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2017 Kansas Summer Annual Forage Hay and Silage Variety Trial

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2017 Kansas Summer Annual Forage Hay and Silage Variety Trial

Cover Page Footnote

This work was funded in part by the Kansas Agricultural Experiment Station and seed suppliers. Sincere appreciation is expressed to all participating researchers and seed suppliers who have a vested interest in expanding and promoting annual forage production in the U.S.

Authors

J. D. Holman, A. Obour, A. Esser, J. Lingenfelser, S. Maxwell, T. Roberts, and G. F. Sassenrath



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Kansas State University Agricultural Experiment Station and Cooperative Extension Service

2017 Kansas Summer Annual Forage Hay and Silage Variety Trial

J. Holman, A. Obour, A. Esser, J. Lingenfelser, S. Maxwell, T. Roberts, and G.F. Sassenrath

Summary

In 2017 summer annual forage variety trials were conducted across Kansas near Garden City, Hays, Mound Valley, and Scandia. All sites evaluated included hay and silage entries. Companies were able to enter varieties into any possible combinations of research sites, so not all sites had all varieties. Across the sites, a total of 61 hay varieties and 66 silage varieties were evaluated.

Introduction

In 2014 there was a total of 34,455,000 acres of hay and haylage harvested in the U.S. for a total of 95,372,000 dry matter tons of production. Yields averaged 2.77 tons of dry matter per acre. Of this total, about 13,580,000 acres were alfalfa which averaged 3.76 dry matter tons per acre and all other crops averaged 2.13 dry matter tons/a.

In Kansas, there were 2,420,000 acres of hay and haylage harvested with an average yield of 2.24 dry matter tons per acre in 2014. Of this total, 650,000 acres were alfalfa with an average yield of 3.72 dry matter tons per acre, and 1,770,000 acres were crops other than alfalfa with an average yield of 1.69 dry matter tons/a. Kansas ranked 6th in the U.S. for hay and haylage production, which largely supports the state dairy (ranked 19th in the U.S. and valued at \$482,765,000), and cattle (feedlot, background, and cow/calf) industries (ranked 2nd in the U.S. and valued at \$10,153,087,000). Dairy and beef cattle industries represented 58% of the total agriculture product of Kansas in 2014. Hay and grain commodities that support these two industries are critical for the state.

Study Objectives

The objectives of the Kansas Summer Annual Forage Variety Trial are to evaluate the performance of released and experimental varieties, determine where these varieties are best adapted, and increase the visibility of summer annual forages in Kansas. Breeders, marketers, and producers use data collected from the trials to make informed variety selections. The Summer Annual Forage Trial is planted at locations across Kansas based on the interest of those entering varieties into the test.

Procedures

The Summer Annual Forage Variety Test was conducted near Garden City, Hays, Mound Valley, and Scandia. All of the sites evaluated hay and silage entries. Companies were able to enter varieties into any possible combinations of research sites, so not all sites had all varieties. In the hay test, there were 26 entries at Garden City, 15 at Hays, 9 at Mound Valley, and 11 at Scandia.

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In the silage test, there were 23 entries at Garden City, 15 at Hays, 4 at Mound Valley, and 19 at Scandia (Table 1).

Across the sites, a total of 61 hay varieties and 66 silage varieties were evaluated. Information on the varieties is shown in Tables 2 and 3.

Management guidelines were provided to cooperators; however, previous growing experience influenced final management decisions. All trials were planted in small research plots (approximately 225 ft²) with three replications. Cultural practices (Table 4), growing season temperature, and precipitation (Figures 1-4) are provided for each site. Results are listed alphabetically by seed supplier. Forage samples were dried, ground, and analyzed for nutritive value using NIR (near infrared reflectance) by SDK Laboratories in Hutchinson, KS. Forage nutritive values measured were acid detergent fiber (ADF), neutral detergent fiber (NDF), in vitro true dry matter digestibility after 48 hours (IVTDMD@48hr), lignin, % of NDF digestible after 48 hours (NDFD@48hr), nitrogen free NDF (NDFn), net energy for gain (NEG), net energy for lactation (NEL), net energy for maintenance (NEM), non-fibrous carbohydrates (NFC), crude protein, relative forage quality (RFQ), total digestible nutrients (TDN), and starch (silage only).

2017 Growing Conditions

Temperature and precipitation for each site is shown (Figures 1-4). Thick black lines on the temperature graphs represent long-term average high and low temperatures (°F) for the location. The upper thin line represents actual daily high temperatures, and the lower thin line represents actual daily low temperatures. On the precipitation graph, the line labeled “normal” represents long-term average precipitation (1981-2010), and the line labeled “17” represents actual precipitation.

In general, the 2017 growing season saw below normal mean temperature during the first part of August and below normal growing season precipitation. The exception was Mound Valley, which had above normal growing season precipitation. Hays and Scandia largely relied on stored soil water for crop growth resulting in little regrowth and no second harvest in those hay tests.

Results and Discussion

Since all entries were not evaluated across all sites, data were analyzed by location. All locations had a control entry of Rox Orange (Waconia) and Sumac for the hay test, and a control entry of Kansas Orange for the silage test.

Hay Test

At Garden City, Sweet Forever BMR, EXP-SCA-1, and EXP-SCA-2 St. were in the top LSD (least significant difference at $P \leq 0.05$) group in the first cutting (Table 5). In the second cutting more separation occurred between entries and BMR 455, Grazex BMR 801, and Sweetleaf II were in the highest yielding LSD group. Combined across cuttings, Grazex BMR 301, EXP-SCA-1, and EXP-SCA-2 St., EXP-SCA-3 BMR, and Sweetleaf II were in the top LSD group.

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At Hays, 374x66, AL374x66, High Yield BMR, Rox Orange, Canex, Canex BMR 210, Honey Graze V, High Yield BMR Dwarf, Grazex BMR 301, 1922, and Rocket had the greatest yield in the top LSD group in the first cutting (Table 6). There was no second cutting due to dry conditions.

At Mound Valley, Early Sumac, Wondergreen SX-60, SweetSioux WMR, Cadan 99B, SweetSioux BMR, Sweet Six BMR, and Nutri King BMR were in the top LSD group at the first cutting (Table 7). There were no differences in the second cutting between varieties. Combined across cuttings, Early Sumac, Wondergreen SX-60, SweetSioux WMR, Cadan 99B, SweetSioux BMR, Sweet Six BMR, and Nutri King BMR were in the top LSD group.

At Scandia, dry conditions limited regrowth so only the first cutting was harvested. In the first cutting, 1st Choice BMR, Honey Graze V, Bruiser BMR, Nutri King BMR, Sweet Six BMR, Super Sugar DM, Sweet Forever BMR, and 1922 were in the top LSD group (Table 8).

Silage Test

At Garden City, AF7401, XF7303, AF8301, KS Orange, Nitri-Choice II, Canex BMR 600, 4Ever Green, GW2120, EXP 15 F 909, EXP 15 910, EXP 10217, EXP 10219, FS3501, and FS3631 were in the top LSD group for silage (Table 9).

At Hays, AF8301, XF7103, Silo Mor II, SiloSorghum Conventional, KS Orange, Canex BMR 210, Canex BMR 600, White Star, FS3501, and FS3631 were in the top LSD group for silage (Table 10).

At Mound Valley, there was no difference in the varieties harvested (Table 11).

At Scandia, there was no difference in the varieties harvested (Table 12).

Recommendation

Inestimable differences in soil type, weather, and environmental conditions play a part in increasing experimental error, therefore one should use more than one year of data to make an informed variety selection decision.

Acknowledgments

This work was funded in part by the Kansas Agricultural Experiment Station and seed suppliers. Sincere appreciation is expressed to all participating researchers and seed suppliers who have a vested interest in expanding and promoting annual forage production in the U.S.

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Table 1. Number of hay and silage entries for each location

Location	Hay	Silage
Garden City	26	23
Hays	15	15
Mound Valley	9	4
Scandia	11	19
Total	61	66

