NITROGEN AND HARVEST IMPACT ON BIOMASS YIELD OF PERENNIAL WARM-SEASON GRASSES

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ABSTRACT

Uncertainties of the supply of fossil fuels from finite resources and the negative environmental impacts of their use are the two major driving forces for the search of alternative burning fuels. Perennial warm-season grasses have drawn interest as bioenergy feedstocks due to the high yielding capacity with minimal amounts of inputs under a wide range of geography, and the capability to produce multiple environmental benefits. Nitrogen (N) fertility and harvest management are considered as critical practices when optimizing the biomass yield and the feedstock quality of these grasses. Evaluation of the impact of N fertilizer rate and timing in combination with the harvest date on biomass dry matter yield (BDM) was the objective of this research. This research was conducted on four field sites located in central and west-central Missouri. Dry ammonium nitrate was used as the N fertilizer and applied at the rates of 0, 34, 67, and 101 kg ha^{-1} at two application times, all N early spring and split N (early spring and following 1st harvest). Four harvest treatments as follows: 1) one cut in September; 2) one cut in November; 3) one cut in June and a second in September; and 4) one cut in June and a second in November. These treatments were arranged in a split-plot design with N treatment as the main plot and harvest date as the sub-plot in a randomized complete bock design. Effect of the gravest date on the BDM yield was significant for all four sites, but in a different way. One harvest in November produced the greatest BDM yield at two sites while June + November harvest strategy for the remaining sites. Split application of N at the rate of 101 kg ha^{-1} resulted in the highest BDM yield in all locations. Interaction effect of N rate and harvest date was location dependent. Results of this research suggest that the management of both N fertility and harvest need to be considered simultaneously for optimizing the biomass yield of perennial warm-season grasses grown as bioenergy feedstocks.

Keywords: bioenergy, feedstock, nitrogen fertility

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