

To Grow or not to Grow: A Tool for Comparing Returns to Switchgrass for Bioenergy with Annual Crops and CRP

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Cellulosic biomass for biofuel remains a substantial part of the Renewable Fuel Standard (RFS) mandate and perennial grasses like switchgrass meet the RFS requirements for cellulosic biomass. Perennial grasses are a popular choice because of the benefits they can provide over traditional row crop production: numerous production years from a single planting, yield advantages on marginally productive cropland, increased soil carbon sequestration, reduced greenhouse gas emissions, and other environmental benefits. Despite these benefits, scalable production of switchgrass in the Midwest faces substantial challenges. The largest of these is the need to compete economically with alternative land uses: row crop production, grazing, haying, or Conservation Reserve Program (CRP).

Recent improvements in switchgrass production efficiencies and costs are changing the economic profile of this production system. The recent release of 'Liberty' switchgrass has increased the field-scale yields to greater than 6 tons per acre. Since crop production decisions often come down to which production system has the greatest economic benefit, increasing the harvestable yield per acre is a major benefit.

The **Switchgrass Decision Tool** draws on decades of research from USDA-ARS and university research. Collaborative research activities escalated with the establishment of the CenUSA Bioenergy project, a five-year multi-institutional research effort supported by the USDA.¹ The release of 'Liberty' switchgrass was a milestone of this collaborative effort. This tool is based on state-of-the-art switchgrass production management information developed by the entire CenUSA team.

There are challenges to growing perennial grasses for bioenergy. Changing a farm production system from annual crops to perennial grasses for bioenergy is a major decision that has long-term land use implications. Perennial grasses like switchgrass must be harvested each year for 5 to 10 years to be economically feasible, reducing the flexibility to change crop production systems. This decision tool gives farmers the ability to economically compare how well switchgrass will perform compared to their current crop production systems. This decision tool is intended to be a guide for farmers considering growing switchgrass for bioenergy. The production estimates, returns, and

¹ CenUSA Bioenergy is supported by Agriculture and Food Research Initiative Competitive Grant no. 2011-68005-30411 from the USDA National Institute of Food and Agriculture.

costs provided are based on the best available information for switchgrass production. When evaluating switchgrass as a production alternative, producers should consider their specific field characteristics and productive capabilities and adjust, as necessary, the default values supplied.

Getting Started: Your Production Estimates

Producers interested in comparing the returns to switchgrass production with alternative production systems start with the worksheet, **“Your Production Practices.”** This sheet has several prompts under the headings **“General Production Information for this Field,”** and **“Switchgrass Production Inputs,”** designed to identify the field and production characteristics that will impact the expected returns to switchgrass production beyond the assumptions built in from the enterprise budget (found in the worksheet tab, **“Advanced Inputs”**). Depending on whether the producer selects ‘CRP,’ ‘Continuous Corn,’ ‘Corn/Soybean Rotation,’ or ‘Pasture for Grazing/Haying,’ the other prompts update to elicit the necessary information. On the right side of the worksheet, the producer can see several output values, including those for costs and revenues of switchgrass, break-even factors for switchgrass, and a comparison of switchgrass returns with the alternative land use selected.

Comparing Per-Acre Net Returns

Producers can view the **“Chart Comparison of Returns”** worksheet to compare the expected net returns per acre to switchgrass and the alternative production system they chose. This chart calculates returns based on the user-supplied information in **“Your Production Estimates.”**

Advanced Inputs and Default Values

Per acre switchgrass production costs and field operations are detailed in the worksheet, **“Advanced Inputs.”** The producer who wishes to understand the underlying assumptions of the basic calculations for costs can refer to this sheet and also change the values in yellow to reflect alternative assumptions or costs of operations s/he faces. As these values are changed, this impacts the outputs in the **“Your Production Estimates”** worksheet and also the **“Chart Comparison of Returns”** worksheet. To reset the **“Advanced Inputs”** information, the worksheet can either be re-downloaded or input from the **“Default Values”** worksheet.

Other Considerations That Impact the Switchgrass Production Decision

This tool is intended to give producers a guide to understanding best management practices for switchgrass production and also to compare the expected returns to switchgrass production with several alternative land uses. There are important factors to this decision that are not included, largely because associated market values do not exist or the extent of the benefit is to date, not well documented. These positive externalities include increased soil carbon sequestration, reductions in nutrient use, reduced erosion, and improved water quality. Individual producers must decide what value, if any, this contributes to their decision to switch to a perennial grass production system.