Table 2. 2017 Hay entries

Company	Variety	Type	BMR	Dwarf	Male sterile	Dry stalk	Photo-period sensitive	Maturity	Greenbug resistance
Browning Seed	Cadan 99B	SS	N	N	N	Y	N	M	N
Browning Seed	SweetSioux WMR	SS	N	N	N	Y	N	M	N
Browning Seed	SweetSioux BMR	SS	Y	N	N	N	N	M	N
Browning Seed	Wondergreen SX-66	SS	N	N	N	Y	N	ME	N
Arrow Seed	1st Choice BMR	SS	Y	N	N	N	N	E	N
Arrow Seed	Honey Graze V	SS	N	N	N	N	N	L	N
CHS Seed Resources	High Yield BMR Dwarf	SS	Y	N	N	N	N	ME	N
CHS Seed Resources	High Yield BMR	FS	Y	N	N	N	N	ML	N
Sharp Bros. Seed	Canex	FS	N	N	N	N	N	ME	N
Sharp Bros. Seed	Canex BMR 210	FS	Y	N	N	N	N	M	N
Sharp Bros. Seed	Grazex BMR 301	SS	Y	N	Y	N	N	M	N
Sharp Bros. Seed	Grazex BMR 801	SS	Y	N	Y	N	N	M	N
Coffey Forage Seeds Inc.	ExCeed BMR	MT	Y	Y	N	N	N	M	N
Coffey Forage Seeds Inc.	Tifleaf 3	MT	N	Y	N	N	N	M	N
Coffey Forage Seeds Inc.	Epic BMR	MT	Y	Y	N	N	N	M	N
Coffey Forage Seeds Inc.	Surpass BMR	SS	Y	N	N	N	N	ML	N
Coffey Forage Seeds Inc.	Exp-SCA-1	SS	N	N	N	N	N	L	N
Coffey Forage Seeds Inc.	Exp-SCA-2 St.	SS	N	N	N	N	N	L	N
Coffey Forage Seeds Inc.	Exp-SCA-3 BMR	SS	Y	N	N	N	N	ML	N
Coffey Forage Seeds Inc.	Xtragraze BMR	SS	Y	N	N	N	N	M	N

continued

Table 2. 2017 Hay entries

Company	Variety	Type	BMR	Dwarf	Male sterile	Dry stalk	Photo-period sensitive	Maturity	Greenbug resistance
WinField United	Rocket	SN	Y	N	N	N	N	M	N
WinField United	1922	SS	Y	Y	N	N	Y	PS	N
Star Seed	Bruiser BMR	SS	Y	N	N	N	N	ME	N
Walter Moss Seed	MegaGreen	SS	N	N	N	N	Y	L	Y
Walter Moss Seed	MegaGreen BMR	SS	Y	N	N	N	Y	L	Y
KSU (check)	Rox Orange	FS	N	N	N	N	N	M	N
KSU (check)	Early Sumac	FS	N	N	N	N	N	M	N
Ward Seed	Sweet Forever BMR	SS	Y	N	N	N	Y	L	N
Ward Seed	Super Sugar DM	SS	N	N	N	N	N	L	N
Ward Seed	Nutri King BMR	SS	Y	N	N	N	N	ME	N
Ward Seed	Sweet Six BMR	SS	Y	N	N	Y	N	E	N
Monsanto	BMR 455	SS	Y	N	Y	N	N	M	N
Monsanto	Nutri-Cane II	FS	N	N	Y	N	N	M	N
Monsanto	Sweetleaf II	FS	N	N	Y	N	N	M	N
Richardson/Agrilead	AL374x66	FS	N	Y	N	N	N	E	N
Richardson/Agrilead	374x66	FS	N	Y	N	N	N	E	N

Hybrid information was provided by seed companies.

*Abbreviations: Forage sorghum (FS), sorghum sudan (SS), sorghum (S), sudangrass (SU), and millet (MT), brown mid-rib (BMR), photoperiod sensitive (PS).

**Maturity groups: early (E), medium early (ME), medium (M), medium late (ML), late (L), and full (F).

Table 3. 2017 Silage entries

Company	Variety	Type	BMR	Dwarf	Male sterile	Dry stalk	Photo-period sensitive	Maturity	Greenbug resistance	1,000 seed weight, grams
Alta Seeds	AF7401	FS	Y	Y	N	N	N	L	N	22.50
Alta Seeds	AF8301	FS	N	N	N	N	N	M	N	32.15
Alta Seeds	XF7103	FS	Y	Y	N	N	N	E	N	24.21
Alta Seeds	XF7302	FS	Y	Y	N	N	N	M	N	25.31
Alta Seeds	XF7303	FS	Y	Y	N	N	N	M	N	32.20
Arrow Seed	Silo Mor II	FS	N	N	N	N	N	ML	N	27.25
Arrow Seed	Silo Mor II BMR	FS	Y	N	N	N	N	ML	N	28.87
CHS Seed Resources	SiloSorghum Conventional	FS	N	N	N	N	N	ML	N	27.55
KSU (check)	KS Orange FSK 6080	FS	N	N	N	N	N	M	N	19.04
Monsanto	Nitri-Choice II	FS	Y	N	N	Y	N	M	N	32.04
Sharp Bros. Seed	Canex BMR 210	FS	Y	N	N	N	N	ML	N	27.89
Sharp Bros. Seed	Canex BMR 600	FS	Y	N	N	N	N	ML	N	26.98
Sharp Bros. Seed	Silex BMR 540	FS	Y	Y	N	N	N	ML	N	29.66
Star Seed	White Star	FS	N	N	N	N	N	ME	N	30.11
Walter Moss Seed	4EVER Green	FS	N	N	N	N	Y	PPS	Y	27.48
Ward Seed	EXP 10217	NA	NA	NA	NA	NA	NA	NA	NA	39.16
Ward Seed	EXP 10218	NA	NA	NA	NA	NA	NA	NA	NA	30.34
Ward Seed	EXP 10219	NA	NA	NA	NA	NA	NA	NA	NA	38.27
Ward Seed	EXP 15 F 910	NA	NA	NA	NA	NA	NA	NA	NA	23.87
Ward Seed	EXP 15 F 1097 BMR	NA	NA	NA	NA	NA	NA	NA	NA	25.10
Ward Seed	EXP 15 F 909	NA	NA	NA	NA	NA	NA	NA	NA	27.73
Ward Seed	GW 2120	FS	N	N	Y	N	N	M	N	23.27
Ward Seed	GW 400 BMR	FS	Y	N	Y	N	N	ME	N	27.62
Ward Seed	Silo Pro BMR	FS	Y	Y	N	N	N	M	N	28.98
WinField United	FS3501	FS	N	N	N	N	N	M	N	27.93
WinField United	FS3631	FS	Y	Y	N	N	N	ML	N	32.77
Richardson/Agrilead	AL374x66	FS	N	N	Y	N	N	E	N	27.00
Richardson/Agrilead	374x66	FS	N	N	Y	N	N	E	N	26.86

Hybrid information was provided by seed companies.

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Table 4. Irrigation, planting, harvesting, and fertilizing details for hay and silage variety tests near Garden City, Hays, Mound Valley, and Scandia, KS, in 2017

Location	Irrigation	Planting date	1st harvest date(s)	2nd harvest date	Seeding rate	Harvest area	Fertilizer	
							N/a	P ₂ O ₅ /a
	inches				lb/a	ft ²	----- lb/a -----	
Hay test								
Garden City	13.25	17-Jun	28-Jul / 15-Aug and 28-Aug	2-Nov	20	360	180	0
Hays	-	6-Jun	24-Aug / 12-Sep	-	15	60 - 75	50	30
Mound Valley	-	6-Jun	31-Jul	27-Nov	20	30	100	0
Scandia	-	15-Jun	30-Aug / 20-Sep	-	30	60	50	0
Location	Irrigation	Planting date	1st harvest date(s)	2nd harvest date	Seeding rate	Harvest area	Fertilizer	
							N/a	P ₂ O ₅ /a
	inches				seeds/a	ft ²	----- lb/a -----	
Silage test								
Garden City	13.25	9-Jun	21-Aug and 28-Aug / 11-Sep	-	80,000	202.5	180	0
Hays	-	6-Jun	11-Sep, 17-Sep, and 28-Sep / 10-Oct	-	50,000	25	50	30
Mound Valley	-	6-Jun	5-Sep	-	80,000	150	150	46
Scandia	-	14-Jun	12-Sep and 20-Sep / 3-Oct	-	80,800	67.5	50	0

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Table 5a. Performance: Hay performance tests near Garden City, Finney County

Brand	Name	1st cutting	2nd cutting	Total yield	1st cutting	2nd cutting	1st height	2nd height
		---- lb DM/a ----			---- % moisture ----		---- inches ----	
Forage sorghum								
Sharp Bros. Seed	Canex	5,788	7,145	12,933	0.89	0.61	85	73
Sharp Bros. Seed	Canex BMR 210	10,658	3,503	14,161	0.82	0.54	108	49
KSU (check)	Rox Orange	9,743	2,909	12,652	0.83	0.52	99	37
KSU (check)	Early Sumac	5,324	7,213	12,537	0.88	0.61	77	72
Monsanto	Nutri-Cane II	11,135	3,612	14,748	0.83	0.53	103	48
Monsanto	Sweetleaf II	7,245	8,094	15,339	0.82	0.49	97	97
Millet								
Coffey Forage Seeds Inc.	ExCeed BMR	8,326	2,085	10,411	0.83	0.38	71	33
Coffey Forage Seeds Inc.	Tifleaf 3	5,469	7,428	12,897	0.86	0.38	59	69
Coffey Forage Seeds Inc.	Epic BMR	8,707	2,221	10,928	0.84	0.39	76	37
Sorghum sudan								
Sharp Bros. Seed	Grazex BMR 801	5,506	8,839	14,345	0.85	0.57	88	87
Sharp Bros. Seed	Grazex BMR 301	12,152	4,526	16,678	0.81	0.49	119	72
Coffey Forage Seeds Inc.	Surpass BMR	9,905	4,527	14,433	0.82	0.58	91	52
Coffey Forage Seeds Inc.	Exp-SCA-1	14,001	2,236	16,237	0.77	0.36	140	37
Coffey Forage Seeds Inc.	Exp-SCA-2 St.	14,890	1,844	16,734	0.77	0.37	136	34
Coffey Forage Seeds Inc.	Exp-SCA-3 BMR	10,962	4,738	15,700	0.83	0.59	112	58
Coffey Forage Seeds Inc.	Xtragraze BMR	10,205	3,943	14,148	0.81	0.59	102	47
WinField United	1922	10,081	1,116	11,197	0.84	0.39	102	34
Star Seed	Bruiser BMR	10,614	3,108	13,722	0.83	0.54	107	47
Walter Moss Seed	MegaGreen	11,257	781	12,038	0.82	0.23	126	52
Walter Moss Seed	MegaGreen BMR	11,663	556	12,219	0.84	0.25	96	44
Ward Seed	Sweet Forever BMR	14,004	879	14,883	0.82	0.39	121	33
Ward Seed	Super Sugar DM	9,992	4,837	14,829	0.83	0.57	109	66
Ward Seed	Nutri King BMR	5,165	6,337	11,502	0.87	0.61	90	74
Ward Seed	Sweet Six BMR	5,691	7,367	13,058	0.86	0.56	89	76
Monsanto	BMR 455	5,993	7,988	13,981	0.85	0.61	90	78
Sudan								
WinField United	Rocket	10,188	2,122	12,309	0.84	0.42	101	42
	Average	9,410	4,229	13,639	0.83	0.48	99.74	55.71
	LSD (0.05)	1,494	1,203	1,801				

