Perennial Grasses for Bioenergy Production

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Introduction

There is interest across the country in testing the performance of perennial grass bioenergy crops. This includes the establishment of these crops plus studying management options to optimize production. The objective of this study was to determine the potential yield levels of perennial native grasses in southeast Iowa utilizing the latest cultivars and optimum growing practices.

Materials and Methods

A biomass energy production plot was established in 2013 on the ISU Southeast Research Farm, Crawfordsville, Iowa. The site consists of a Nira silty clay loam soil. The research site has six plots with two replications for each of three treatments. Individual plots were 50 ft × 150 ft. The three treatments were:

- Shawnee switchgrass
- Bioenergy switchgrass (experimental cultivar)
- Low diversity mix of warm season native grasses (big bluestem, Indiangrass, sideoats grama)

The bioenergy plots were established in Spring 2013 on an area that had been in corn in 2012. The plot area was chisel plowed in Fall 2012. In the spring of 2013, the plot area was tilled with a field cultivator and then rolled two times with a cultipacker just ahead of planting. All of the plots were drilled on May 21 with a native grass drill at approximately 6 lb/acre of pure live seed (PLS). An additional 2-3 lb/acre of PLS was broadcast because of concerns the tilled ground may have allowed the drilled seed to be placed deeper than the desired seeding depth of ¼ to ½ inch. The plots were rolled again with a cultipacker following seeding.

Weed control was provided by spraying the switchgrass plots with 8 oz/acre of quinclorac (Paramount®) and 1.5 qt/acre of atrazine following seeding. The low diversity mix plots were sprayed with 4 oz/acre of imazapic (Plateau®) following seeding.

Visual obstruction measurements (VOM), extended plant leaf height, and harvest samples were taken November 2013. These results are shown in Table 1. In 2014, different nitrogen fertilizer rates will be applied to determine the biomass response to nitrogen fertilization.

Results and Discussion

Overall, for a seeding establishment year, the growth of the switchgrass and of the native grasses was good to excellent in 2013. The bioenergy switchgrass had excellent growth and was significantly taller and had greater dry matter yield than the Shawnee switchgrass. Likewise, the Shawnee switchgrass had significantly more growth and dry matter yield than the low diversity grass mix. It is anticipated yield levels should increase in succeeding years with nitrogen fertilization and maturing grass stands.

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Table 1. Bioenergy grass yields and growth results.

Treatment	Visual obstruction measurement (in.)	Extended leaf height (in.)	Dry matter yield tons/acre
Shawnee switchgrass	30.5	43.5	3.33
Bioenergy switchgrass	45.3	57.5	5.44
Low diversity grass mix	7.1	25.6	1.40
LSD P=0.10	7.6	15.6	1.62