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2021 Kansas Summer Annual Forage Hay and Silage Variety Trial

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2021 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. Holman, A. Obour, S. Dooley, and T. Roberts



FORAGE REPORT 2021

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Research and Extension

KANSAS STATE UNIVERSITY AGRICULTURAL EXPERIMENT STATION AND COOPERATIVE EXTENSION SERVICE

2021 Kansas Summer Annual Forage Hay and Silage Variety Trial

J. Holman, A. Obour, S. Dooley, and T. Roberts

Summary

In 2021, summer annual forage variety trials were conducted across Kansas near Garden City, Hays, and Scandia. All 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. Across the sites, a total of 104 hay varieties and 55 sorghum silage varieties were evaluated.

Introduction

Annually, there are approximately 35,000,000 acres of hay and haylage harvested in the U.S. for a total of 96,000,000 dry matter tons of production. Yields in Kansas averaged 2.77 tons of dry matter per acre. Of this total, about 13,600,000 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 2,400,000 acres of hay and haylage harvested with an average yield of 2.24 dry matter tons per acre. 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. This largely supports the state dairy (ranked 19th in the U.S. and valued at \$483,000,000) and cattle (feedlot, background, and cow/calf) industries (ranked second in the U.S. and valued at \$10,200,000,000) (USDA, NASS). Dairy and beef cattle represented 58% of the total agricultural product of Kansas. 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, and Scandia, KS. 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 35 entries at Garden City, 35 at Hays, and 34 at Scandia. In the silage test, there were 32 sorghum entries at Garden City and 23 sorghum entries at Scandia (Table 1). 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 5), growing season temperature, and precipitation (Figures 1, 2, and 3) are provided for each site. Results are listed alphabetically by seed supplier. Forage samples were dried, ground, and analyzed for nutrient contents using NIR (near infrared reflectance) by Sevitech Laboratories in Dodge City, KS. Nutrient contents measured were crude protein (CP), adjusted crude protein (Adj_CP), nitrogen free neutral detergent fiber (NDFn), acid detergent fiber (ADF), neutral detergent fiber organic matter basis (aNDFom), lignin, undigested aNDFom remaining after in vitro digestion at 240 hr (uNDFom240), neutral detergent fiber-digestible at 240 hr (NDFD240), water soluble carbohydrates (WSC), starch, total fatty acids (TFA), ash, calcium (Ca), phosphorus (P), magnesium (Mg), potassium (K), sulfur (S), non-fiber carbohydrates (NFC), total digestible nutrients using Ohio Agricultural Research and Development Center (OARDC) calculation (TDN_OARDC), net energy for lactation 3x intake using OARDC (NEL3x_OARDC), net energy for gain using OARDC (NEG_OARDC), net energy for maintenance using OARDC (NEM_OARDC), and relative feed value (RFV).

2021 Growing Conditions

Temperature and precipitation (Figures 1, 2, and 3) for each site is shown. 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 (1980–2020), and the line labeled “2020” represents actual precipitation.

In general, the 2021 growing season saw near normal temperatures across all locations. Precipitation was near normal at Garden City and Hays, but very dry (50%) at Scandia. However, Garden City was irrigated so moisture was not limiting.

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 Early Sumac for the hay test, and a control entry of Kansas Orange for the silage test.

Hay Test

Top performing varieties varied by cutting and when comparing a single cutting compared to total yield. These results indicate performance evaluation needs to consider single or multiple cuttings, and the regrowth potential of varieties.

At Garden City, Danny Boy II BMR, Fullgraze II, Fullgraze II BMR, Excel II, 18180, 19102, and 19186 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; Cadan 99 B WMR, Sweet Sioux BMR, Sweet Sioux WMR, Sweetleaf, Dynagraz II, Dynagraz II BMR, PearlMil, Super Sweet 10, Early Sumac, Sordan 79, SP4555, Grazex AT, 20270, Tifleaf III, and Integra 31F65 were in the highest yielding

LSD group. Combined across cuttings, all varieties except PearlMil, Early Sumac, Rox Orange, Bruiser, 19011, and 20268 were in the top LSD group.

At Hays, Nutri-Cane, Danny Boy II BMR, Fullgraze II, Fullgraze II BMR, Super Sweet 10, Bruiser, Excel II, 18180, and 19102 had the greatest yield in the top LSD group in the first cutting (Table 6). There was no second cutting due to little regrowth and frost in early October.

At Scandia, Fullgraze II BMR and 19102 were in the top LSD group in the first cutting (Table 7). There was no second cutting due to little regrowth and frost in early October.

Sorghum Silage Test

At Garden City, ADVF7424, ADV8322, ADVS6504, ADVS6520, ADVXF4501G, ADVXS005, AF7401, 5 Star, F72FS05, F74FS72 BMR, Super Sile 20, Super Sile 30, Buffalo Sugar Sweet AT, Brutis, 19042, 19156, and Integra 34F95 were in the top LSD group for silage (Table 8).

At Scandia, Nutri-Choice, Nutri-Chomp, 5 Star, F70FS91 BMR, F72FS05, F74FS72 BMR, Super Sile 20, Super Sile 30, KS Orange, Brutis, Packer, 19040, 19042, 19156, Integra 33F70, and Integra 38F80 were in the top LSD group for silage (Table 9).

Recommendation

Inestimable differences in soil type, weather, and environmental conditions play a part in increasing experimental error, therefore one should use more than one location and year to make an informed variety selection decision. Please refer to previous years' forage reports to see how a variety performed across years (<https://www.agronomy.k-state.edu/outreach-and-services/kaes-research-reports/forage.html>).

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

Location	Hay	Silage
Garden City	35	32
Hays	35	- ^a
Scandia	34	23
Total	104	55

^aHays silage test was abandoned.