Values in bold within a column are in the highest least significant different (LSD) group.

Table 5b. Forage quality: Hay performance tests near Garden City, Finney County

Brand	Name	ADF	NDF	IVTDMD	Lignin	NDFD	NDFn	NEG	NEL	NEM	NFC	Crude protein	RFQ	TDN
				@48hr		@48hr								
----- % -----														
Forage sorghum														
Sharp Bros. Seed	Canex	41.96	64.94	70.00	8.62	51.67	60.39	0.19	0.49	0.52	15.56	10.70	84.42	49.53
Sharp Bros. Seed	Canex BMR 210	41.60	64.63	73.20	8.31	56.33	60.11	0.24	0.54	0.57	18.77	8.99	93.62	53.11
KSU (check)	Rox Orange	40.32	63.14	70.03	8.33	50.33	58.72	0.21	0.51	0.54	20.40	8.86	88.35	50.99
KSU (check)	Early Sumac	42.80	65.79	67.60	9.35	47.82	61.19	0.17	0.47	0.50	15.34	9.98	77.81	47.69
Monsanto	Nutri-Cane II	40.66	63.80	70.07	8.68	50.90	59.33	0.22	0.51	0.54	20.14	8.54	87.71	51.03
Monsanto	Sweetleaf II	45.42	70.15	64.33	10.26	46.57	65.24	0.15	0.45	0.47	12.53	9.50	68.73	45.78
Millet														
Coffey Forage Seeds Inc.	ExCeed BMR	38.61	62.60	77.97	7.82	65.07	58.21	0.27	0.56	0.60	14.49	13.45	107.90	55.49
Coffey Forage Seeds Inc.	Tifleaf 3	39.54	61.36	77.30	8.41	62.87	57.06	0.26	0.55	0.58	14.27	14.52	99.71	54.29
Coffey Forage Seeds Inc.	Epic BMR	38.62	61.81	78.53	7.82	65.64	57.48	0.27	0.56	0.60	13.74	14.42	105.88	55.34

continued

Table 5b. Forage quality: Hay performance tests near Garden City, Finney County

Brand	Name	ADF	IVTDMD			NDFD			NEG	NEL	NEM	Crude		
			NDF	@48hr	Lignin	@48hr	NDFn	NFC				protein	RFQ	TDN
----- % -----														
Sorghum sudan														
Sharp Bros. Seed	Grazex BMR 801	42.09	65.72	71.30	9.03	54.87	61.12	0.21	0.51	0.54	15.17	10.60	87.97	50.87
Sharp Bros. Seed	Grazex BMR 301	43.24	68.20	69.23	9.15	53.03	63.43	0.21	0.51	0.54	16.29	8.90	84.94	50.98
Coffey Forage Seeds Inc.	Surpass BMR	40.51	64.27	73.20	8.02	56.60	59.77	0.22	0.52	0.55	15.67	10.68	93.47	51.81
Coffey Forage Seeds Inc.	Exp-SCA-1	47.20	71.08	60.63	9.74	40.80	66.11	0.14	0.45	0.47	16.87	7.32	62.10	45.34
Coffey Forage Seeds Inc.	Exp-SCA-2 St.	47.43	71.84	61.67	9.52	43.20	66.81	0.16	0.47	0.49	17.74	6.77	64.14	46.95
Coffey Forage Seeds Inc.	Exp-SCA-3 BMR	42.54	65.91	71.80	8.86	55.70	61.29	0.21	0.51	0.53	14.41	10.44	86.32	50.60
Coffey Forage Seeds Inc.	Xtragraze BMR	41.44	64.63	71.13	8.46	53.83	60.11	0.21	0.51	0.54	15.92	10.12	88.59	50.78
WinField United	1922	42.87	64.24	73.00	7.44	55.37	59.74	0.20	0.50	0.52	13.05	11.62	82.61	49.59
Star Seed	Bruiser BMR	40.83	65.10	74.67	7.99	53.27	60.55	0.22	0.52	0.55	18.49	8.66	89.89	51.52
Walter Moss Seed	MegaGreen	47.02	70.66	61.80	9.47	42.23	65.71	0.12	0.44	0.45	15.28	7.57	60.86	44.35
Walter Moss Seed	MegaGreen BMR	44.65	67.32	70.97	8.17	54.77	62.61	0.18	0.49	0.51	12.18	10.51	76.62	48.51
Ward Seed	Sweet Forever BMR	43.19	67.00	70.83	8.12	53.40	62.31	0.21	0.51	0.54	18.20	7.70	81.50	50.59
Ward Seed	Super Sugar DM	43.22	66.56	68.27	9.70	50.17	61.90	0.18	0.48	0.51	15.83	9.45	79.30	48.69
Ward Seed	Nutri King BMR	42.14	63.65	72.03	8.81	54.57	59.45	0.20	0.50	0.52	14.43	11.09	84.77	49.76
Ward Seed	Sweet Six BMR	42.29	65.26	72.67	8.74	57.07	60.69	0.21	0.51	0.54	13.58	11.18	87.41	50.77
Monsanto	BMR 455	42.29	63.99	73.23	9.17	56.60	59.51	0.21	0.51	0.54	15.43	10.56	88.02	50.86
Sudan														
WinField United	Rocket	43.35	63.51	71.93	8.03	53.23	59.06	0.18	0.49	0.51	14.22	11.00	79.69	48.72
	Average	43.35	65.66	70.67	8.69	53.30	61.07	0.20	0.50	0.53	15.69	10.12	84.32	50.15
	LSD (0.05)	1.89	2.22	2.06	0.08	4.45	2.06	0.03	0.03	0.03	2.14	0.78	8.87	2.56

Acid detergent fiber (ADF), neutral detergent fiber (NDF), in vitro true dry matter digestibility after 48 hours (IVTDMD@48hr), % of NDF digestible after 48 hours (NDFD@48hr), nitrogen free NDF (NDFn), net energy for gain (NEG), net energy for lactation (NEL), net energy for maintenance (NEM), non-fibrous carbohydrates (NFC), relative forage quality (RFQ), total digestible nutrients (TDN).

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Table 6a. Performance: Hay performance tests near Hays, Ellis County

Brand	Name	1st cutting lb DM/a	1st cutting % moisture	1st height inches
Forage sorghum				
AgriLead	374x66	8,070	0.76	64
AgriLead	AL374x66	7,554	0.77	65
CHS Seed Resources	High Yield BMR	8,546	0.62	71
KSU (check)	Rox Orange	7,747	0.78	67
KSU (check)	Early Sumac	5,664	0.77	67
Sharp Bros. Seed	Canex	8,468	0.76	69
Sharp Bros. Seed	Canex BMR 210	7,424	0.77	62
Sorghum sudan				
Arrow Seed	1st Choice BMR	5,439	0.80	64
Arrow Seed	Honey Graze V	8,817	0.62	92
CHS Seed Resources	High Yield BMF Dwarf	7,403	0.76	70
Sharp Bros. Seed	Grazex BMR 301	7,387	0.74	83
Sharp Bros. Seed	Grazex BMR 801	5,333	0.75	79
Star Seed	Bruiser BMR	6,790	0.77	67
WinField United	1922	8,542	0.60	80
Sudan				
WinField United	Rocket	8,966	0.58	75
	Average	7,477	0.72	71.61
	LSD (0.05)	1,834		

