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Adaptability of Miscanthus Cultivars for Biomass Production

Abstract

In 2016, miscanthus dry matter production (DM) averaged 8,890 lb DM/a and did not differ between the two cultivars in production at the Mound Valley Unit of the Southeast Agricultural Research Center. Total three-year production for the cultivars was also similar, averaging 35,050 lb/a.

Keywords

energy crop, warm-season perennial

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Adaptability of Miscanthus Cultivars for Biomass Production

J.L. Moyer

Summary

In 2016, miscanthus dry matter production (DM) averaged 8,890 lb DM/a and did not differ between the two cultivars in production at the Mound Valley Unit of the Southeast Agricultural Research Center. Total three-year production for the cultivars was also similar, averaging 35,050 lb/a.

Introduction

Miscanthus is a productive, efficient genus of warm-season perennial grass. Because of its growth potential and stalk properties, miscanthus has been identified by the U.S. Department of Energy as a possible dedicated energy crop. This study was established to compare cultivars for adaptation in eastern Kansas and to produce biomass to test for suitability as a bioenergy crop.

Experimental Procedures

Two cultivars were planted on 3-ft spacings on May 24, 2012 in four replications at the Mound Valley Unit of the Southeast Agricultural Research Center. The initial soil test indicated 18 and 280 lb/a of available phosphorus (P) and potassium (K), respectively, with 2.0% organic matter and pH 6.2 in a silty clay loam.

Plots were 3 rows, with seven plants per row. Plants were irrigated occasionally in the summer of 2012, but several were replanted in late May through early June 2013. Cultivation was performed for weed control in the summer of 2012 and once in 2013, but no further cultural practices have been performed. The center row of each plot was harvested at 2.5-in. height after each growing season, harvest was conducted on December 1 in 2016. At harvest, biomass was subsampled, dried at 140°F for moisture content, and saved for analysis.

Results and Discussion

Each year, dry matter (DM) production was similar for the cultivars ($P > 0.10$, Table 1). In 2013, average yield was less than 5,000 lb/a, because only 1.40 in. of rainfall was received between June 5 and July 20, and stands were not fully established. In 2014, 2015, and 2016, DM production did not differ between cultivars or years, averaging 10,970; 10,250; and 8,890 lb/a, respectively. The four-year production thus totaled 35,050 lb DM/a, for an average yield of 8,760 lb/a/yr.

Biomass had similar dry matter content for the two cultivars each year, and for the average across years ($P > 0.10$, Table 2). However, dry matter content was higher in 2014 than in the other years, and lower than the rest in 2016. The variation was probably most affected by preharvest weather conditions rather than maturity differences, since harvest dates were weeks after the first killing freeze.

Table 1. Miscanthus yields (lb dry matter/a) for 2013 through 2016, Mound Valley Unit, Southeast Agricultural Research Center

| Cultivar ¹ | Year | | | | Average |
|-----------------------|--------|---------|---------|--------|---------|
| | 2013 | 2014 | 2015 | 2016 | |
| Freedom | 5,298 | 11,443 | 10,750 | 8,114 | 8,667 |
| IL clonal | 4,586 | 10,505 | 9,758 | 9,656 | 8,861 |
| Average ² | 4,942a | 10,974b | 10,254b | 8,885b | 8,763 |

¹No difference ($P = 0.10$) was found between cultivars within or across years.

²Means of a year followed by a different letter were significantly different at $P = 0.05$.

Table 2. Miscanthus dry matter contents (%) for 2013 through 2016, Mound Valley Unit, Southeast Agricultural Research Center

| Cultivar ¹ | Year | | | | Average |
|-----------------------|------|------|------|------|---------|
| | 2013 | 2014 | 2015 | 2016 | |
| Freedom | 72 | 79 | 71 | 62 | 71 |
| IL clonal | 71 | 79 | 70 | 60 | 70 |
| Average ² | 71b | 79c | 70b | 61a | 70 |

¹No difference ($P = 0.10$) was found between cultivars within or across years.

²Means of a year followed by a different letter were significantly different at $P = 0.05$.