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Impact of agronomic treatments on fuel characteristics of herbaceous biomass feedstock for potential combustion

Hilla Kludze
University of Guelph, Canada

Miscanthus and **switchgrass** are two perennial grasses with the potential to replace coal in generating heat and electricity. Agronomic management practices such as nutrient fertilizer applications are required for crops to grow and thrive. However, some of the nutrients essential for biomass growth are also highly undesirable in the combustion process. A field-plot study was conducted to evaluate the impact of agronomic treatments on the quantitative fuel properties of the two grass species. Biomass samples were analyzed in the laboratory in terms of proximate analysis, ultimate analysis, gross calorific values and elemental ash composition according to ASTM standards. Empirical indices were used to characterize samples for their potential to impact combustion quality as a function of the agronomic treatments. Combustion indices were calculated to estimate slagging, *fouling* and *bed agglomeration* potential of treatment biomass samples. Ash content was significantly affected by crop species and harvest time (α=0.05). Delayed harvest in the spring resulted in significant reduction of ash content in the two species. Potassium (K) was the only ash mineral that was significantly reduced as a result of delayed harvesting; reduction in other ash minerals was varied. N-fertilization tended to increase combustion indices, suggesting improvement in biomass combustion quality when there is minimal fertilization for both plant species. More studies are needed to find alternative technologies to leach out other undesirable ash chemical constituents that adversely impact thermochemical combustion. The study provides a better understanding of how fuel properties of *Miscanthus* and switchgrass may be affected by agronomic practices.

Biography

Hilla Kludze received his Ph.D. from Louisiana State University (LSU), USA, and an MBA from Memorial University of Newfoundland (MUN), Canada. He worked in several research and academic institutions including LSU, USDA-ARS and IRRI; he is currently a researcher at the University of Guelph, Canada. She is a specialist in agricultural biomass and biogas production systems and technologies, environmental sustainability and impact assessment of biomass production systems, redox chemistry and biogeochemical cycling of elements under anaerobiosis, and bioenergy product and market development. He has several published papers to his credit in reputable journals and books.

hkludze@uoguelph.ca