Productivity & Quality of Summer Annual Grasses in the Northern Great Plains

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When perennial cool-season grasses become dormant mid to late summer in the northern Great Plains, pastures decline in forage yield/quality. Summer annuals grow best in warm weather, meeting immediate feed shortages during summer and providing high yields of hay/silage for later use. Now is the time to decide which summer annual cultivar fits a particular situation. Base selection on adaptation, yield potential and nutritive quality. Cultivars differ in growth rate, recovery after cutting, forage yield/quality, height, and leaf-to-stem ratio. Due to inherent differences, sudangrass and pearl millet are suited for pasture and hay, and forage sorghum is best for silage.

Despite regional importance of summer annuals, limited data are available on effect of harvest date on yield/quality of various species and cultivars. A 2-year trial at 2 SD locations determined effects of harvest management on yield/quality of several summer annuals.

Methods. 'Piper' sudangrass, '877F' sorghum-sudangrass hybrid, '811F' sterile forage sorghum, and 'Mil-Hy 100' and '3-Mil-X' pearl millet were planted at Aurora and Highmore, SD. Seeding rates were 20 lbs PLS/acre for Piper and pearl millets, and 8 lbs PLS/acre for 811F and 877F. Planting depth was about 1" with row spacings of 6" for the pearl millets, 12" for Piper, and 36" for 877F and 811F. Plots were harvested once per year during early August, late August, or late September.

Forage Yield. Averaged across years, cultivars, and locations, yields increased about 90% between Harvests 1 and 2 (Table 1). However, between Harvest 2 and 3, yields declined in Year 1 but increased in Year 2. The decrease in yields in Year 1 was primarily due to heavy grasshopper infestations late in the season.Sudangrass (Piper), sudangrass x sorghum hybrid (877F), and pearl millets (Mil-Hy 100, 3-Mil-X) grew faster initially and produced about twice as much forage than the forage sorghum (811F) on first harvest in early August. On second harvest in late August, sudangrass and pearl millet entries produced about one-third more forage than the sorghum entries. However, on third harvest in late September, yield of forage sorghum was higher than sudangrass and the pearl millets. Although forage production of 811F increased between second and third harvests, its slow growth for the first 80+ days after planting resulted in average yields considerably lower than 877F and Mil-Hy 100 (Table 2). Since 811F is not recommended for use in the northern Great Plains, but is adapted to higher temperatures and longer growing season of the southern Great Plains, yield potential was likely not realized in this study.

Table 1. *Effect of harvest date.Values averaged across cultivars & locations.*

	Harvest			Harvest			Harvest		
	1	2	3	1	2	3	1	2	3
	DM yield (tons/acre)			CP (%)			IVDDM (%)		
Year 1	2.2	4.3	3.5	8.3	6.4	6.3	56.9	52.9	53.4
Year 2	1.4	2.6	3.2	8.4	7.2	5.7	65.0	61.0	59.2

Forage Quality. Crude protein (CP) and *in vitro* digestible dry matter (IVDDM) significantly decreased as annuals matured. Decline was greater between Harvests 1 and 2 than between Harvests 2 and 3 (Table 1); probably due to large increases in biomass and high temperatures associated with August growth and development.

Cultivars differed significantly for CP and IVDDM. Piper was lower than other cultivars for quality parameters (Table 2). The seed-producing hybrid (877F) showed the smallest decline in IVDDM from second to third harvest.

It is apparent that selection of an appropriate summer annual grass depends on the environment, livestock nutritional requirements, rotational systems, and emergency forage needs. Summer annual grasses provide an excellent source of late summer and early fall feed for livestock.

Table 2. *Effect of cultivar on 3 harvest dates for 2 years at 2 SD locations. Values are averaged across cultivars and locations.*

Cultivar	Yield (T/ac)	CP (%)	IVDDM (%)
811F	2.5	7.5	58.9
877F	3.8	6.6	57.9
Mil-Hy 100	3.5	7.1	57.6
3-Mil-X	2.7	7.7	59.5
Piper	2.9	5.6	54.2
LSD(0.05)	0.8	1.4	2.3

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