Proso Millet For Grain and Forage

Steve Zwinger and Steve Schaubert

Proso millet is a late-planted, warm-season crop that is well adapted to the growing conditions of North Dakota and the Northern Plains. Proso millet has a history of being planted in North Dakota with the annual acreage ranging from 10,000 to 100,000 acres. Recent years the state average has been slightly above 30,000 acres per year.

Proso millet is a multiple-use crop that can be utilized for both grain and forage. As a grain crop its main use is in the bird food or feed grain market, although there is some interest and a developing market as a human food. Recent developments in waxy types, or varieties that are high in the starch amylopectin and low in amylose as compared to non-waxy types that are high in amylose and low in amylopectin are being trialed and compared to traditional grain types. These waxy varieties that are higher in amylopectin tend to be more easily digested.

With the current shift in crop acreage and rotations along with the loss of CRP and other forage sources, the need to produce quality forage for livestock is becoming increasingly important as fewer acres are being devoted to forage production. Proso millet is a crop that is useful for the integration of cropland into a livestock system by utilizing the crop as a late-season planted forage or harvesting the straw after the combining operation and feeding it as winter forage. The straw can be baled or left in the swath and swath grazed in the winter months if conditions permit, thus allowing the livestock to aftermath graze cropland.

The CREC has evaluated the performance of proso millet varieties for grain and forage yield for a number of years building a database that is available in past reports and on the CREC website. During the 2013 growing season, the CREC evaluated eight proso millet varieties for grain along with straw yield and quality. These varieties, with the exception of Crown and Red Kibi, were developed in the 1990s by the Nebraska Agricultural Experiment Station for grain production. These varieties were developed as white seeded, short, strong strawed for grain production. Crown is an older tall, early, gray seeded variety developed in Canada. Red Kibi is a new red seeded waxy variety being evaluated and developed by industry for human food.

The trial was planted on June 6 to a field that was previously cropped to spring wheat. The trial was sown with a drill in 7” rows at 25 lbs/ac PLS. Fall soil tests taken from the field indicated 44 lbs/ac (0-24”) nitrogen, and 12 PPM (0-6”) phosphorus/ac with no additional fertilizer used in the growing season. No herbicides were used in the trial. The trial was swathed on September 5 and harvested on September 13. Forage yield and quality were gathered on September 19.

Data gathered (Table 1) illustrate the differences in maturity and plant heights between the varieties. Crown and Dawn were generally earlier than other varieties. Yield data gathered from Dawn is much lower and should be used with caution as the performance of this variety was particularly impacted by gopher, and to a lesser extent, grasshopper damage. This may in part be due to the earliness of this variety. Plant heights illustrate the relative differences between the traditional grain types as compared to the varieties Crown and Red Kibi which are much taller. The CREC long-term (1991-2010) trial mean of 1972 lbs/ac compares very close to the 2013 trial mean of 2023 lbs/ac, illustrating the consistent performance of proso millet in central North Dakota. Although there is no official test weight for proso millet, test weight above 52 is considered good. Data gathered illustrate test weights at or above 52 lbs/bu, with Crown having an above-average test weight close to 56 lbs/bu.

Proso Millet						**Carrington**
Variety	Days to Heading	Plant Lodge 0-9	Plant Height inch	Test Weight lb/bu	Seed Yield lb/ac	Straw Yield DM lb/ac
Crown	47.8	1.0	48.7	55.8	3277.8	2854.2
Dawn	47.3	7.8	35.2	52.1	647.5	1719.2
Earlybird	65.0	0.3	41.5	51.5	2301.4	3587.4
Horizon	68.8	0.0	38.3	51.7	1996.2	3421.6
Huntsman	69.3	0.0	37.0	51.8	1936.7	3328.0
Red Kibi	64.3	0.5	53.0	53.0	1345.0	4656.1
Sunrise	67.8	0.0	39.7	51.5	2092.5	3650.3
Sunup	61.3	0.0	39.6	51.7	2587.3	3060.8
Mean	61.4	1.2	41.6	52.4	2023	3284.7
C.V. (%)	3.9	36.2	12.4	1.4	13.1	9.5
LSD 0.10	2.9	0.5	6.3	0.9	322.5	446.9

Planting Date = June 6; Seed Harvest Date = September 13; Straw Harvest Date = September 19; Previous Crop = Spring Wheat

Forage quality and yield (Table 2) gathered from the straw illustrate differences amongst the varieties. Crude proteins ranged from 4.5 to 6.9 percent, while TDN values ranged from 53 to 61 percent. Relative Feed Value (RFV) ranged from 65 percent for Crown, the highest seed yielding variety, to 94 percent for Sunup. Overall the straw quality of Sunup is the highest from the varieties tested. Quality data gathered indicate that the straw is of good quality, equal to prairie grass hay and equal to or better than CRP hay. Straw yield data from proso millet gathered at the CREC is limited, although preliminary yields of 3200 DM lbs/ac indicate harvesting the straw to supplement livestock hay needs for the winter months is a viable option with this crop.

Table 2. Forage quality data from proso millet straw.

Variety	Crude Protein	ADF	NDF	Ca	P	Mg	K	S	TDN	RFV
	%	%	%	%	%	%	%	%	%	%
Crown	4.5	46.4	75.2	0.45	0.16	0.34	1.90	0.16	52.8	65.3
Dawn	6.2	42.8	67.7	0.82	0.17	0.46	2.33	0.20	55.6	76.4
Earlybird	5.9	40.7	67.1	0.53	0.19	0.29	2.13	0.15	57.2	79.4
Horizon	5.9	39.1	65.6	0.64	0.17	0.30	1.84	0.15	58.4	83.5
Huntsman	6.6	39.1	66.0	0.59	0.18	0.29	1.99	0.15	58.4	82.5
Red Kibi	5.5	43.4	70.7	0.50	0.18	0.25	1.99	0.12	55.1	72.7
Sunrise	6.3	40.9	67.4	0.62	0.18	0.30	2.00	0.15	57.0	78.7
Sunup	6.9	36.4	59.9	0.62	0.19	0.31	1.86	0.16	60.5	94.4
Mean	6.0	41.1	67.4	0.60	0.18	0.32	2.00	0.16	56.9	79.1
C.V. (%)	10.3	4.9	4.1	11.4	6.6	6.9	12.4	6.3	2.7	7.4
LSD 0.10	0.9	46.4	4	0.1	0.02	0.03	0.36	0.01	2.3	8.4

Planting Date = June 6; Seed Harvest Date = September 13; Straw Harvest Date = September 19; Previous Crop = Spring Wheat

Proso millet variety evaluation.