Table 2. 2021 Hay entries

Company	Variety/Entry	Type	BMR	Dwarf	Male Sterile	Dry Stalk	Photo-period Sensitive	Aphid Resistance	Maturity
Dyna-Gro Seed	PearlMil	MT	N	N	N	N	N	N	EM
Ward Seed	Tifleaf III	MT	NS	Y	NS	NS	NS	NS	M
Channel Seed	Nutri-Cane	FS	N	N	Y	N	N	NS	M
Dyna-Gro Seed	Sweet Ton MS	FS	N	N	Y	N	N	N	M
KSU (check)	Early Sumac	FS	N	N	N	N	N	N	M
KSU (check)	Rox Orange	FS	N	N	N	N	N	N	M
Star Seed	Magnum Ultra BMR	FS	Y	N	Y	N	N	NS	L
S & W Seed Co	SP4105	SS	Y	N	N	N	Y	NS	NA
Browning Seed	CADAN 99 B WMR	SS	N	N	N	y	NS	NS	ML
Browning Seed	HEADLESS WONDER	SS	Y	N	N	N	Y	NS	PPS
Browning Seed	SWEET SIOUX BMR	SS	Y	N	N	N	N	NS	M
Browning Seed	SWEET SIOUX WMR	SS	N	N	N	N	N	NS	M
Channel Seed	Qualimax	SS	N	N	N	N	N	NS	ML
Channel Seed	Sweetleaf	SS	N	N	Y	N	N	N	M
Dyna-Gro Seed	Danny Boy II BMR	SS	Y	N	N	N	Y	N	M
Dyna-Gro Seed	Dynagraze II	SS	N	N	N	N	N	N	EM
Dyna-Gro Seed	Dynagraze II BMR	SS	N	N	N	N	N	N	ML
Dyna-Gro Seed	Fullgraze II	SS	N	N	N	N	N	N	ML
Dyna-Gro Seed	Fullgraze II BMR	SS	Y	N	N	N	N	N	ML
Dyna-Gro Seed	Super Sweet 10	SS	N	N	N	N	N	N	EM
S & W Seed Co	Sordan 79	SS	N	N	N	N	N	NS	M
S & W Seed Co	SP4555	SS	Y	N	N	N	N	NS	M
Sharp Brothers	Grazex AT	SS	N	N	N	N	N	Y	ME
Star Seed	Bruiser	SS	Y	Y	N	N	N	NS	ME
Star Seed	Excel II	SS	N	N	N	N	N	NS	L
Star Seed	Nutrimaxx BMR	SS	Y	N	N	N	N	NS	L
Ward Seed	18180	SS	NS	NS	NS	NS	NS	NS	L
Ward Seed	18182	SS	Y	NS	NS	Y	NS	NS	M
Ward Seed	19011	SS	Y	Y	NS	Y	NS	NS	ML
Ward Seed	19102	SS	NS	NS	NS	NS	Y	NS	L
Ward Seed	19186	SS	Y	NS	NS	NS	Y	NS	L
Ward Seed	20268	SS	Y	NS	NS	Y	NS	NS	ML
Ward Seed	20270	SS	Y	NS	NS	NS	NS	NS	ML
Ward Seed	19011 harvested +25 day	SS	Y	Y	NS	Y	NS	NS	L
Wilbur Ellis	Integra 31F65	SS	Y	Y	N	N	N	NS	ML
Wilbur Ellis	Integra Ranch Hand	SS	Y	N	N	N	N	NS	M
S & W Seed Co	SWSB8801	SS	Y	N	N	N	N	NS	M

Hybrid information was provided by seed companies.

Abbreviations: Millet (MT), Forage sorghum (FS), sorghum sudan (SS), sorghum (S), dual-purpose (DP), brown mid-rib (BMR), photoperiod sensitive (PS), not applicable (NA).

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

Table 3. 2021 Silage Entries

Company	Variety/Entry	Type	BMR	Dwarf	Male Sterile	Dry Stalk	Photo-period Sensitive	Greenbug	Sugarcane Aphid Tolerance	Maturity	Grams /1000 seeds
Alta Seeds	ADVF7424	FS	Y	Y	N	N	N	NS	NS	ML	24.15
Alta Seeds	ADVF8322	FS	N	N	N	N	N	NS	Y	M	38.67
Alta Seeds	ADVS6504	SS	Y	N	N	N	Y	NS	NS	L	30.42
Alta Seeds	ADVS6520	SS	Y	N	N	N	Y	NS	Y	L	27.2
Alta Seeds	ADVXF450IG	FS	N	Y	N	N	N	NS	NS	M	29.12
Alta Seeds	ADVXS005	SS	Y	N	N	N	Y	NS	Y	L	28.84
Alta Seeds	AF7401	FS	Y	Y	N	N	N	NS	NS	ML	25.41
Channel Seed	Nutri-Choice	FS	N	N	N	N	N	NS	NS	ML	37.12
Channel Seed	Nutri-Chomp	FS	Y	N	Y	N	N	NS	NS	ML	32.05
Dyna-Gro Seed	5 Star	FS	N	N	N	N	N	N	NS	M	26.56
Dyna-Gro Seed	F70FS91 BMR	FS	Y	N	N	Y	N	N	NS	E	37.57
Dyna-Gro Seed	F71FS72 BMR	FS	Y	N	N	Y	N	N	NS	E	23.38
Dyna-Gro Seed	F72FS05	FS	N	N	N	N	N	N	Y	EM	31.54
Dyna-Gro Seed	F74FS23 BMR	FS	Y	N	N	N	N	N	NS	M	33.13
Dyna-Gro Seed	F74FS72 BMR	FS	Y	Y	N	Y	N	N	NS	M	26.44
Dyna-Gro Seed	Super Sile 20	FS	N	N	N	N	N	N	NS	ML	23.11
Dyna-Gro Seed	Super Sile 30	FS	N	N	N	N	N	N	NS	M	26.70
Dyna-Gro Seed	Sweet Ton MS	FS	N	N	Y	N	N	N	NS	L	24.96
KSU (check)	KS Orange	FS	N	N	N	N	N	N	NS	M	20.54