Table 6b. Forage quality: Hay performance tests near Hays, Ellis County

Brand	Name	ADF	NDF	IVTDMD		NDFD		NEG	NEL	NEM	NFC	Crude		
				@48hr	Lignin	@48hr	NDFn					protein	RFQ	TDN
----- % -----														
Forage sorghum														
AgriLead	374x66	36.87	61.55	75.23	6.66	58.70	57.25	0.31	0.59	0.63	26.75	6.53	106.71	58.28
AgriLead	AL374x66	37.55	61.82	74.90	6.43	57.77	57.49	0.30	0.58	0.63	24.92	7.82	109.63	57.54
CHS Seed Resources	High Yield BMR	36.49	59.20	76.97	6.43	59.33	55.06	0.32	0.60	0.64	30.15	4.86	98.09	58.85
KSU (check)	Rox Orange	38.23	60.91	75.53	6.07	58.90	56.65	0.30	0.59	0.63	25.85	7.48	107.79	57.52
KSU (check)	Early Sumac	36.09	59.04	76.87	6.22	59.03	54.91	0.33	0.61	0.65	29.95	6.04	108.02	59.45
Sharp Bros. Seed	Canex	34.72	57.32	77.97	6.55	59.80	53.31	0.34	0.62	0.67	30.34	7.67	121.93	60.51
Sharp Bros. Seed	Canex BMR 210	37.77	62.37	77.10	5.49	62.07	58.00	0.32	0.61	0.65	24.83	7.23	113.83	59.21
Sorghum sudan														
Arrow Seed	1st Choice BMR	38.89	64.30	76.20	6.12	61.70	59.79	0.29	0.58	0.62	21.36	7.47	106.69	57.22
Arrow Seed	Honey Graze V	36.81	60.36	75.77	7.82	58.10	56.13	0.32	0.60	0.64	29.72	5.61	102.37	58.57
CHS Seed Resources	High Yield BMF Dwarf	37.99	61.68	74.50	6.44	56.67	57.36	0.28	0.57	0.61	24.00	7.24	100.50	55.83
Sharp Bros. Seed	Grazex BMR 301	37.53	62.28	73.60	6.58	55.97	57.92	0.29	0.58	0.62	25.34	6.89	102.83	56.90
Sharp Bros. Seed	Grazex BMR 801	39.71	64.02	72.20	6.92	55.43	59.54	0.27	0.56	0.60	22.68	6.85	96.01	55.16
Star Seed	Bruiser BMR	38.02	62.60	76.27	6.04	60.67	58.22	0.30	0.58	0.63	22.82	7.28	106.48	57.34
WinField United	1922	37.50	59.39	75.37	5.34	57.80	55.24	0.29	0.58	0.62	25.63	6.48	100.87	56.79
Sudan														
WinField United	Rocket	39.21	60.13	74.30	5.23	56.77	55.92	0.27	0.56	0.60	25.12	5.57	91.41	55.56
	Average	37.56	61.13	75.52	6.29	58.58	56.85	0.30	0.59	0.63	25.96	6.74	104.88	57.65
	LSD (0.05)	1.80	2.33	2.41	0.66	3.61	2.17	0.03	0.03	0.03	3.24	1.46	9.92	2.03

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Table 7a. Performance: Hay performance tests near Mound Valley, Labette County

Brand	Name	1st cutting	2nd cutting	Total yield	1st cutting	2nd cutting
		----- lb DM/a -----			-----% moisture ----	
Forage sorghum						
KSU (check)	Rox Orange	4,656	3,040	7,695	0.82	0.28
KSU (check)	Early Sumac	6,062	3,267	9,329	0.79	0.28
Sorghum sudan						
Browning Seed	Wondergreen SX-60	6,291	2,822	9,113	0.73	0.25
Browning Seed	SweetSioux WMR	6,441	3,263	9,704	0.74	0.30
Browning Seed	Cadan 99B	6,688	3,000	9,688	0.73	0.22
Browning Seed	SweetSioux BMR	5,933	3,132	9,064	0.78	0.27
Ward Seed	Sweet Forever BMR	4,769	3,103	7,871	0.79	0.27
Ward Seed	Sweet Six BMR	6,714	2,853	9,566	0.76	0.26
Ward Seed	Nutri King BMR	5,576	2,851	8,427	0.79	0.24
	Average	5,903	3,037	8,940	0.77	0.26
	LSD (0.05)	1,599	802	1,711		

Table 7b. Forage quality: Hay performance tests near Mound Valley, Labette County

Brand	Name	ADF	IVTDMD			NDFD			NEG	NEL	NEM	NFC	Crude	
			NDF	@48hr	Lignin	@48hr	NDFn	protein					RFQ	TDN
----- % -----														
Forage sorghum														
KSU (check)	Rox Orange	37.38	61.11	72.87	6.30	53.10	56.83	0.26	0.55	0.59	23.28	9.18	102.47	54.44
KSU (check)	Early Sumac	34.97	57.84	75.63	5.26	54.20	53.79	0.30	0.58	0.62	27.14	9.76	117.26	57.43
Sorghum sudan														
Browning Seed	Wondergreen SX-60	38.13	61.85	71.13	6.31	50.80	57.52	0.27	0.56	0.60	25.78	8.04	102.94	55.53
Browning Seed	SweetSioux WMR	37.38	61.14	72.03	6.19	51.90	56.86	0.28	0.57	0.61	26.09	8.49	107.40	56.21
Browning Seed	Cadan 99B	38.18	62.01	70.67	6.48	50.20	57.67	0.27	0.56	0.60	26.46	7.55	100.98	55.47
Browning Seed	SweetSioux BMR	36.50	59.77	74.97	5.89	56.30	55.59	0.29	0.58	0.62	24.24	9.51	112.98	56.75
Ward Seed	Sweet Forever BMR	38.93	62.19	74.17	5.99	55.70	57.84	0.26	0.56	0.59	22.54	8.49	100.85	54.92
Ward Seed	Sweet Six BMR	36.48	60.72	74.87	5.76	56.50	56.47	0.29	0.58	0.62	23.60	9.80	114.35	56.94
Ward Seed	Nutri King BMR	38.20	61.83	74.17	5.90	56.00	57.50	0.27	0.56	0.60	21.93	9.42	104.96	55.16
	Average	37.35	60.94	73.39	6.01	53.86	56.67	0.28	0.57	0.61	24.56	8.91	107.13	55.87
	LSD (0.05)	1.52	1.51	2.11	0.53	3.89	1.41	0.03	0.03	0.03	2.65	1.71	8.33	2.47

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Table 8a. Performance: Hay performance tests near Scandia, Republic County

Brand	Name	1st cutting		
		lb DM/a	% moisture	inches
Forage sorghum				
KSU (check)	Rox Orange	4,878	0.78	72
KSU (check)	Early Sumac	5,500	0.75	83
Sorghum sudan				
Arrow Seed	1st Choice BMR	7,967	0.79	88
Arrow Seed	Honey Graze V	7,019	0.71	105
Star Seed	Bruiser BMR	7,271	0.79	86
Ward Seed	Nutri King BMR	6,461	0.77	97
Ward Seed	Sweet Six BMR	6,881	0.75	93
Ward Seed	Super Sugar DM	6,743	0.71	94
Ward Seed	Sweet Forever BMR	8,433	0.76	92
WinField United	1922	6,634	0.77	85
Sudan				
WinField United	Rocket	3,427	0.72	74
	Average	6,474	0.75	88
	LSD (0.05)	2,360		

Table 8b. Forage quality: Hay performance tests near Scandia, Republic County

Brand	Name	ADF	NDF	IVTDMD	Lignin	NDFD	NDFn	NEG	NEL	NEM	NFC	Crude protein	RFQ	TDN
				@48hr		@48hr								
----- % -----														
Forage sorghum														
KSU (check)	Rox Orange	34.01	56.38	80.97	5.22	64.83	52.43	0.36	0.64	0.69	29.28	9.54	137.61	62.19
KSU (check)	Early Sumac	32.55	52.73	80.57	6.16	60.23	49.04	0.35	0.63	0.68	32.05	9.81	135.13	61.61
Sorghum sudan														
Arrow Seed	1st Choice BMR	36.22	59.59	80.40	5.98	65.23	55.42	0.33	0.62	0.66	23.18	10.19	128.00	60.02
Arrow Seed	Honey Graze V	39.42	61.55	72.60	6.84	53.17	57.25	0.29	0.57	0.61	27.89	6.32	98.09	56.42
Star Seed	Bruiser BMR	35.46	58.55	80.50	5.78	65.17	57.45	0.33	0.61	0.66	23.47	10.36	128.16	59.94
Ward Seed	Nutri King BMR	36.33	59.32	78.17	6.11	60.98	55.17	0.31	0.59	0.63	24.15	9.89	120.43	58.33
Ward Seed	Sweet Six BMR	36.37	59.55	77.47	6.29	60.47	55.39	0.30	0.59	0.63	23.93	9.41	117.17	57.86
Ward Seed	Super Sugar DM	37.46	60.29	73.60	6.54	53.90	56.07	0.29	0.58	0.62	26.05	8.33	108.91	56.91
Ward Seed	Sweet Forever BMR	36.69	60.28	77.57	5.70	60.23	56.06	0.31	0.60	0.64	26.83	7.44	112.80	58.71
WinField United	1922	41.64	63.93	72.03	6.19	53.63	59.46	0.23	0.53	0.56	18.38	9.16	91.79	52.34
Sudan														
WinField United	Rocket	37.15	58.21	76.77	5.84	57.37	54.14	0.28	0.57	0.61	23.12	10.26	109.74	56.21
	Average	36.66	59.13	77.33	6.06	59.57	55.26	0.31	0.59	0.64	25.30	9.16	117.07	58.23
	LSD (0.05)	2.60	2.38	2.06	0.64	3.33	2.21	0.03	0.02	0.03	3.50	2.89	13.11	1.99

