Biofuel productivity plots

Purpose

Evaluate biofuel crop productivity on various soils and micro climates across Michigan.

Materials and methods

This plot was established as a randomized complete block design with four replications. Switchgrass and miscanthus were established in 2008. Whole corn plants were clipped off at 3-4 inches above ground and weighed for total biomass. Ears were separated from the stalk, shelled and grain weight and moisture recorded. Total biomass removed would be comparable to corn silage harvest. Whole plants of sweet sorghum were harvested, much like corn. A walk behind sickle bar mower was used to harvest a 28-inch swath from the center of switchgrass and miscanthus plots.

County	Isabella
Cooperator	Clyde Taylor
Nearest town	Mt. Pleasant
Soil type	Perrinton loam
Planting dates	Miscanthus 2009; switchgrass planted 2008; corn, sweet sorghum May 2011
Weed control	Switchgrass: 8 oz. 2,4-D Miscanthus: 8 oz. 2,4-D + .5 lbs/A atrazine
Fertilizer	Switchgrass: 152 lbs/A 46-0-0 (70 lbs. actual N) Miscanthus: 207 lbs/A 46-0-0 (95 lbs. actual N) Sorghum and corn: 207 lbs/A 46-0-0 (95 lbs. actual N) + 207 lbs/A 19-19-19 (40 lbs. actual N,P, K)
Exp. design	RCB, 4 replications

	2008		2009		2010		2011	
Species	Yield[1]	Ethanol[2]	Yield[1]	Ethanol[2]	Yield[1]	Ethanol[2]	Yield[1]	Ethanol[2]
Switchgrass	–	–	2.6	220	4.8	404	6.2	530
Forage sorghum	–	–	–	–	–	–	2.9	249
Corn grain	–	–	83	234	139	390	–	–
Corn stover	–	–	2.6	218	2.6	224	–	–
Sweet sorghum	6	510	5.6	497	3.6	309	–	–
Miscanthus	–	–	–	–	3.4	291	3.9	330

[1]tons of dry matter/A (corn grain = bu/A).

[2]tons/A X 85 gal/ton = gal of ethanol/A (corn grain = bu/A X 2.8 gal/bu = ethanol/A).

Results and discussion

Sorghum has demonstrated significant potential as an annual crop for bioenergy production. Switchgrass also has significant yield potential as a bioenergy crop. Sorghum is an annual crop that could easily fit into crop rotations, yet allowing flexibility without committing long term production. Switchgrass offers benefits in being perennial, lower input and higher yielding but require longer term commitment (10 years). Miscanthus was quite variable between replications. Additional rhizomes were planted in May 2010, but little yield was obtained from these new plants.

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