continued

Table 3. 2021 Silage Entries

Company	Variety/Entry	Type	BMR	Dwarf	Male Sterile	Dry Stalk	Photo-period Sensitive	Greenbug	Sugarcane Aphid Tolerance	Maturity	Grams /1000 seeds
MOJO Seed	Opal	FS	N	Y	N	Semi	N	N	Y	ML	35.07
MOJO Seed	Pearl	FS	N	Y	N	Semi	N	N	Y	ML	31.20
Sharp Brothers	Buffalo Sugar Sweet AT	FS	N	N	N	N	N	NS	Y	ML	31.76
Sharp Brothers	SBW7706W	FS	N	N	N	N	N	C, E	NS	M	32.55
Star Seed	Brutis	FS	Y	Y	N	N	N	N	NS	L	26.25
Star Seed	Packer	FS	N	N	N	N	N	N	NS	ML	32.67
Ward Seed	19040	FS	NS	NS	NS	NS	NS	NS	NS	ML	28.67
Ward Seed	19042	FS	NS	NS	NS	NS	NS	NS	NS	ML	33.85
Ward Seed	19156	FS	NS	NS	NS	NS	NS	NS	NS	M	32.50
Ward Seed	19181	FS	NS	NS	NS	NS	NS	NS	NS	ML	31.77
Wilbur Ellis	Integra 33F70	FS	Y	Y	N	N	N	N	NS	ML	33.73
Wilbur Ellis	Integra 34F95	FS	Y	N	Y	N	N	N	NS	M	31.74
Wilbur Ellis	Integra 38F80	FS	N	N	N	N	N	SCA	NS	ML	29.4

Hybrid information was provided by seed companies.

Abbreviations: Forage sorghum (FS), sorghum sudan (SS), sorghum (S), dual-purpose (DP), brown mid-rib (BMR), photoperiod sensitive (PS), not applicable (NA).

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

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Table 4. Irrigation, plant, harvest, and fertilizer details for hay and silage variety tests near Garden City, Hays, and Scandia, KS, in 2021

Location	Irrigation (inch)	Planting Date	1st Harvest Date	2nd Harvest Date	Seeding Rate	Harvest Area (ft ²)	N Fertilizer (lb N/a)	P Fertilizer (lb P ₂ O ₅ /a)
Hay Test								
Garden City	14	15-Jun	23-Aug 30-Aug 7-Sep 21-Sep	9-Nov	20 (lb/acre)	360/150	160	0
Hays	---	11-Jun	25-Aug 16-Sep	---	15 (lb/acre)	78/66	50	0
Scandia	---	7-Jun	4-Aug 11-Aug 19-Aug 25-Aug 1-Sep 15-Sep	---	20 (lb/acre)	60	55	0
Silage Test								
Garden City	14	22-Jun	28-Sep 5-Oct 19-Oct 7-Sep	---	80000 (seeds/acre)	225	160	0
Scandia	---	8-Jun	15-Sep 22-Sep	---	50000 (seeds/acre)	50	55	0

Table 5. Hay performance test near Garden City

Company	Variety	First Cutting				Second Cutting				Total Yield
		Days to cutting	Height (inches)	DM lb/acre	% Moisture	Days to cutting	Height (inches)	DM lb/acre	% Moisture	DM lb/acre
Browning Seed	CADAN 99 B WMR	71	107	8817	0.76	74	44	3158	0.53	11974
Browning Seed	HEADLESS WONDER	74	103	8931	0.77	72	34	2333	0.43	11264
Browning Seed	SWEET SIOUX BMR	74	91	7839	0.79	72	38	2915	0.46	10754
Browning Seed	SWEET SIOUX WMR	69	110	7976	0.77	76	45	3237	0.51	11213
Channel Seed	Nutri-Cane	74	92	9133	0.79	72	24	1839	0.66	10972
Channel Seed	Qualimax	84	112	9779	0.78	61	15	1179	0.58	10959
Channel Seed	Sweetleaf	69	99	8603	0.74	76	42	3436	0.50	12039
Dyna-Gro Seed	Danny Boy II BMR	98	107	10893	0.79	47	0	0	0.00	10893
Dyna-Gro Seed	Dynagraz II	69	95	7515	0.77	76	48	3432	0.57	10947
Dyna-Gro Seed	Dynagraz II BMR	69	91	7262	0.79	76	42	2662	0.51	9924
Dyna-Gro Seed	Fullgraze II	84	115	12031	0.76	61	0	0	0.00	12031
Dyna-Gro Seed	Fullgraze II BMR	98	108	11894	0.76	47	0	0	0.00	11894
Dyna-Gro Seed	PearlMil	69	59	6148	0.79	76	27	3506	0.42	9654
Dyna-Gro Seed	Super Sweet 10	69	91	7871	0.78	76	51	3454	0.60	11326
Dyna-Gro Seed	Sweet Ton MS	71	87	8054	0.79	74	29	2225	0.41	10280
KSU (check)	Early Sumac	69	84	7059	0.81	76	32	2720	0.52	9779
KSU (check)	Rox Orange	69	83	6685	0.82	76	21	2210	0.41	8895
S & W Seed Co	Sordan 79	69	94	8196	0.82	76	48	3543	0.57	11739
S & W Seed Co	SP4555	69	84	7162	0.80	76	46	2733	0.61	9895
Sharp Brothers	Grazex AT	69	102	8016	0.77	76	46	3322	0.49	11339

