



Adding Annual Forages Into Southern Iowa Farm Enterprises: A Forage Plot Demonstration Project

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Incorporating annual forages into the farming operation provides the opportunity to fill in forage production gaps and extend the grazing season. However, many questions remain regarding species selection, forage quality and quantity, and application on the farm level. The objective of this forage plot demonstration project is to compare feed value and yield potential of various cool and warm season annual forages.

Materials and Methods

Five species of cool-season annual forages: cereal rye (Hazlet Rye), hybrid rye (KWS Progas), forage wheat (Willow Creek), winter wheat (Certified Oahe Hard Red), and triticale (Fridge) were no-till drilled September 21, 2020 with a harvest date of May 24, 2021; then drilled October 7, 2021, and harvested May 20, 2022. Five species of warm-season: German millet, pearl millet, sorghum sudangrass BMR hybrid, sudangrass hybrid, and teff (Moxie) were no-till drilled June 18, 2021 and harvested August 10 and September 24, 2021. Because German millet is a single-cut species compared with the other species, which are multi-cut species, the German millet was only harvested August 10, 2021.

For both cool- and warm-season species, individual species were seeded into 1,050 sq. ft. forage plots at the Armstrong Research and Demonstration Farm and Neely-Kinyon Memorial Research and Demonstration Farm. Target seeding rates for cool seasons were 100 lbs./acre with the exception of hybrid rye, which was seeded at the recommended rate of 50 lbs./acre. Target seeding rates for warm seasons were 35 lbs./acre for sorghum sudangrass, 30 lbs./acre for German and pearl millet, 20 lbs./acre for sudangrass and 10 lbs./acre for teff. Eight replicates of each species were seeded with half of the plots receiving 0 lb. of Nitrogen (N) fertilization per acre, and half receiving 50 lb. of N/acre early in the growing season and (n=4/species). For cool-season species, forage samples were taken at random throughout individual plots and compiled for nutrient analysis based on species and N treatment. Yield data also were collected on individual plots and compiled for final species yield data. For warm-season species, forage samples were taken to determine nutrition analysis and yield data were collected at each cutting. Results from both cuttings were compiled and reported in the tables. The target for harvesting both cool and warm season species were near boot stage, or the reproductive stage when the seed head became present, mimicking when forages would be grazed and optimizing yield potential without hindering feed quality.

Results and Discussion

Forage nutrient value of the cool and warm season species are found in Table 1. While targeting harvest at boot stage for both cool and warm season species, individual variation in forage maturity at the time of harvest influenced forage quality. Cereal rye and hybrid rye were the first to reach reproductive maturity and tended to have the lowest forage quality as expressed by crude protein and energy (total digestible nutrients). Triticale reached reproductive maturity intermediate of the rye varieties and the two wheat varieties. As expected, nitrogen application tended to boost forage quality for both cool and warm season species.

Forage yield results are found in Table 2. For both cool and warm season annuals, N application resulted in an approximately 25% yield boost, demonstrating if producers are targeting annual forages as a forage source, fertilization is advantageous. Based on available equipment, cutting height of warm season forages was too low: approximately 3-4 in. instead of the desired 6-8 in. to favor adequate regrowth, therefore limited second cutting and total yield for the summer. Additionally, dry conditions over the span of the trial likely also limited forage growth.

Key Takeaways

Annual forages are a high-quality forage resource that can be a valuable addition to the cow herd. Incorporating annual forages into the grazing rotation can help fill in forage production gaps and extend the grazing season. Results of this forage plot project demonstrated an added 2.5-5 tons of forage on a dry matter per acre basis available for feed.

Table 1. Nutrient value of various cool and warm season species¹.

Species	year	0 lbs.N					50 lbs.N					
		DM%	CP%	ADF%	NDF%	TDN%	DM%	CP%	ADF %	NDF %	TDN %	
Cool season ²	Cereal rye	2021	17.54	11.23	42.91	66.32	55.48	21.67	12.70	43.37	66.28	55.12
		2022	25.02	11.77	36.20	57.48	60.70	17.69	13.45	33.68	54.62	62.67
	Hybrid rye	2022	17.50	13.14	37.69	58.89	59.54	18.12	14.72	35.86	55.60	60.97
	Triticale	2021	17.65	13.44	40.58	61.69	57.29	16.87	16.87	39.27	59.91	58.31
		2022	16.19	14.17	32.89	51.75	63.29	16.43	15.31	34.92	53.53	61.70
	Forage wheat	2021	22.18	12.10	37.60	58.45	59.61	19.67	15.66	39.47	60.46	58.16
		2022	18.67	16.82	33.50	48.25	62.81	18.07	17.66	31.47	49.75	64.39
	Winter wheat	2021	24.26	11.68	38.97	60.47	58.54	22.65	14.84	40.38	60.51	57.45
2022		18.39	14.69	32.29	50.62	63.75	17.66	17.36	34.62	48.77	61.94	
Warm season ³	German Millet		23.02	8.38	44.59	67.42	54.17	21.56	11.77	44.08	65.03	54.57
	Pearl Millet		19.06	7.78	38.68	61.73	58.80	18.12	9.89	39.46	62.79	58.16
	Sorghum Sudangrass	2021	22.14	7.66	36.55	59.63	61.63	20.29	8.65	36.49	59.58	60.48
	Sudangrass		21.04	9.07	37.54	61.89	60.25	19.29	9.80	37.17	60.32	60.66
	Teff		34.37	9.21	40.67	64.87	57.22	32.29	10.72	38.57	63.40	58.86

¹Abbreviations: DM=dry matter, CP=crude protein, ADF=acid detergent fiber, NDF=neutral detergent fiber, TDN=total digestible nutrients.

²2021= drilled 9/21/20, harvested 5/24/21. 2022=drilled 10/7/21, harvested 5/20/22.

³2021=drilled 6/18/21, harvested 8/10/21 and 9/24/22. Results of both cuttings were compiled with the average reported.

Table 2. Yield of various cool and warm season species, tons of dry matter/acre.

Species	Year	Armstrong Research Farm		Neely Kinyon Research Farm		
		0N	50N	0N	50N	
Cool season ²	Cereal rye	2021	0.49	0.86	1.63	1.83
		2022	0.98	1.04	1.01	1.28
	Hybrid rye	2022	1.44	1.35	0.91	1.15
	Triticale	2021	0.25	0.41	0.89	1.22
		2022	0.77	1.20	0.51	0.91
	Forage wheat	2021	0.31	0.78	1.20	1.46
		2022	0.54	0.44	0.29	0.64
	Winter wheat	2021	0.67	0.83	0.94	1.40
2022		0.51	1.07	0.48	0.91	
Warm season ³	German Millet		2.85	2.07	2.39	3.07
	Pearl Millet		1.58	2.93	1.54	2.14
	Sorghum Sudangrass	2021	0.76	1.75	1.98	2.14
	Sudangrass		2.69	4.12	2.78	3.67
	Teff		2.68	3.33	3.14	2.64

²2021=drilled 9/21/20, harvested 5/24/21. 2022=drilled 10/7/21, harvested 5/20/22.

³2021=drilled 6/18/21, harvested 8/10/21 and 9/24/22. Results of both cuttings were compiled with the total yield reported. 2022 data currently unavailable.

Acknowledgments

This project was funded by the Iowa Nutrient Research Center and the Southern Iowa Forage and Livestock Committee. Additionally, the authors wish to thank Millborn Seeds and Barenbrug USA for partial seed donation.