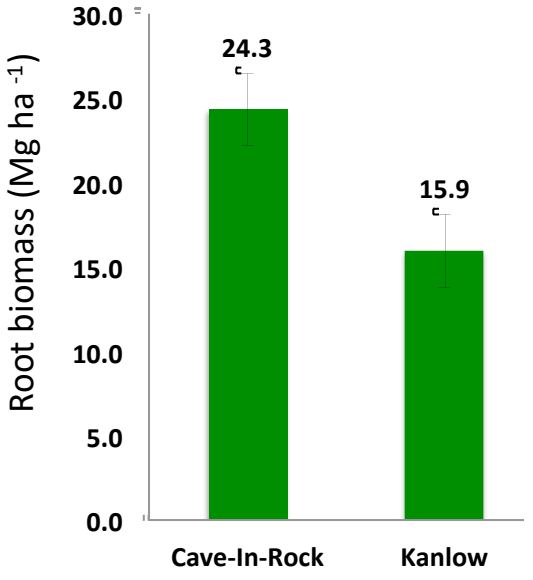


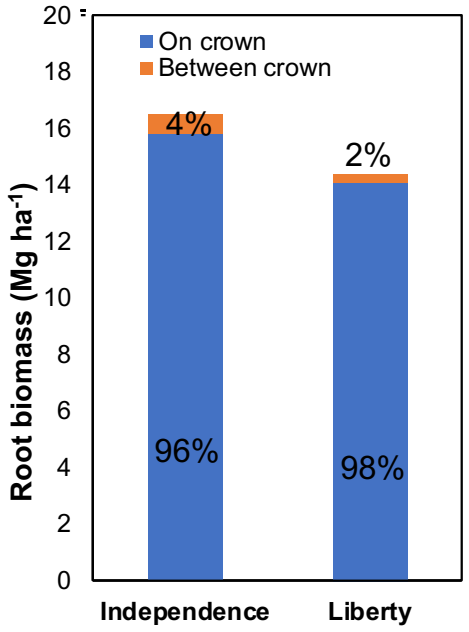
- Miscanthus biomass yield declines over time without N fertility management.
- The so-called “aging effect” in perennials is largely driven by P&K deficiency.
- Soil fertility management is a critical factor for sustainable biomass production of Purpose-Grown Energy Crops.

Purpose-Grown Energy Crops; Carbon Storage









Total root biomass production potential at 15 cm soil depth. Switchgrass contributes >10 Mg ha^{-1} of C to the soil in 3 years.

- Switchgrass had lower soil N_2O emissions compared to corn during the growing season.
- Growing season soil CO_2 emission was higher in the switchgrass production system than in the corn production system.
- Soil CO_2 emissions are the sum of heterotopic respiration (SOM mineralization) and autotropic respiration (root respiration).