continued

Table 5. Hay performance test near Garden City

Company	Variety	First Cutting				Second Cutting				Total Yield
		Days to cutting	Height (inches)	DM lb/acre	% Moisture	Days to cutting	Height (inches)	DM lb/acre	% Moisture	DM lb/acre
Star Seed	Bruiser	93	83	8642	0.76	52	7	538	0.82	9180
Star Seed	Excel II	86	101	10433	0.77	59	20	1754	0.64	12187
Star Seed	Magnum Ultra BMR	71	82	7880	0.80	74	29	2131	0.44	10011
Star Seed	Nutrimaxx BMR	93	103	10015	0.79	52	0	0	0.00	10015
Ward Seed	18180	86	111	11401	0.76	59	15	770	0.88	12171
Ward Seed	18182	69	87	8373	0.79	76	36	2441	0.51	10813
Ward Seed	19011	86	77	8021	0.77	59	11	554	0.89	8576
Ward Seed	19102	98	109	11035	0.80	47	0	0	0.00	11035
Ward Seed	19186	98	98	12244	0.76	47	0	0	0.00	12244
Ward Seed	20268	81	84	7676	0.78	64	17	1304	0.68	8980
Ward Seed	20270	69	85	7555	0.78	76	44	3951	0.50	11506
Ward Seed	19011 harvested +25 day	98	78	9960	0.72	47	0	0	0.00	9960
Ward Seed	Tifleaf III	69	59	8077	0.79	76	27	3450	0.41	11527
Wilbur Ellis	Integra 31F65	71	78	6862	0.80	74	42	3316	0.50	10179
Wilbur Ellis	Integra Ranch Hand	89	105	9957	0.78	57	6	435	0.78	10391
<i>LSD</i>			8	2005	0.02		14	1343	0.29	2444

Values in bold are in the top LSD group.

Abbreviations for this table and following tables: Crude protein (CP), adjusted crude protein (Adj_CP), nitrogen free neutral detergent fiber (NDFn), acid detergent fiber (ADF), neutral detergent fiber organic matter basis (aNDFom), lignin, undigested aNDFom remaining after in vitro digestion at 240 hr (uNDFom240), neutral detergent fiber-digestible at 240 hr (NDFD240), water soluble carbohydrates (WSC), starch, total fatty acids (TFA), ash, non-fiber carbohydrates (NFC), total digestible nutrients (TDN), net energy for lactation (NEL), net energy for gain (NEG), net energy for maintenance (NEM), and relative feed value (RFV).

Table 5b. 2021 Garden City, Kansas Hay Performance Test, Finney County

Company	Variety	CP	ADF	aNDFom	Lignin	uNDFom240	Starch	EE	TFA
Browning Seed	CADAN 99 B WMR	8.74	39.24	61.71	4.30	17.34	4.77	2.42	0.87
Browning Seed	HEADLESS WONDER	7.75	40.25	61.99	4.35	17.96	4.36	2.31	0.78
Browning Seed	SWEET SIOUX BMR	8.55	36.46	56.91	3.24	15.54	4.41	2.61	0.94
Browning Seed	SWEET SIOUX WMR	9.16	39.12	60.74	4.06	16.12	4.84	2.53	0.93
Channel Seed	Nutri-Cane	8.75	35.92	55.29	3.66	16.76	4.48	2.74	0.99
Channel Seed	Qualimax	8.23	37.06	56.40	3.78	16.52	5.39	2.44	0.99
Channel Seed	Sweetleaf	8.03	41.23	63.83	4.65	18.60	4.77	2.28	0.75
Dyna Gro Seed	Danny Boy II BMR	7.37	39.25	58.68	3.72	17.77	4.07	2.29	0.74
Dyna Gro Seed	Dynagraze II	9.42	37.49	57.60	4.06	17.00	4.86	2.52	1.00
Dyna Gro Seed	Dynagraze II BMR	8.35	37.37	59.01	3.46	15.03	4.15	2.61	0.91
Dyna Gro Seed	Fullgraze II	8.18	38.88	62.18	4.25	19.17	4.67	2.47	0.81
Dyna Gro Seed	Fullgraze II BMR	7.49	37.39	58.93	3.61	18.18	4.50	2.37	0.76
Dyna Gro Seed	PearlMil	12.28	37.04	59.47	4.01	14.27	4.33	2.50	1.10
Dyna Gro Seed	Super Sweet 10	9.34	37.94	59.09	4.32	16.76	4.97	2.48	0.97
Dyna Gro Seed	Sweet Ton MS	9.25	35.09	55.50	3.50	15.59	4.77	2.60	0.99
KSU check	Early Sumac	8.52	35.72	56.50	3.52	14.78	4.27	2.68	1.01
KSU check	Rox Orange	8.95	36.44	59.18	3.69	16.08	3.78	2.62	0.89
S & W Seed Co	Sordan 79	8.31	41.57	62.95	4.61	18.65	4.70	2.09	0.71
S & W Seed Co	Rox Orange	9.38	36.71	57.62	3.40	15.23	4.58	2.63	0.97
Sharp Brothers	Grazex AT	7.96	39.84	61.51	4.38	18.40	5.80	2.18	0.84

continued

Table 5b. 2021 Garden City, Kansas Hay Performance Test, Finney County

Company	Variety	CP	ADF	aNDFom	Lignin	uNDFom240	Starch	EE	TFA
Star Seed	Bruiser	8.39	38.87	59.09	3.67	16.93	4.15	2.55	0.88
Star Seed	Excel II	8.08	38.21	57.54	4.10	17.09	4.82	2.42	0.93
Star Seed	Magnum Ultra BMR	8.47	37.31	58.67	3.73	16.43	4.81	2.55	0.95
Star Seed	Nutrimaxx BMR	7.41	37.21	59.76	3.41	16.08	4.29	2.44	0.91
Ward Seed	18180	7.43	38.37	58.98	4.16	18.22	5.02	2.35	0.86
Ward Seed	18182	8.48	38.33	58.90	3.46	15.93	4.93	2.47	0.87
Ward Seed	19011	9.08	36.50	56.01	3.35	15.53	5.14	2.63	0.97
Ward Seed	19102	6.38	41.41	62.38	4.61	19.18	4.25	2.03	0.68
Ward Seed	19186	7.19	35.11	56.42	3.10	15.08	6.00	2.50	0.96
Ward Seed	20268	9.18	36.63	55.84	3.42	15.84	4.38	2.69	0.95
Ward Seed	20270	9.11	37.85	56.81	3.54	15.72	4.77	2.47	0.86
Ward Seed	19011 harvested +25 day	7.91	35.40	53.56	3.32	16.51	6.69	2.72	1.00
Ward Seed	Tifleaf III	13.41	35.75	58.50	3.92	13.94	4.72	2.55	1.14
Wilbur Ellis	Integra 31F65	10.01	37.10	58.63	3.83	15.86	3.98	2.62	0.94
Wilbur Ellis	Integra Ranch Hand	8.19	37.99	58.70	3.69	17.41	4.90	2.43	0.78
Average		8.65	37.77	58.71	3.83	16.61	4.72	2.48	0.90

