Establishment of switchgrass trials to characterize biomass yield-site relationships in Arkansas

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Justification

Switchgrass (*Panicum virgatum* L.) is considered a likely species to serve as a future lignocellulosic biofuel crop in Arkansas. Information is needed on factors affecting its biomass yield across a range of soil, temperature, and precipitation conditions in Arkansas to develop yield-prediction and economic models for a potential bioenergy industry using this grass.

Objective

Establish cultivar trials of switchgrass across the range of potential production environments in Arkansas to determine soil adaptation and yield potentials.
This report only describes the experimental design and establishment phase.

Methods

Cultivars and experimentals –

6 entries x 5 reps in well-drained sites A, C, E, G (see Fig. 1 for sites)

Alamo	NF/GA-C75	OSU-NSL-2001-1
Cave-In-Rock	NF/GA-C77	OSU-SL93-2001-1

4 entries x 6 reps in poorly drained sites B, D, F, H

Alamo	OSU-NSL-2001-1
Cave-In-Rock	OSU-SL93-2001-1

All entries were planted by broadcasting by hand in late May-early June 2007 10 kg/ha of pure live seed into plots and raking lightly.

Two soil cores to 1 m depth from each trial site will be characterized for profile characteristics. Bulk density is determined at 0 to 10 and 10 to 20 cm for each site. Each plot is sampled in 2007 and 5 yr later for total C and N for future determination of soil C sequestration over the life of the trial.

Stand counts will be taken at the end of 2007 and every year for 5 yr. Biomass yields will be measured in Years 2 through 5. Data will be collected on precipitation, temperature, radiation, and changes in soil profile water content to estimate crop water use. The ALMANAC crop simulation model (Kiniry et al., 2005) will be used to test biomass yield predictions, and modified as necessary to improve predictions based on soil and climatic variables.

Preliminary Results:

Acceptable stands were achieved at Sites A, C, F, and G. Data have yet to be analyzed, but Table 1 shows example of data from Site A. Cave-in-Rock showed poor seedling emergence at all sites.

Table 1. Preliminary stand counts at site A.

Entry	Plants/m^2
Alamo	9.3
Cave-in-Rock	3.1
NF/GA C75	8.5
NF/GA C77	13.1
OSU-NSL-2001-1	4.4
OSU-S93L-2001-1	6.0

Locations - the four corners of Arkansas comprising a well drained and a poorly drained soil type in each area. List below indicates region, soil mapping unit, and classification subgroup. Trial letters refer to site labels on map in Figure 1.

Northwest

- A. Captina silt loam – Typic Fragiudults, well drained
- B. Captina silt loam – Typic Fragiudults, poorer drained variant

Northeast

- C. Calloway silt loam – Glossaquic Fragiudalfs, well drained
- D. Sharkey clay – Vertic Haplaquepts, poorly drained

Southwest

- E. Sawyer silt loam – Aquic Paleudults, well drained
- F. Una clay loam – Typic Haplaquepts, poorly drained

Southeast

- G. Rilla silt loam, upland – Typic Hapludalfs, relatively well drained
- H. Rilla silt loam, swale – Typic Hapludalfs, poorly drained

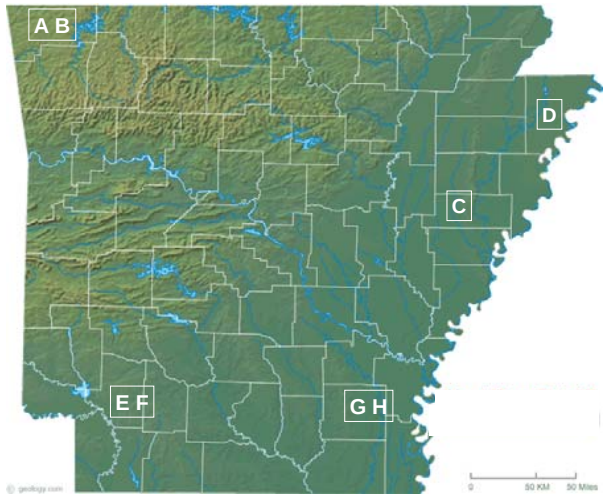

Figure 1. Locations of switchgrass adaptation trials in Arkansas

Literature Cited:

J.R. Kiniry et al. 2005. Switchgrass simulation by the ALMANAC model at diverse sites in the southern US. Biomass and Bioenergy 29:419-425.

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