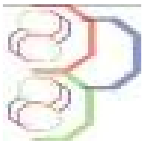

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Mycorrhizal Enhancement of Biomass Productivity of Big Bluestem and Switchgrass in Neutral and Acidic Substrate

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ABSTRACT

Objectives: Greenhouse pot studies were conducted to assess the abilities of two arbuscular mycorrhizal fungi (AMF) namely, *Rhizophagus clarus (Rc) and R. intraradices (Ri)* to enhance biomass productivity of big bluestem (*Andropogon gerardii*), as a complementary bioenergy feedstock to and switchgrass (*Panicum virgatum*).

Methodology and results: Big bluestem (BB) and switchgrass (SG) were grown in a soilless substrate adjusted to pH=6.5 or 4.5 and inoculated separately with *Rc* and *Ri*. Plants were grown in the greenhouse for 12 weeks. Results show that AMF significantly enhanced biomass productivity of the grasses over corresponding controls, regardless of pH. Substrate inoculation with *Rc* produced the highest and similar total BB biomass at pH=6.5 and 4.5. However, biomass partitioning into shoot and root differed with pH. Inoculation with *Ri* produced the highest and similar total SG biomass at pH=6.5 and 4.5. SG biomass was more equally distributed at both pHs.

Conclusion and application of findings: Differences in substrate partitioning into shoot and root biomass shown by *Rc*-inoculated BB at 4.5, appeared to be consistent with *Rc* endowing BB the capacity to maintain both relatively high shoot as well as root biomass at pH=4.5. This pattern of substrate partitioning was not shown by *Rc*- or *Ri*-inoculated BB grown at pH =6.5, or *Ri*-inoculated BB grown at pH=4.5. Neither was the pattern shown by *Rc*- or *Ri*-inoculated SG, which maintained relatively similar R/S ratios regardless of pH. The usual biomass partitioning by BB at pH=4.5 deserves further investigation. Different patterns of biomass partitioning notwithstanding, results of this study strongly suggest that BB could complement SG, the model biofuel feedstock, especially under acidic substrate conditions.

Key words: Big bluestem; switchgrass; biofuel feedstock; arbuscular mycorrhizae, substrate acidity.