Table 5b. 2021 Garden City, Kansas Hay Performance Test, Finney County

Company	Variety	Ash	WSC	NFC	NSC	RFV	TDN	NEM	NEG	NEL
Browning Seed	CADAN 99 B WMR	8.31	8.01	21.38	12.78	85.01	58.50	0.57	0.32	0.60
Browning Seed	HEADLESS WONDER	8.50	7.38	21.91	11.74	83.13	57.60	0.56	0.30	0.59
Browning Seed	SWEET SIOUX BMR	9.06	11.45	25.95	15.86	96.16	61.80	0.62	0.36	0.63
Browning Seed	SWEET SIOUX WMR	8.59	8.49	21.62	13.33	86.10	58.80	0.58	0.32	0.60
Channel Seed	Nutri-Cane	8.20	11.59	28.19	16.07	98.07	62.40	0.63	0.37	0.64
Channel Seed	Qualimax	8.71	11.56	26.80	16.95	95.61	60.90	0.61	0.35	0.62
Channel Seed	Sweetleaf	8.01	7.31	20.22	12.08	79.87	56.10	0.54	0.28	0.57
Dyna Gro Seed	Danny Boy II BMR	10.01	9.06	24.51	13.13	89.84	58.80	0.58	0.32	0.60
Dyna Gro Seed	Dynagraze II	8.54	9.99	24.53	14.85	92.60	60.60	0.60	0.35	0.62
Dyna Gro Seed	Dynagraze II BMR	8.67	9.35	24.41	13.50	91.36	60.90	0.61	0.35	0.62
Dyna Gro Seed	Fullgraze II	7.84	8.77	21.95	13.44	85.26	58.80	0.58	0.32	0.60
Dyna Gro Seed	Fullgraze II BMR	8.43	10.49	25.52	14.99	91.70	60.90	0.61	0.35	0.62
Dyna Gro Seed	PearlMil	10.15	7.98	18.66	12.31	91.55	61.20	0.61	0.35	0.63
Dyna Gro Seed	Super Sweet 10	8.04	9.55	23.78	14.52	90.03	60.00	0.59	0.33	0.61
Dyna Gro Seed	Sweet Ton MS	8.47	12.13	27.10	16.89	98.79	63.30	0.64	0.38	0.65
KSU check	Early Sumac	7.25	11.84	28.24	16.10	96.61	62.70	0.64	0.37	0.64
KSU check	Rox Orange	7.48	10.47	24.83	14.25	91.95	62.10	0.63	0.37	0.64
S & W Seed Co	Sordan 79	9.15	6.52	19.71	11.22	80.47	56.10	0.54	0.28	0.57
S & W Seed Co	Rox Orange	9.21	9.85	24.05	14.43	93.96	61.80	0.62	0.36	0.63
Sharp Brothers	Grazex AT	7.78	9.34	22.82	15.13	84.67	57.90	0.56	0.31	0.59

continued

Table 5b. 2021 Garden City, Kansas Hay Performance Test, Finney County

Company	Variety	Ash	WSC	NFC	NSC	RFV	TDN	NEM	NEG	NEL
Star Seed	Bruiser	10.05	8.22	22.99	12.37	89.43	59.10	0.58	0.32	0.60
Star Seed	Excel II	8.65	10.69	25.85	15.51	92.30	59.70	0.59	0.33	0.61
Star Seed	Magnum Ultra BMR	8.01	11.17	24.90	15.98	92.25	60.90	0.61	0.35	0.62
Star Seed	Nutrimaxx BMR	8.09	10.20	25.33	14.49	90.73	61.20	0.61	0.35	0.63
Ward Seed	18180	8.24	10.37	25.64	15.39	90.14	59.40	0.59	0.33	0.61
Ward Seed	18182	10.04	8.82	22.77	13.75	89.73	59.70	0.59	0.33	0.61
Ward Seed	19011	9.88	10.38	25.24	15.52	96.25	61.80	0.62	0.36	0.63
Ward Seed	19102	8.85	8.32	22.68	12.57	81.70	56.10	0.53	0.28	0.57
Ward Seed	19186	7.61	12.79	29.26	18.79	98.78	63.30	0.64	0.38	0.65
Ward Seed	20268	9.85	10.20	25.63	14.58	97.19	61.50	0.62	0.36	0.63
Ward Seed	20270	10.68	8.61	23.86	13.39	93.35	60.00	0.60	0.34	0.61
Ward Seed	19011 harvested +25 day	9.08	10.72	29.96	17.42	102.36	63.00	0.64	0.38	0.65
Ward Seed	Tifleaf III	10.38	8.50	18.42	13.21	94.34	62.40	0.63	0.37	0.64
Wilbur Ellis	Integra 31F65	9.73	7.93	22.09	11.92	91.18	60.90	0.61	0.35	0.62
Wilbur Ellis	Integra Ranch Hand	9.80	8.55	23.90	13.44	90.92	60.00	0.59	0.34	0.61
Average		8.84	9.62	24.13	14.34	91.24	60.29	0.60	0.34	0.62

