Switchgrass Management:Variety Selection, Fertility, and Harvest Time

L. Gorlitsky, S. Herbert, M. Hashemi, R. Prostak, and S. Weis

Switchgrass (*Panicum virgatum* L.) is a native warm-season, perennial grass. The plant produces large volumes of biomass and its high cellulosic content makes switchgrass a potential feedstock for ethanol production as well as a combustion fuel source for industrial and residential heat. Its production requires relatively low inputs of fertilizer and management, and therefore switchgrass has been considered for biofuel production on marginal lands and for use on Conservation Reserve Program (CRP) land in the more erodible regions of the tall-grass prairie states. Compared to annual cropping in these areas, switchgrass for biofuel could increase the ecological sustainability of erodible land while lowering the cost of land care.

Switchgrass grows well in fine to coarse textured soils, and in regions where annual precipitation falls between 15 and 30 inches or more per year. In general, differences between ecotypes have been related to local soil and climatic characteristics, with eastern and southern varieties adapted to higher moisture conditions, and western and northern varieties adapted to drier conditions.

Switchgrass once established grows back each year after harvest, and can be harvested for many years when sustainable methods are employed to manage, harvest, and process the crop. Switchgrass has an extensive root structure, which aids its survival during winter months and regrowth in the spring-early summer. Field Studies have been conducted since 2006 at UMass Crop and Animal Research and Education Center Farm in South Deerfield, MA. An extension of the first study and a new study in 2009 evaluated harvest and nitrogen fertilizer management.

Treatments: Varieties: Blackwell, Carthage, Cave-in-Rock, Shawnee, Shelter (September 2 harvest)
Nitrogen Application Rate: 0, 60, 120 lb/ac (August 27 harvest)
Time of Harvest (Non-structural Carbohydrates): August and November

Partial results obtained from these studies indicated:

- Yield comparisons of varieties showed that Cave-in Rock had the greatest yield in September 2009 (Figure 1) whereas in previous years Shawnee had the highest yield.

Switchgrass growing in South Deerfield MA.

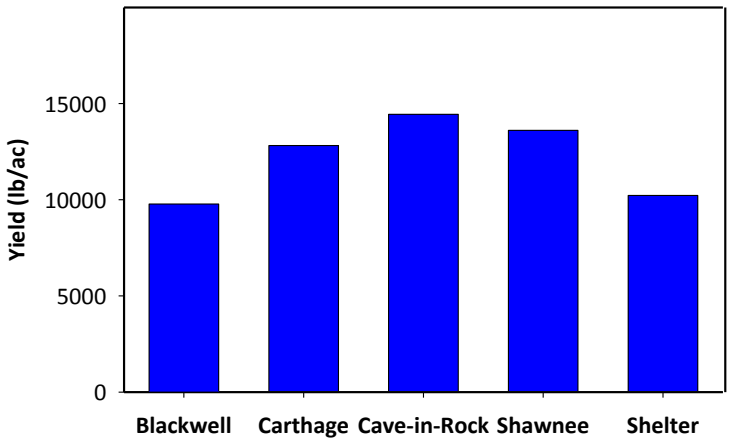

Figure 1. Yield (pounds/ acre) comparison of switchgrass cultivars.

- Increased nitrogen application did not significantly increase switchgrass yield (Figure 2). This study will continue and allow a longer term evaluation of nitrogen response.

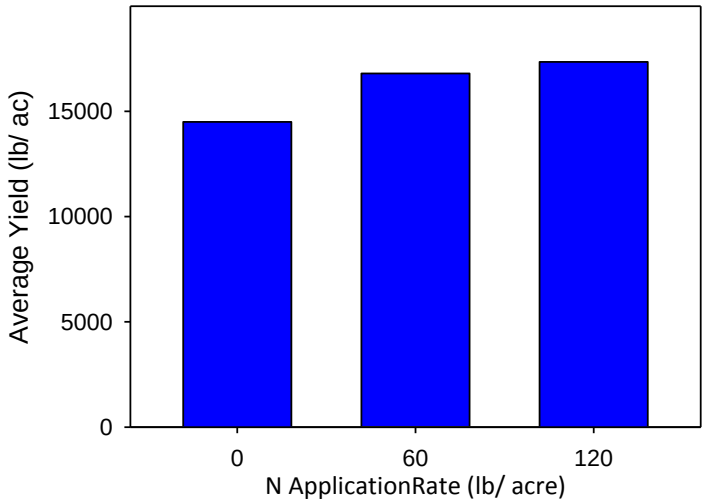

Figure 2. Effect of N Application Rate on Switchgrass Yield.

- Harvest time affected carbohydrate reserves. Sucrose levels nearly doubled between August and November harvest, indicating that the plant was storing Non-structural Carbohydrates for the winter (Figure 3).

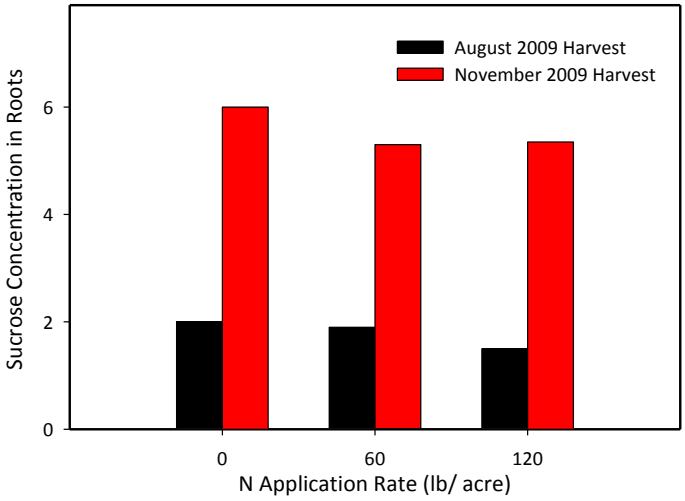

Figure 3. Influence of N fertilization and harvest date on root sucrose concentration of Cave-in-Rock cultivar.