Table 9a. Performance: Silage performance tests near Garden City, Finney County

Brand	Variety	Yield	Harvest moisture	Stand ¹	Vigor ¹	Flowering date	Days to harvest	Height	Lodging
		lb DM/a	%					inches	%
Alta Seeds	AF7401	15,813	0.76	10	10	9/12/17	116	78	0
Alta Seeds	XF7302	13,857	0.76	10	10	9/12/17	116	75	0
Alta Seeds	XF7303	15,250	0.75	10	10	9/12/17	116	66	0
Alta Seeds	XF7103	11,562	0.72	10	9	8/28/17	96	65	0
Alta Seeds	AF8301	15,266	0.76	10	10	9/4/17	104	90	0
KSU (check)	KS Orange	17,875	0.72	9	9	8/28/17	104	118	0
Monsanto	Nitri-Choice II	17,209	0.76	10	10	9/12/17	116	97	0
Sharp Bros. Seed	Canex BMR 210	13,168	0.74	10	10	8/28/17	96	112	0
Sharp Bros. Seed	Canex BMR 600	15,764	0.77	10	9	9/12/17	116	125	0
Sharp Bros. Seed	Silex BMR 540	14,707	0.74	10	10	9/12/17	116	92	0
Star Seed	White Star	13,867	0.73	10	10	8/28/17	96	79	0
Walter Moss Seed	4EVER Green	17,654	0.81	10	10	1/7/00	116	121	10
Ward Seed	Silo Pro BMR	12,369	0.78	10	10	8/28/17	104	81	0
Ward Seed	GW 400 BMR	14,173	0.74	10	10	8/28/17	96	106	0
Ward Seed	GW 2120	15,815	0.75	10	10	8/28/17	96	113	0
Ward Seed	EXP 15 F 909	15,183	0.71	10	10	9/4/17	96	123	0
Ward Seed	EXP 15 F 910	16,472	0.70	10	10	8/28/17	96	121	0
Ward Seed	EXP 15 F 1097 BMR	13,031	0.77	10	10	8/28/17	96	104	0
Ward Seed	EXP 10217	16,170	0.77	10	10	9/18/17	116	87	0
Ward Seed	EXP 10218	14,429	0.75	10	9	9/4/17	104	74	0
Ward Seed	EXP 10219	17,567	0.78	10	10	9/18/17	116	104	0
WinField United	FS3501	16,249	0.78	10	10	8/28/17	104	111	0
WinField United	FS3631	15,473	0.77	10	9	9/12/17	116	92	0
Average		15,170	0.75	10	10	-	106	97	0.43
LSD (0.05)		2,972							

¹Stand and vigor are measured via a visual rating of 0-10, with 10 being the best.

Table 9b. Forage quality: Silage performance tests near Garden City, Finney County

Brand	Variety	ADF	IVTDMD		NDFD			NEG	NEL	NEM	NFC	Crude		TDN	Total starch
			NDF	@48hr	Lignin	@48hr	NDFn					protein	RFQ		
----- % -----															
Alta Seeds	AF7401	36.10	56.81	71.53	4.45	53.00	52.83	0.27	0.56	0.60	25.73	7.81	102.10	55.45	9.00
Alta Seeds	XF7302	37.52	58.78	71.33	4.55	54.47	54.66	0.27	0.56	0.60	24.24	8.22	104.10	55.61	6.73
Alta Seeds	XF7303	36.75	57.31	70.90	4.61	51.17	53.30	0.25	0.54	0.58	24.73	8.05	97.17	53.76	9.77
Alta Seeds	XF7103	33.89	52.06	75.60	4.30	51.27	48.41	0.29	0.58	0.62	28.91	9.01	110.92	56.55	16.20
Alta Seeds	AF8301	40.30	63.40	66.23	6.02	49.00	58.97	0.22	0.52	0.55	21.52	7.61	86.52	51.39	5.83
KSU (check)	KS Orange	36.72	59.87	66.63	5.24	50.03	55.68	0.28	0.57	0.60	26.00	8.12	104.52	55.74	8.10
Monsanto	Nitri-Choice II	40.85	64.15	64.50	5.72	48.67	59.66	0.22	0.52	0.55	21.85	6.55	82.55	51.55	6.00
Sharp Bros. Seed	Canex BMR 210	35.62	58.38	72.70	3.83	56.50	54.29	0.32	0.60	0.65	26.70	9.01	121.04	58.98	9.63
Sharp Bros. Seed	Canex BMR 600	38.74	63.82	68.27	4.59	55.33	59.35	0.27	0.56	0.60	23.30	6.92	98.81	55.78	2.90
Sharp Bros. Seed	Silex BMR 540	36.48	59.40	69.87	4.84	53.90	55.24	0.28	0.57	0.61	24.52	8.32	106.07	55.93	5.67
Star Seed	White Star	37.08	58.55	70.70	4.71	51.07	54.45	0.25	0.55	0.58	24.47	8.27	99.14	54.12	11.30
Walter Moss Seed	4EVER Green	43.54	70.43	63.17	5.77	51.57	65.50	0.20	0.50	0.53	16.94	6.50	75.53	49.80	0.00
Ward Seed	Silo Pro BMR	36.07	59.56	73.27	4.21	58.03	55.39	0.29	0.58	0.62	22.91	9.85	115.52	57.09	2.90
Ward Seed	GW 400 BMR	33.33	53.72	77.30	3.19	58.33	49.96	0.33	0.61	0.66	28.69	9.64	127.84	59.96	9.33
Ward Seed	GW 2120	35.01	56.45	71.77	4.48	50.83	52.50	0.28	0.57	0.60	27.31	8.53	107.35	55.95	12.87
Ward Seed	EXP 15 F 909	39.56	62.82	66.17	5.49	47.77	58.42	0.22	0.52	0.55	23.05	6.97	85.25	51.63	8.93
Ward Seed	EXP 15 F 910	38.74	62.23	66.10	5.50	47.20	57.87	0.23	0.53	0.55	23.22	7.71	89.89	52.04	9.93
Ward Seed	EXP 15 F 1097 BMR	33.67	53.98	76.53	3.43	57.07	50.20	0.31	0.60	0.64	27.71	9.90	123.31	58.71	9.97
Ward Seed	EXP 10217	38.50	62.73	67.40	4.81	53.23	58.34	0.26	0.55	0.59	22.27	8.10	99.92	54.73	3.63
Ward Seed	EXP 10218	37.93	62.02	69.47	4.66	53.10	57.68	0.25	0.55	0.58	21.96	9.09	101.75	54.25	4.33
Ward Seed	EXP 10219	39.83	65.01	66.07	4.91	52.83	60.46	0.26	0.55	0.58	21.94	6.94	93.30	54.25	3.23
WinField United	FS3501	37.96	61.86	70.33	4.81	54.80	57.53	0.28	0.57	0.61	23.21	8.56	107.18	56.14	5.13
WinField United	FS3631	35.03	58.16	72.00	3.72	57.13	54.09	0.30	0.58	0.62	24.51	9.19	115.11	57.34	3.37
Average		37.36	60.06	69.91	4.69	52.88	55.86	0.27	0.56	0.59	24.16	8.21	102.39	55.08	7.16
LSD (0.05)		2.02	2.75	2.08	0.06	2.16	2.55	0.02	0.02	0.02	2.34	1.08	8.49	1.61	3.58

Table 10a. Performance: Silage performance tests near Hays, Ellis County

Brand	Variety	Yield	Harvest moisture	Stand	Vigor	Flowering date	Days to harvest	Height	Lodging
		lb DM/a	%					inches	%
Alta Seeds	AF7401	10,055	0.74	10	9	9/10/17	114	69	0
Alta Seeds	AF8301	11,958	0.72	10	9	9/13/17	114	74	0
Alta Seeds	XF7103	11,231	0.66	10	9	9/25/17	97	57	0
Alta Seeds	XF7302	8,143	0.74	10	8	8/26/17	114	67	0
Alta Seeds	XF7303	9,986	0.73	9	8	8/28/17	114	59	0
Arrow Seed	Silo Mor II	10,715	0.72	9	9	9/1/17	114	75	0
Arrow Seed	Silo Mor II BMR	9,956	0.69	9	9	8/22/17	114	59	0
CHS Seed Resources	SiloSorghum Conventional	10,199	0.72	10	10	9/18/17	114	76	0
KSU (check)	KS Orange	11,958	0.65	9	9	9/12/17	103	100	12
Sharp Bros. Seed	Canex BMR 210	11,246	0.70	8	8	8/20/17	103	96	8
Sharp Bros. Seed	Canex BMR 600	10,082	0.74	9	8	8/26/17	126	85	0
Sharp Bros. Seed	Silex BMR 540	9,278	0.69	8	8	9/1/17	126	61	0
Star Seed	White Star	12,446	0.65	10	10	9/5/17	97	64	0
WinField United	FS3501	11,073	0.73	10	9	8/24/17	114	87	0
WinField United	FS3631	11,119	0.71	10	9	9/20/17	126	75	0
Average		10,630	0.71	9	9	*	113	74	1.33
LSD (0.05)		2,323							