Table 6. Hay performance test near Hays

Company	Variety	First Cutting				Total Yield
		Days to cutting	Height (inches)	DM lb/acre	% Moisture	DM lb/acre
Browning Seed	CADAN 99 B WMR	75	103	9290	0.63	9290
Browning Seed	HEADLESS WONDER	75	95	9779	0.67	9779
Browning Seed	SWEET SIOUX BMR	75	86	8314	0.72	8314
Browning Seed	SWEET SIOUX WMR	75	97	8815	0.65	8815
Channel Seed	Nutri-Cane	75	77	11594	0.70	11594
Channel Seed	Qualimax	97	108	10658	0.65	10658
Channel Seed	Sweetleaf	75	99	9034	0.67	9034
Dyna-Gro Seed	Danny Boy II BMR	97	101	11959	0.69	11959
Dyna-Gro Seed	Dynagraze II	75	82	8992	0.68	8992
Dyna-Gro Seed	Dynagraze II BMR	75	82	7639	0.66	7639
Dyna-Gro Seed	Fullgraze II	97	101	11389	0.61	11389
Dyna-Gro Seed	Fullgraze II BMR	97	100	11474	0.64	11474
Dyna-Gro Seed	PearlMil	75	58	5876	0.67	5876
Dyna-Gro Seed	Super Sweet 10	75	77	11372	0.66	11372
Dyna-Gro Seed	Sweet Ton MS	75	77	9804	0.69	9804
KSU (check)	Early Sumac	75	73	8752	0.71	8752
KSU (check)	Rox Orange	75	66	6927	0.73	6927
S & W Seed Co	Sordan 79	75	89	9780	0.71	9780
S & W Seed Co	SP4105	97	89	9787	0.68	9787
S & W Seed Co	SP4555	75	78	7969	0.71	7969
S & W Seed Co	SWSB8801	75	63	7770	0.67	7770
Sharp Brothers	Grazex AT	75	94	9209	0.62	9209
Star Seed	Bruiser	97	83	13160	0.61	13160
Star Seed	Excel II	97	115	12072	0.63	12072
Star Seed	Magnum Ultra BMR	75	81	10590	0.63	10590
Star Seed	Nutrimaxx BMR	97	95	8750	0.69	8750
Ward Seed	18180	97	108	11744	0.65	11744
Ward Seed	18182	75	80	10671	0.67	10671
Ward Seed	19011	75	67	10206	0.67	10206
Ward Seed	19011	75	70	10412	0.66	10412
Ward Seed	19102	97	110	12704	0.69	12704
Ward Seed	19186	97	100	9657	0.66	9657
Ward Seed	20268	75	69	9465	0.66	9465
Ward Seed	20270	75	76	9744	0.66	9744
Ward Seed	Tifleaf III	75	50	6482	0.65	6482
<i>LSD</i> ¹			9	2396	0.05	2396

¹Values in bold are in the top LSD group.

There was no second cutting for Hays, KS.

Table 6b. 2021 Hays, Kansas Forage Hay Performance Test, Ellis County

Company	Variety	CP	ADF	aNDFom	Lignin	uNDFom240	Starch	EE	TFA
Browning Seed	CADAN 99 B WMR	9.31	36.80	59.04	3.76	16.46	3.81	2.68	0.92
Browning Seed	HEADLESS WONDER	8.99	38.30	61.34	4.01	16.43	3.83	2.40	0.87
Browning Seed	SWEET SIOUX BMR	8.78	36.99	57.06	3.38	14.43	3.76	2.45	0.83
Browning Seed	SWEET SIOUX WMR	9.29	37.44	60.51	3.69	15.81	3.78	2.60	0.90
Channel Seed	Nutri-Cane	7.23	34.88	55.46	3.49	16.22	4.37	2.58	0.95
Channel Seed	Qualimax	5.24	39.90	58.99	4.28	18.60	3.49	2.32	0.73
Channel Seed	Sweetleaf	8.32	40.03	62.14	4.36	18.39	4.70	2.43	0.79
Dyna Gro Seed	Danny Boy II BMR	6.59	38.70	58.65	3.56	16.26	3.00	2.38	0.72
Dyna Gro Seed	Dynagraze II	10.24	35.36	59.19	3.13	14.09	3.34	2.70	1.01
Dyna Gro Seed	Dynagraze II BMR	9.17	36.15	57.70	3.77	15.75	4.25	2.60	0.96
Dyna Gro Seed	Fullgraze II	6.78	37.96	62.04	3.98	18.85	3.97	2.42	0.77
Dyna Gro Seed	Fullgraze II BMR	7.21	37.55	59.44	3.51	16.39	2.72	2.44	0.70
Dyna Gro Seed	PearlMil	12.00	36.22	57.72	3.76	12.21	2.64	2.67	1.27
Dyna Gro Seed	Super Sweet 10	7.31	39.31	59.99	4.31	18.84	4.70	2.31	0.75
Dyna Gro Seed	Sweet Ton MS	8.87	35.98	57.75	3.41	14.40	3.60	2.64	0.98
KSU check	Early Sumac	9.05	33.55	54.44	3.20	14.02	3.64	2.73	1.06
KSU check	Rox Orange	9.58	34.90	56.67	3.21	15.31	3.10	2.54	0.91

continued

Table 6b. 2021 Hays, Kansas Forage Hay Performance Test, Ellis County

Company	Variety	CP	ADF	aNDFom	Lignin	uNDFom240	Starch	EE	TFA
S & W Seed Co	Sordan 79	8.66	37.98	59.43	4.09	16.69	3.47	2.30	0.77
S & W Seed Co	SP4105	9.14	37.06	58.31	3.44	14.79	2.27	2.58	0.86
S & W Seed Co	SP4555	9.66	35.04	55.13	3.17	14.09	3.94	2.59	0.93
S & W Seed Co	SWSB8801	9.21	34.52	51.18	2.95	14.52	4.73	2.70	0.94
Sharp Brothers	Grazex AT	8.81	37.90	60.06	4.12	16.89	4.83	2.35	0.93
Star Seed	Bruiser	7.91	37.96	58.67	3.11	15.92	3.93	2.75	0.79
Star Seed	Excel II	5.50	37.79	58.12	4.01	17.56	4.83	2.35	0.80
Star Seed	Magnum Ultra BMR	7.22	36.94	56.98	3.75	16.40	4.32	2.48	0.83
Star Seed	Nutrimaxx BMR	6.31	37.98	58.39	3.47	14.98	3.67	2.42	0.74
Ward Seed	18180	4.72	40.05	59.52	4.15	17.87	4.15	2.40	0.69
Ward Seed	18182	8.77	36.95	57.93	3.19	14.66	4.37	2.49	0.81
Ward Seed	19011	8.07	35.71	55.67	2.92	14.49	4.65	2.79	0.98
Ward Seed	19011	11.32	33.82	54.69	2.93	13.50	3.13	2.89	1.07
Ward Seed	19102	6.01	39.25	60.41	4.14	16.84	3.17	2.36	0.73
Ward Seed	19186	6.65	36.33	56.83	3.17	14.14	3.74	2.66	0.82
Ward Seed	20268	7.82	36.79	55.25	3.15	14.21	3.78	2.64	0.79
Ward Seed	20270	7.56	37.19	56.74	3.30	15.41	4.15	2.46	0.82
Ward Seed	Tifleaf III	10.86	36.12	59.58	3.72	13.09	2.99	2.61	1.18
Average		8.23	37.01	58.03	3.59	15.67	3.79	2.53	0.87

