Title: Sustainable Herbaceous Energy Crop Production in the Southeast United States

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Abstract: This proposal develops a comprehensive assessment of economic viability and environment sustainability of producing advanced energycane and biomass sorghum in the southeast United States. This project will leverage knowledge/products developed as part of the Sun Grant Regional Feedstock Partnership, address the impact of opportunities outlined in the *2016 Billion Ton Report*, and fill the knowledge gaps on economic viability and environment sustainability. The overall goal of the proposed research is to optimize sustainable biomass supply from energycane and biomass sorghum over the diverse edaphic and climatic environments in the southeast United States. The specific objectives are:

1. *Characterize the seasonal dynamics of biomass production of energy crops in multiple edaphic and climatic environments*
   1.1. Quantify seasonal biomass production and composition quality
   1.2. Determine the effect of storage methods and durations on biomass quantity and quality
2. *Quantify the impact of energy crop production on environmental sustainability in agricultural and marginal lands*
   2.1. Determine carbon sequestration and greenhouse gas emissions
   2.2. Quantify soil nutrient loss, water quality, soil erosion and soil quality
   2.3. Quantify the biodiversity of soil microbes and aboveground invertebrates
3. *Develop site-specific best management practices to optimize biomass production, harvest and storage*
   3.1. Conduct economic analysis of biomass production, harvest and storage
   3.2. Assess life-cycle carbon footprint from biomass production, harvest and storage
   3.3. Assess the ecosystem services from energy crop production
   3.4. Identify site-specific best management practices derived from economic and environment impact analysis
   3.5. Develop site-specific operational plans for year-round biomass supply

Field experiments using three new genotypes of energycane and three genotypes of biomass sorghum will be conducted at seven sites (three in Texas, and one each in Louisiana, Mississippi; Georgia, and Florida). Data on biomass yield and quality during the growing season, post-maturity, and during storage will be collected. Data on carbon footprints and other environment data will also be collected during the growing season and offseason. Integrated analysis on economic viability and environmental sustainability will be conducted to determine the best management practices on biomass production, harvest and storage and to develop site-specific year-round biomass supply plans.

Outcomes from the proposed project will support DOE's Bioenergy Technologies Office's main strategic goal of reducing the price of biofuels to less than $3/gasoline gallon equivalent, reducing the cost of feedstock delivered to the conversion reactor throat to less than $84/dry ton, and increasing the availability and affordability of biomass-derived transportation fuels and bioproducts.