Table 10b. Forage quality: Silage performance tests near Hays, Ellis County

Brand	Variety	ADF	NDF	IVTDMD		NDFD		NEG	NEL	NEM	NFC	Crude protein	RFQ	TDN	Total starch
				@48hr	Lignin	@48hr	NDFn								
----- % -----															
Alta Seeds	AF7401	38.72	62.23	70.97	4.07	55.70	57.87	0.29	0.57	0.61	25.29	5.85	96.35	56.55	7.60
Alta Seeds	AF8301	39.30	60.19	66.93	5.47	46.13	55.98	0.23	0.53	0.56	27.80	4.20	73.84	52.57	15.70
Alta Seeds	XF7103	34.67	53.67	73.47	4.01	50.60	49.92	0.29	0.58	0.62	31.85	5.75	95.90	56.96	18.60
Alta Seeds	XF7302	36.79	59.90	71.23	4.22	54.70	55.71	0.29	0.57	0.61	25.69	7.34	103.90	56.45	7.63
Alta Seeds	XF7303	39.04	61.49	70.00	4.76	52.50	57.18	0.26	0.55	0.58	25.42	5.41	85.89	54.23	8.27
Arrow Seed	Silo Mor II	39.86	62.90	65.80	5.07	47.97	58.50	0.23	0.53	0.56	24.59	5.44	78.78	52.05	10.23
Arrow Seed	Silo Mor II BMR	36.92	58.30	70.37	4.57	50.77	54.22	0.27	0.56	0.60	28.24	5.89	92.74	55.60	14.73
CHS Seed Resources	SiloSorghum Conv.	39.33	62.40	67.80	4.88	51.17	58.03	0.25	0.55	0.58	25.31	5.47	85.42	53.94	9.20
KSU (check)	KS Orange	39.11	60.96	67.00	5.10	48.37	56.70	0.27	0.56	0.60	28.83	4.43	83.57	55.29	16.80
Sharp Bros. Seed	Canex BMR 210	36.96	56.71	71.27	4.29	50.73	52.74	0.29	0.58	0.62	30.16	5.28	93.19	56.79	18.60
Sharp Bros. Seed	Canex BMR 600	36.21	60.88	70.40	4.04	55.37	56.62	0.03	0.60	0.64	28.61	5.97	105.06	58.72	8.97
Sharp Bros. Seed	Silex BMR 540	37.42	60.03	68.37	4.94	50.37	55.83	0.27	0.56	0.60	28.22	5.14	88.21	55.33	13.57
Star Seed	White Star	35.96	57.31	71.67	3.96	51.83	53.30	0.28	0.57	0.61	28.33	6.42	98.08	56.21	14.70
WinField United	FS3501	37.42	62.06	68.63	4.54	53.40	57.72	0.30	0.58	0.63	27.42	5.71	98.67	57.40	8.87
WinField United	FS3631	36.24	58.47	70.73	3.99	52.33	54.38	0.29	0.58	0.62	28.70	5.88	97.56	56.85	13.63
Average		37.60	59.83	69.64	4.53	51.46	55.65	0.26	0.56	0.60	27.63	5.61	91.81	55.66	12.47
LSD (0.05)		3.97	6.53	4.90	1.03	3.87	6.07	0.04	0.03	0.04	4.28	1.55	14.62	2.92	6.50

Table 11a. Performance: Silage performance tests near Mound Valley, Labette County

Brand	Variety	Yield	Harvest moisture	Stand	Vigor	Flowering date	Days to harvest	Height	Lodging
		lb DM/a	%					inches	%
Alta Seeds	XF7103	7,933	1	10	10	9/8/17	91	58	0
KSU (check)	KS Orange	5,857	1	10	10	9/12/17	91	92	47
Ward Seed	EXP 15 F 1097 BMR	6,027	0.75	10	10	9/12/17	91	84	50
Ward Seed	GW 400 BMR	7,117	0.74	10	10	9/12/17	91	81	44
Average		6,733	1	10	10	42989	91	79	35
LSD (0.05)		4,185							

Table 11b. Forage quality: Silage performance tests near Mound Valley, Labette County

Brand	Variety	ADF	NDF	IVTDMD		NDFD		NEG	NEL	NEM	NFC	Crude		TDN	Total
				@48hr	Lignin	@48hr	NDFn					protein	RFQ		
----- % -----															
Alta Seeds	XF7103	36.80	56.45	67.20	5.53	48.97	52.50	0.27	0.55667	0.59	28.31	5.63	88.88	54.89	9.87
KSU (check)	KS Orange	41.07	65.59	61.47	7.00	46.93	61.00	0.23	0.52667	0.56	23.88	4.66	75.69	52.28	4.27
Ward Seed	EXP 15 F 1097 BMR	38.87	60.76	65.87	6.37	49.87	56.51	0.24	0.54	0.57	24.10	7.10	91.67	53.40	1.20
Ward Seed	GW 400 BMR	38.28	59.90	66.53	6.11	49.87	55.71	0.25	0.55	0.58	25.22	6.70	92.40	54.04	3.60
Average		38.76	60.68	65.27	6.25	48.91	56.43	0.25	0.54	0.58	25.38	6.02	87.16	53.65	4.73
LSD (0.05)		2.22	3.48	3.33	1.47	2.95	3.24	0.04	0.03	0.03	3.47	1.13	8.92	2.66	5.72

Table 12a. Performance: Silage performance tests near Scandia, Republic County

Brand	Variety	Yield	Harvest moisture	Stand	Vigor	Days to harvest	Height	Lodging
		lb DM/a	%				inches	%
Agrilead	374x66	9,855	0.74	10	9	90	103	0
Agrilead	AL374x66	9,075	0.73	10	10	90	97	3
Alta Seeds	AF7401	9,105	0.73	9	9	111	63	0
Alta Seeds	AF8301	9,038	0.73	10	10	111	80	0
Alta Seeds	XF7103	7,789	0.75	9	9	90	63	0
Alta Seeds	XF7302	9,541	0.75	10	10	111	66	0
Alta Seeds	XF7303	8,874	0.72	10	9	111	55	0
Arrow Seed	Silo Mor II	8,997	0.72	10	10	111	83	0
Arrow Seed	Silo Mor II BMR	8,901	0.71	10	10	111	76	0
KSU (check)	KS Orange	8,545	0.68	8	9	98	108	0
Star Seed	White Star	8,332	0.75	10	10	90	71	0
Ward Seed	EXP 15 F 1097 BMR	8,247	0.74	9	9	90	77	17
Ward Seed	EXP 15 F 909	8,137	0.69	10	10	90	104	0
Ward Seed	EXP 15 F 910	8,966	0.63	9	10	98	102	0
Ward Seed	GW 2120	7,860	0.73	9	9	90	96	0
Ward Seed	GW 400 BMR	8,872	0.74	10	10	90	88	0
Ward Seed	Silo Pro BMR	8,352	0.71	10	10	98	71	0
WinField United	FS3501	8,331	0.76	10	10	98	86	0
WinField United	FS3631	7,999	0.71	10	9	111	74	0
Average		8,675	0.72	10	10	99	82	1
LSD (0.05)		2,288						

Table 12b. Forage quality: Silage performance tests near Scandia, Republic County

