

Evaluation of Perennial Herbaceous Biomass Energy Crops in North Dakota

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With the continued interest and need for alternative energy sources, the Carrington Research Extension Center initiated a perennial grass trial in 2006 to evaluate biomass feedstock production in conjunction with other NDSU Research Extension Centers. The objective is to evaluate warm- and cool-season grasses and grass mixtures for biomass feedstock for cellulosic ethanol production. The species and mixtures evaluated were seeded at the CREC on May 19, 2006. The grasses were established with a specialized plot drill with 6-inch row spacing in a 15 by 30 foot plot. In 2006, the trial was mowed and sprayed to control weeds and treatments were not harvested to promote establishment. The first biomass harvest occurred on September 13, 2007. In 2008, the grass treatments managed for an 'annual harvest' were harvested on September 17. In each of the two seasons where grasses were harvested, a late September application of herbicide was made to supplement weed control.

Yields on the dryland plots at Carrington.

Species	----- Yield -----		
	2007	2008	2-yr. Avg.
	----- T/ac -----		
Trailblazer Switchgrass	6.06a*	4.57abc	5.32
Sunburst Switchgrass	5.41ab	5.13a	5.27
Sunburst Switchgrass + Sunnyview Big Bluestem	5.36ab	4.86ab	5.11
Sunburst Switchgrass + Tall Wheatgrass	5.14bc	4abcd	4.57
Sunburst Switchgrass + Mustang Alti wildrye	5.11bc	4.96ab	5.04
Alkar Tall Wheatgrass	4.71bcd	4.37abc	4.54
CRP Mix (Wheatgrasses + alfalfa + sweet clover)	4.65bcd	3.79bcd	4.22
Haymaker Intermediate Wheatgrass	4.49cd	3.35cd	3.92
CRP Mix (Intermediate and Tall Wheatgrass)	4.26d	3.75bcd	4.01
Magnar Basin + Mustang Alti wildrye	4d	3.12d	3.56
LSD 0.05	0.77	1.05	--
R ²	0.71	0.55	--

* Yields followed by the same letter are not significantly different at the 0.05 level.

Similar to 2007, the switchgrass and switchgrass mixtures yielded higher than the cool-season grasses except for the wheatgrasses. The 2008 season started out dry and cool and was below average for moisture except for June, September, and October. The growing season was below normal for temperature through most of the season. The current yield data from these two seasons suggests that both warm-season and cool-season grasses have great potential for biomass feedstock production. Continued evaluation of both warm-season and cool-season grasses is necessary to determine the long-term productivity of these treatments.