Table 6b. 2021 Hays, Kansas Forage Hay Performance Test, Ellis County

Company	Variety	Ash	WSC	NFC	NSC	RFV	TDN	NEM	NEG	NEL
Browning Seed	CADAN 99 B WMR	8.70	7.31	23.19	11.11	91.51	61.20	0.61	0.35	0.63
Browning Seed	HEADLESS WONDER	8.26	7.03	21.61	10.86	86.10	59.70	0.59	0.33	0.61
Browning Seed	SWEET SIOUX BMR	9.95	8.90	24.85	12.66	93.98	61.20	0.61	0.35	0.63
Browning Seed	SWEET SIOUX WMR	8.90	7.73	21.51	11.51	88.29	60.60	0.60	0.34	0.62
Channel Seed	Nutri-Cane	6.87	13.37	30.82	17.73	100.35	63.60	0.65	0.38	0.65
Channel Seed	Qualimax	8.10	9.66	28.41	13.15	88.52	58.20	0.57	0.31	0.59
Channel Seed	Sweetleaf	8.42	6.03	21.40	10.73	83.16	57.60	0.56	0.30	0.59
Dyna Gro Seed	Danny Boy II BMR	9.58	8.00	25.85	11.00	90.23	59.10	0.58	0.32	0.60
Dyna Gro Seed	Dynagraze II	9.29	7.47	21.93	10.80	92.94	63.00	0.64	0.38	0.65
Dyna Gro Seed	Dynagraze II BMR	8.81	8.47	24.72	12.72	93.97	62.10	0.62	0.36	0.64
Dyna Gro Seed	Fullgraze II	6.81	9.56	24.66	13.53	86.47	60.30	0.60	0.34	0.62
Dyna Gro Seed	Fullgraze II BMR	8.76	8.13	25.23	10.85	90.12	60.90	0.61	0.35	0.62
Dyna Gro Seed	PearlMil	11.02	8.71	19.52	11.35	95.70	62.10	0.62	0.36	0.64
Dyna Gro Seed	Super Sweet 10	8.04	8.30	25.14	13.00	86.92	58.50	0.57	0.31	0.60
Dyna Gro Seed	Sweet Ton MS	8.43	9.77	25.30	13.37	94.54	62.10	0.63	0.36	0.64
KSU check	Early Sumac	7.47	12.65	29.59	16.28	102.99	64.80	0.67	0.40	0.67
KSU check	Rox Orange	7.98	10.86	26.45	13.96	96.81	63.60	0.65	0.38	0.65

continued

Table 6b. 2021 Hays, Kansas Forage Hay Performance Test, Ellis County

Company	Variety	Ash	WSC	NFC	NSC	RFV	TDN	NEM	NEG	NEL
S & W Seed Co	Sordan 79	8.89	7.09	23.55	10.56	89.40	60.00	0.59	0.34	0.61
S & W Seed Co	SP4105	11.58	6.04	21.76	8.32	92.64	60.90	0.61	0.35	0.62
S & W Seed Co	SP4555	10.20	8.44	25.51	12.38	97.89	63.00	0.64	0.37	0.65
S & W Seed Co	SWSB8801	10.55	10.01	29.77	14.74	106.62	63.90	0.65	0.39	0.66
Sharp Brothers	Grazex AT	8.20	8.01	23.08	12.84	87.92	60.00	0.59	0.33	0.61
Star Seed	Bruiser	10.31	7.83	23.84	11.76	90.76	60.00	0.59	0.33	0.61
Star Seed	Excel II	7.66	10.28	29.14	15.11	92.03	60.30	0.60	0.34	0.62
Star Seed	Magnum Ultra BMR	8.03	10.58	28.19	14.91	94.49	61.20	0.61	0.35	0.63
Star Seed	Nutrimaxx BMR	9.32	7.37	26.86	11.04	89.22	60.00	0.60	0.34	0.61
Ward Seed	18180	8.44	8.99	27.86	13.14	86.83	57.90	0.57	0.31	0.59
Ward Seed	18182	10.14	8.20	23.68	12.57	93.85	61.20	0.61	0.35	0.63
Ward Seed	19011	9.63	9.40	26.96	14.05	98.68	62.70	0.63	0.37	0.64
Ward Seed	19011	10.28	8.53	24.37	11.66	101.84	64.80	0.67	0.40	0.67
Ward Seed	19102	8.50	7.80	25.45	10.97	86.51	58.80	0.58	0.32	0.60
Ward Seed	19186	8.98	8.51	28.24	12.25	94.01	61.80	0.62	0.36	0.63
Ward Seed	20268	10.83	8.04	26.78	11.81	96.19	61.20	0.61	0.35	0.63
Ward Seed	20270	9.72	9.38	26.43	13.53	93.69	60.90	0.61	0.35	0.62
Ward Seed	Tifleaf III	9.91	8.95	19.95	11.94	92.54	62.10	0.62	0.36	0.64
Average		9.04	8.73	25.19	12.52	92.79	61.12	0.61	0.35	0.63