Brand	Variety	ADF	NDF	IVTDMD		NDFD		NEG	NEL	NEM	NFC	Crude		TDN	Total starch
				@48hr	Lignin	@48hr	NDFn					protein	RFQ		
----- % -----															
Agrilead	374x66	34.31	58.74	71.43	3.71	52.80	54.63	0.29	0.58	0.62	26.70	8.02	109.17	57.02	9.40
Agrilead	AL374x66	36.22	60.63	70.37	4.23	52.63	56.38	0.29	0.58	0.61	25.51	7.51	104.53	56.58	7.77
Alta Seeds	AF7401	35.93	59.58	74.70	3.50	58.97	55.41	0.31	0.60	0.64	24.46	7.93	114.49	58.48	5.30
Alta Seeds	AF8301	45.38	72.50	63.73	5.73	52.60	67.43	0.22	0.52	0.55	17.21	4.52	71.10	51.77	0.43
Alta Seeds	XF7103	36.11	57.99	75.47	3.94	57.93	53.93	0.31	0.59	0.63	24.19	8.66	115.77	58.06	6.17
Alta Seeds	XF7302	37.61	61.40	74.20	3.50	59.87	57.10	0.31	0.59	0.64	22.48	8.23	113.40	58.07	1.90
Alta Seeds	XF7303	38.86	62.59	72.83	3.87	58.63	58.22	0.29	0.58	0.62	23.48	5.92	98.30	56.97	1.60
Arrow Seed	Silo Mor II	38.88	64.69	69.23	4.55	54.07	60.16	0.26	0.55	0.59	21.51	7.18	96.66	54.88	3.27
Arrow Seed	Silo Mor II BMR	37.74	62.53	70.73	4.05	57.27	58.16	0.31	0.59	0.64	24.37	6.80	106.96	58.03	3.40
KSU (check)	KS Orange	38.28	63.96	67.97	4.47	52.37	59.48	0.27	0.57	0.60	24.41	6.45	96.53	55.62	6.03
Star Seed	White Star	39.13	63.69	71.20	4.56	55.50	59.24	0.27	0.56	0.60	21.52	7.31	98.60	55.26	3.07
Ward Seed	EXP 15 F 1097 BMR	32.23	54.62	78.23	3.35	60.33	50.80	0.34	0.62	0.66	25.60	11.42	134.37	60.23	4.97
Ward Seed	EXP 15 F 909	42.93	70.33	65.87	5.17	52.43	65.41	0.23	0.53	0.56	19.21	4.89	76.54	52.46	2.40
Ward Seed	EXP 15 F 910	42.33	69.17	63.70	5.55	50.57	64.33	0.23	0.53	0.55	18.56	6.57	82.21	51.93	1.60
Ward Seed	GW 2120	35.81	59.61	71.90	4.17	53.10	55.44	0.28	0.57	0.60	24.67	8.21	105.74	55.93	7.40
Ward Seed	GW 400 BMR	33.60	56.76	77.20	3.28	59.80	52.78	0.33	0.61	0.65	25.78	9.52	125.74	59.61	5.23
Ward Seed	Silo Pro BMR	34.05	57.84	74.67	3.61	58.13	53.79	0.31	0.59	0.63	24.53	9.51	120.01	58.26	3.10
WinField United	FS3501	36.31	61.51	72.43	4.00	56.70	57.20	0.31	0.59	0.63	23.97	8.26	113.89	58.00	5.23
WinField United	FS3631	34.10	58.10	74.30	3.49	58.53	54.04	0.32	0.60	0.65	25.76	8.49	120.49	59.38	4.67
Average		37.36	61.91	71.59	4.14	55.91	57.58	0.29	0.58	0.62	23.36	7.65	105.50	56.66	4.36
LSD (0.05)		2.82	3.96	3.01	0.55	2.28	3.68	0.02	0.02	0.02	2.18	1.72	12.00	1.64	3.96

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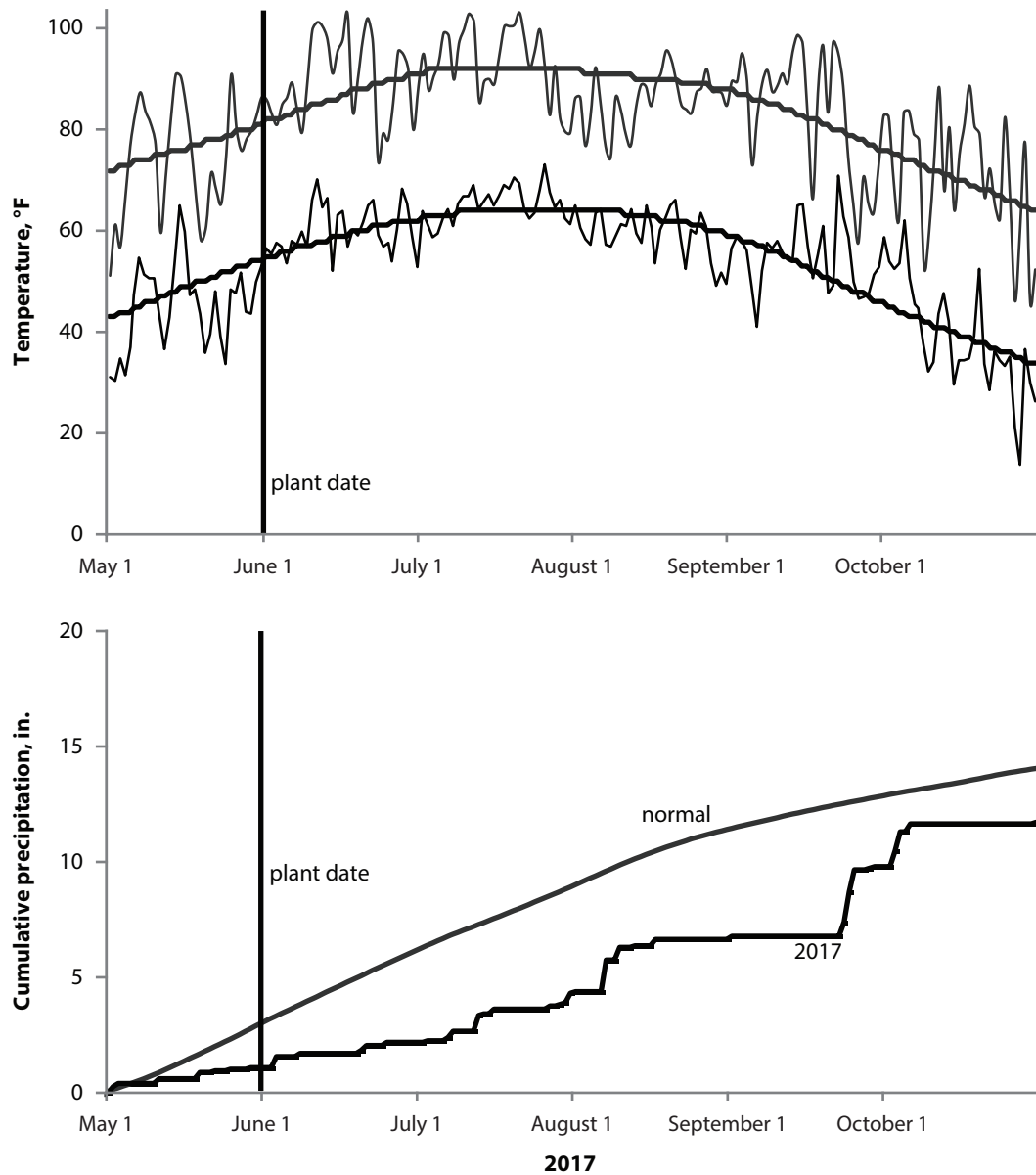


Figure 1. Precipitation and temperature during the 2017 growing season near Garden City, KS. A pane: daily and mean (1981 to 2010) high and low temperature. B pane: daily and mean (1981 to 2010) cumulative precipitation.

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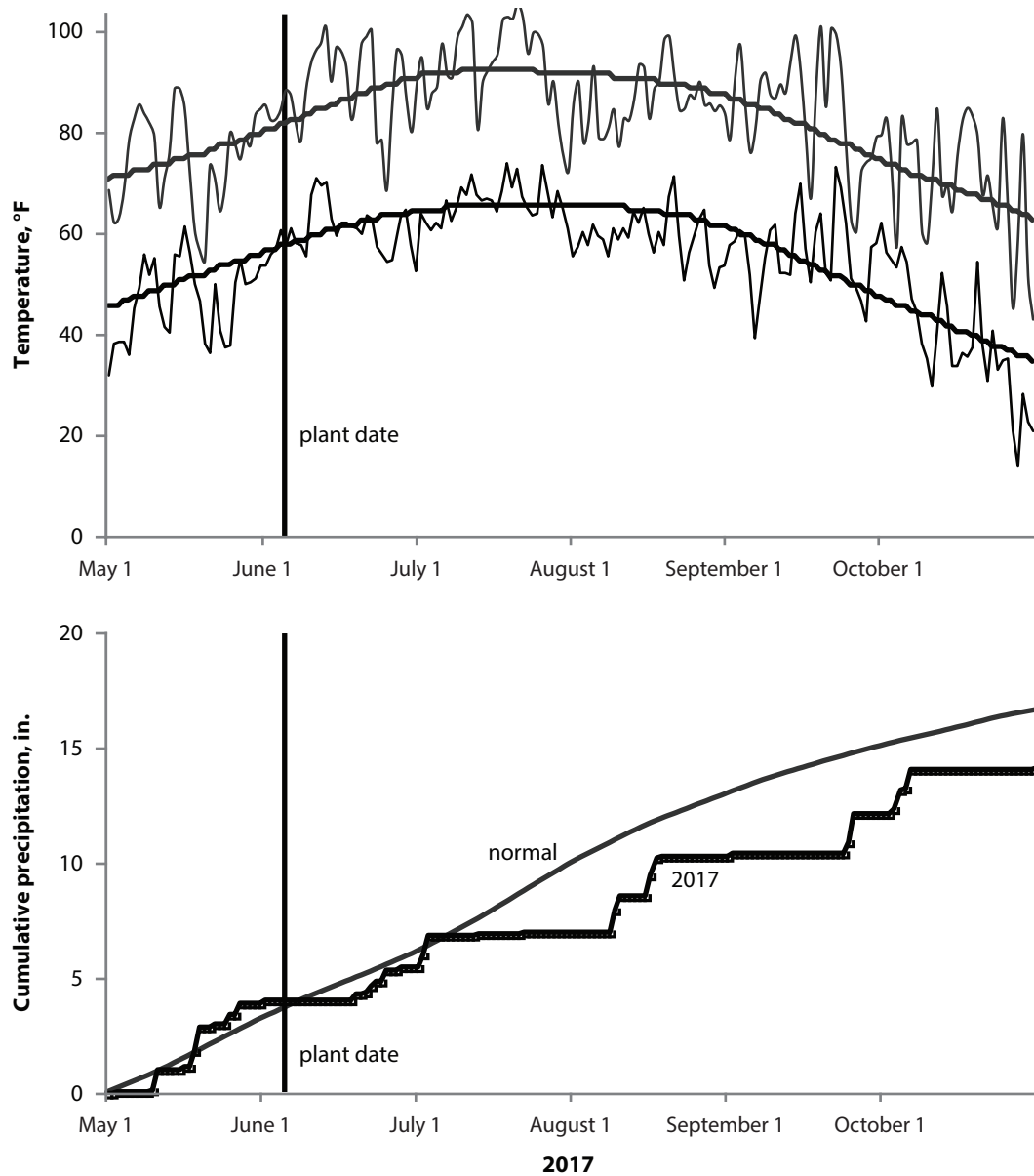


Figure 2. Precipitation and temperature during the 2017 growing season near Hays, KS. A pane: daily and mean (1981 to 2010) high and low temperature. B pane: daily and mean (1981 to 2010) cumulative precipitation.

