

Public Abstract

First Name: Michael

Middle Name: Joseph William

Last Name: Maw

Adviser's First Name: Felix

Adviser's Last Name: Fritschi

Co-Adviser's First Name:

Co-Adviser's Last Name:

Graduation Term: SS 2013

Department: Plant, Insect and Microbial Sciences

Degree: MS

Title: MANAGING SWEET SORGHUM FOR OPTIMUM ETHANOL YIELD IN MISSOURI

Sweet sorghum has the potential in Missouri for production as a biofuel feedstock, but little is known of the crop's yields and appropriate nitrogen management for optimizing ethanol yields. This thesis is a collection of three field studies examining the potential for sweet sorghum (*Sorghum bicolor* (L.) Moench) to be adopted as a biofuel feedstock for ethanol production in the Midwestern U.S. Limited research exists examining the optimum nitrogen fertilizer rate for maximum ethanol yields as well as sweet sorghum's adaptability to the lower Midwestern states. N fertilizer treatment mostly increased yields. The optimal range for N fertilizer rates was between 112 and 168 kg N ha⁻¹. Nitrogen treatment significantly affected plant N concentration and N content. Greater yields resulted in greater N recovery efficiency but did not always result in greater N-use efficiency. The optimum range for highest nitrogen recovery and use efficiencies was identified as 0-112 kg N ha⁻¹. Sweet sorghum ethanol yields were greater than maize yields across sites, but the soil carbon similarly decreased regardless of crop and location. Sweet sorghum is a high-yielding biomass feedstock that shows promise for production in Missouri, especially in marginal lands. With proper nitrogen fertilizer management sweet sorghum is shown to be an efficient plant for ethanol yield, but it may negatively affect soil organic carbon following land-use changes for biofuel production.