

EFFECTS OF BIOCHAR ON YIELD AND NITROGEN NUTRITION OF WARM-SEASON BIOMASS GRASSES

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ABSTRACT

Switchgrass, big bluestem, and Indian grass are perennial (C₄) warm season grasses that are desirable as biomass energy crops which are grown in marginal lands. Biochar is a carbon-rich material which is used as an organic soil amendment. The hypothesis tested was biochar application with N fertilizers to low fertile marginal sandy soils will increase the biomass yield of warm-season grasses. Two greenhouse experiments were conducted in 2014 and 2015. The experimental design was randomized complete block design (RCBD) with four blocks. In the first study, potting media was prepared by homogenously mixing 25% sand and Promix[®] starter mix, with relevant rates of biochar (0, 5, 20, 35 Mg ha⁻¹) while 90% sand was used in the second study. Nitrogen (NH₄NO₃) application rates were 0, 60, 120, 180 kg N ha⁻¹. Above and belowground biomass, net photosynthetic rate, and plant available water of potting media were measured. Biochar by nitrogen interaction effect was not significant for aboveground biomass, root:shoot ratio and photosynthetic rate of any of the grass species in both years. Interaction effect was significant for belowground biomass of switchgrass in 2014 where 20 Mg ha⁻¹ biochar and 60 kg N ha⁻¹ resulted the highest belowground biomass. Further studies should include field experimentation in marginal sandy soils to explore the sustainability of using biochar as a soil amendment for herbaceous biomass production.

Key words: Big bluestem, biomass energy, Indian grass, marginal sandy soils, switchgrass