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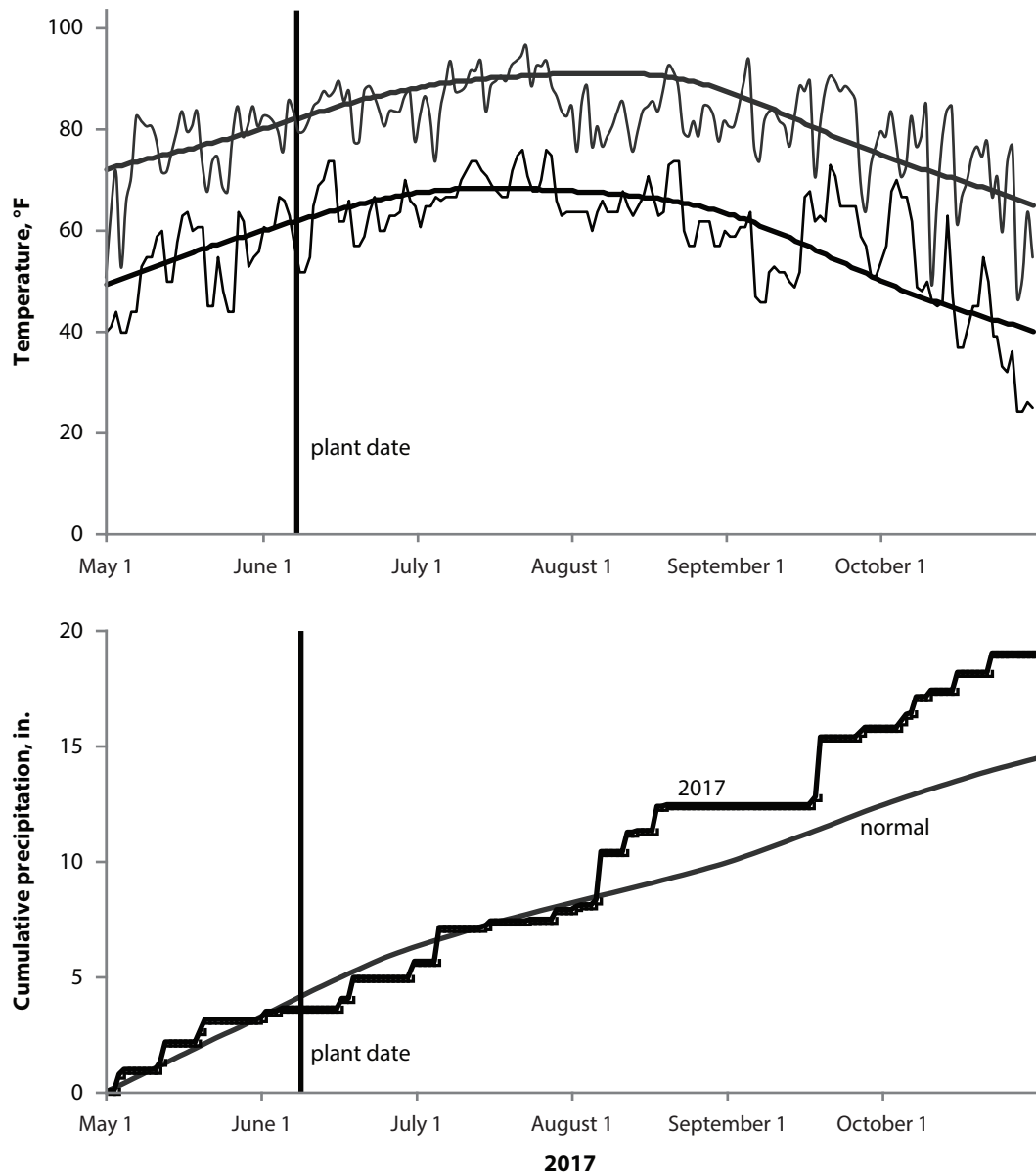


Figure 3. Precipitation and temperature during the 2017 growing season near Mound Valley, KS. A pane: daily and mean (1981 to 2010) high and low temperature. B pane: daily and mean (1981 to 2010) cumulative precipitation.

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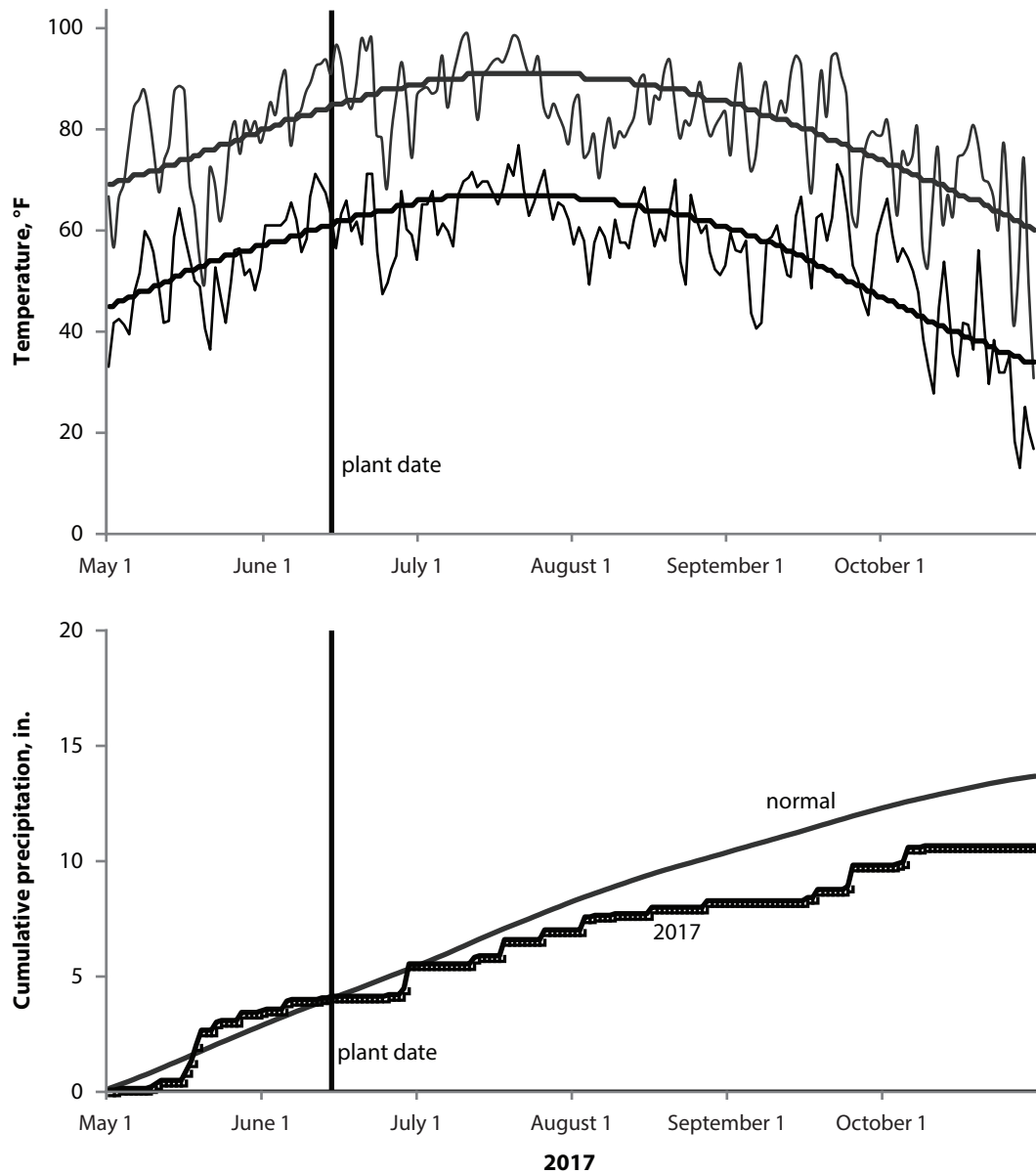


Figure 4. Precipitation and temperature during the 2017 growing season near Scandia, KS. A pane: daily and mean (1981 to 2010) high and low temperature. B pane: daily and mean (1981 to 2010) cumulative precipitation.

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