



Biomass/Bioenergy Research Fact Sheet

Grazinglands Research Laboratory, El Reno, Oklahoma

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Any sustainable biomass/bioenergy production system must be 1) environmentally responsible and coordinated with existing environmental objectives, 2) Agronomically feasible and compatible with current production systems, and 3) economically viable for our producers.



The current biomass project has four focus areas;

I. Understanding and mitigating the environmental impacts of biomass harvest from CRP land, riparian buffer strips, and land enrolled in other conservation practices.

Oklahoma has approximately 1,050,000 acres of CRP land. Over 65% of this acreage is in seven northwest Oklahoma counties. This area is representative of a much larger region of the southern Great Plains. Centered within this area we have six research sites where we are investigating yield and environmental impact of annual biomass harvests from native mixed species or Old World bluestem CRP acreage. Production in 2004 and 2005 average 2 tons per acre of dry matter for Old World bluestem and 1 ton per acre of dry matter for the mixed native species. However, at this point it is not clear that an annual biomass harvest would be sustainable or environmentally acceptable.

Estimates for harvestable riparian buffer strips, adjacent to erodible cropland, have been made. Oklahoma had approximately 6 million acres of wheat in 2005. Over 95% of this acreage was west of the I 35 corridor. Using GIS and available statistics, total harvestable riparian area adjacent to wheat cropland could be as high as 135,000 acres. A study has been designed to investigate production and environmental impact of buffer strip harvest. However, no data is available due to the unfavorable weather conditions of the past year. Assuming the buffer strips to be planted in switchgrass, projections are for yield to be somewhat better than CRP, in the 3 to 4 ton per acre range.

II. Integration of biomass/bioenergy crops, conventional crops, forages and livestock into diversified, sustainable enterprises.

A team of scientists at the Grazinglands Research Laboratory and collaborators at other laboratories recently proposed plans for a new research direction, focused on integrating biomass, grains, forages, and livestock into more diversified production systems that enhance economic flexibility and reduce risk. The approach is to incorporate those components into experimental, farm-scale production systems and compare them with the traditional wheat and stocker calf production system over many years.

III. Development of efficient production systems for bioenergy crops, which include legumes to provide nitrogen inputs.

Energy expenditures, cost, and environmental impact of nitrogen application for grass based biomass systems can be quite large. Research is in progress to insert native or introduced legume species into biomass production systems to mitigate these concerns. Several native and introduced legume species, including alfalfa and Illinois bundleflower, are being evaluated and developed for incorporation in biomass systems. A long term comparison of the efficacy of nitrogen source, legume or chemical nitrogen application, is in progress. The grasses in this study are switchgrass, Miscanthus, gama grass and sorghum hybrids.

IV. Selection and evaluation of productive, well-adapted bioenergy crops and forages.

Given the climatic and agronomic diversity of Oklahoma and the southern Great Plains, it is unlikely that maximum productivity and sustainability of biomass production can or should depend on one or a few species. Continuous efforts are placed on identifying or developing productive well adapted species options. To date, maximum biomass production, up to 20 tons of biomass per acre, has been achieved with an experimental sorghum hybrid.



The USDA- ARS Grazinglands research Lab is comprised of 6, 700 acres of cropland, native prairies grassland, riparian and woodland area. There are 16 scientists at the lab and approximately 40 support personnel. There are two research units, the Forage and Livestock Production Research Unit (FLPRU) and the Agro-Climatic and natural Resources Unit. Biomass research is conducted within the FLPRU. This unit has nine scientists including three agronomists, two plant physiologists, one plant geneticist, two animal scientists and one ecologist.

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