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Switchgrass for Biomass Feedstock in the USA

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Research Project: [Biodiversity Management in Northeastern Grazing Lands](#)

Location: [University Park, Pennsylvania](#)

Title: Switchgrass for Biomass Feedstock in the USA

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Interpretive Summary: Switchgrass has received much study for biomass feedstock production and conversion through research funded by the US-DOE and USDA during the past two decades. We have an improved understanding of the adaptation of existing cultivars and new cultivars with yield and adaptation improvements are now appearing. We also have a good understanding of the agronomics of switchgrass production, mainly from its use as a forage crop. There remain several constraints to switchgrass use in bioenergy cropping systems, including reliable establishment methods to obtain productive stands in the first year, targeted fertilization and nutrient management techniques to efficiently use nitrogen fertilizer, and highly efficient methods to convert biomass to ethanol and other products. Current plant science research on the genetics, breeding, and molecular biology of switchgrass will result in switchgrass plants with improved yield, greater establishment ability, and altered cell-wall properties for more efficient conversion. To realize the potential of these improved populations, teams of scientists, extension staff, and producer-cooperators in key agro-ecoregions are critically needed to develop profitable management practices for the production of biomass feedstocks appropriate to those agro-ecoregions.

Technical Abstract: Switchgrass (*Panicum virgatum* L.) has been identified as a model herbaceous energy crop for the USA. Intensive research on switchgrass as a biomass feedstock in the 1990s greatly improved our understanding of the adaptation of switchgrass cultivars, production practices, and environmental benefits. Several barriers remain to economic production of switchgrass for biomass feedstock including reliable establishment practices to ensure productive stands in the seeding year, efficient use of fertilizers, and more efficient methods to convert lignocellulose to biofuels. Overcoming these barriers will require basic and applied genetic, molecular biology, and plant breeding research to improve switchgrass cultivars. New genomic resources that are in the pipeline will aid in developing molecular markers, and should allow for marker-assisted selection of improved germplasm in the near term. Research is also needed on profitable management practices for switchgrass production appropriate to specific agro-ecoregions and

breakthroughs in conversion methodology. Higher costs of biofuels compared to fossil fuels may be offset by accurately valuing environmental benefits such as reduced runoff and erosion and associated reduced losses of soil nutrients and organic matter, increased incorporation of soil C, and reduced use of agricultural chemicals. Use of warm-season perennial grasses in bioenergy cropping systems may also mitigate increases in atmospheric CO₂. Teams of scientists, extension staff, and producer-cooperators in key agro-ecoregions are critically needed to develop profitable management practices for the production of biomass feedstocks appropriate to those agro-ecoregions.

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