

THE EFFECTS OF PHOSPHORUS AND POTASSIUM APPLICATION ON A 14-YEAR-OLD *MISCANTHUS × GIGANTEUS* STAND

A. Larson, E. Heaton, M. McDaniel, J. Studt, N. Boersma, and A. VanLoocke
Iowa State University, Ames, IA
ashtonl@iastate.edu (641) 344-1314

ABSTRACT

Miscanthus × giganteus (miscanthus) is a perennial C4 grass grown for renewable bioenergy and bioproducts. While miscanthus is often considered to have low nutrient requirements, the need for fertilization remains poorly understood, particularly in mature stands. This study aims to provide insight by evaluating for potential phosphorus (P) and potassium (K) limitations in a 14-year-old miscanthus stand in central Iowa that had received no prior fertilization. The experiment followed a randomized complete block design with four blocks and plots measuring approximately 800 ft². Treatments included fertilization of P (100 lb/a), K (130 lb/a), and combined P+K, with all plots receiving nitrogen (N) at 200 lb/a to eliminate potential N limitation. Baseline soil testing showed low to moderate P (5–13 ppm) and K (73–181 ppm) levels, and pre-treatment measurements of stem height, density, and yield revealed positive correlations between soil nutrient levels and biomass production, with K showing a slightly stronger relationship. In response to fertilization, P did not significantly increase soil test P ($p = 0.33$) or plant tissue P concentrations among treatments ($p = 0.193$). This suggests poor incorporation or rapid fixation of applied P. Conversely, K application led to significantly higher soil test K ($p < 0.001$) and plant tissue K ($p = 0.038$), though without corresponding yield increases indicating sufficient baseline K and possible luxury uptake. Average yield increased across all plots post-treatment, including controls, likely due to N fertilization or favorable weather. This work contributes to a deeper understanding of nutrient requirements in mature miscanthus and will enhance the ability to make informed fertilization recommendations.