Table 7. Hay performance test near Scandia

Company	Variety	First Cutting				Total Yield
		Days to cutting	Height (inches)	DM lb/acre	% Moisture	DM lb/acre
Browning Seed	CADAN 99 B WMR	65	119	7253	0.78	7253
Browning Seed	HEADLESS WONDER	73	119	9863	0.75	9863
Browning Seed	SWEET SIOUX BMR	73	109	7827	0.78	7827
Browning Seed	SWEET SIOUX WMR	65	115	8595	0.76	8595
Channel Seed	Nutri-Cane	73	102	9198	0.79	9198
Channel Seed	Qualimax	79	111	9138	0.75	9138
Channel Seed	Sweetleaf	58	102	6043	0.79	6043
Dyna-Gro Seed	Danny Boy II BMR	88	107	9309	0.77	9309
Dyna-Gro Seed	Dynagraze II	58	89	4371	0.80	4371
Dyna-Gro Seed	Dynagraze II BMR	65	95	6724	0.78	6724
Dyna-Gro Seed	Fullgraze II	79	128	10204	0.73	10204
Dyna-Gro Seed	Fullgraze II BMR	100	120	15867	0.70	15867
Dyna-Gro Seed	PearlMil	65	63	5578	0.82	5578
Dyna-Gro Seed	Super Sweet 10	58	86	4570	0.82	4570
Dyna-Gro Seed	Sweet Ton MS	73	101	7909	0.80	7909
KSU (check)	Early Sumac	65	85	5728	0.84	5728
KSU (check)	Rox Orange	65	83	6460	0.84	6460
S & W Seed Co	Sordan 79	65	104	8958	0.80	8958
S & W Seed Co	SP4555	65	101	5416	0.82	5416
Star Seed	Bruiser	92	97	8211	0.75	8211
Star Seed	Excel II	79	110	7926	0.76	7926
Star Seed	Magnum Ultra BMR	73	93	7392	0.79	7392
Star Seed	Nutrimaxx BMR	92	105	8685	0.76	8685
Ward Seed	18180	79	113	9574	0.75	9574
Ward Seed	18182	65	99	7532	0.80	7532
Ward Seed	19011	73	84	6930	0.80	6930
Ward Seed	19102	100	127	14617	0.79	14617
Ward Seed	19186	100	114	9773	0.71	9773
Ward Seed	20268	73	87	8067	0.80	8067
Ward Seed	20270	77	101	6894	0.77	6894
Ward Seed	19011 harvested +25 day	92	85	9414	0.72	9414
Ward Seed	Tifleaf III	65	65	5795	0.81	5795
Wilbur Ellis	Integra 31F65	73	95	6657	0.81	6657
Wilbur Ellis	Integra Ranch Hand	79	117	9161	0.78	9161
<i>LSD¹</i>			<i>10</i>	<i>3170</i>	<i>0.03</i>	<i>3170</i>

¹Values in bold are in the top LSD group.

There was no second cutting for Scandia, KS.

Table 7b. 2021 Scandia, Kansas Forage Hay Performance Test, Republic County

Company	Variety	CP	ADF	aNDFom	Lignin	uNDFom240	Starch	EE	TFA
Browning Seed	CADAN 99 B WMR	9.80	36.75	59.31	3.79	15.65	4.15	2.64	0.98
Browning Seed	HEADLESS WONDER	5.83	40.25	63.43	4.55	18.29	5.66	2.04	0.73
Browning Seed	SWEET SIOUX BMR	8.76	33.55	53.73	3.06	13.61	5.80	2.52	1.00
Browning Seed	SWEET SIOUX WMR	8.96	37.91	62.10	4.02	17.09	5.19	2.33	0.84
Channel Seed	Nutri-Cane	8.62	32.03	53.23	3.11	14.45	5.84	2.62	1.06
Channel Seed	Qualimax	8.81	36.18	58.00	3.87	15.40	4.48	2.55	1.02
Channel Seed	Sweetleaf	11.12	35.17	60.54	3.65	15.43	4.78	2.80	1.08
Dyna Gro Seed	Danny Boy II BMR	8.87	35.36	56.46	3.32	14.97	4.58	2.53	0.86
Dyna Gro Seed	Dynagraz II	13.02	32.49	54.85	3.34	12.78	3.95	2.88	1.28
Dyna Gro Seed	Dynagraz II BMR	9.61	35.24	59.05	3.16	13.45	4.60	2.52	0.95
Dyna Gro Seed	Fullgraze II	7.65	39.92	65.31	4.51	20.03	4.59	2.32	0.72
Dyna Gro Seed	Fullgraze II BMR	5.08	38.18	59.99	3.78	19.01	5.35	2.08	0.57
Dyna Gro Seed	PearlMil	13.79	36.00	59.01	3.79	11.53	2.69	2.91	1.40
Dyna Gro Seed	Super Sweet 10	11.74	34.42	56.03	3.69	14.29	4.00	2.85	1.18
Dyna Gro Seed	Sweet Ton MS	8.84	32.31	52.82	3.19	13.48	5.80	2.60	1.11
KSU check	Early Sumac	10.79	36.35	59.12	3.56	14.70	3.45	2.71	1.01
KSU check	Rox Orange	10.57	34.64	57.92	3.43	14.73	3.87	2.65	0.91
S & W Seed Co	Sordan 79	8.96	37.00	59.83	4.11	16.08	4.59	2.42	0.81
S & W Seed Co	SP4555	9.61	34.51	54.48	3.22	14.29	4.56	2.58	0.93

continued

Table 7b. 2021 Scandia, Kansas Forage Hay Performance Test, Republic County

Company	Variety	CP	ADF	aNDFom	Lignin	uNDFom240	Starch	EE	TFA
Star Seed	Bruiser	8.33	34.03	54.04	3.05	14.73	5.06	2.60	0.94
Star Seed	Excel II	7.51	37.93	59.60	4.21	16.96	5.45	2.16	0.84
Star Seed	Magnum Ultra BMR	9.95	33.04	53.45	3.27	13.93	5.60	2.71	1.14
Star Seed	Nutrimaxx BMR	6.49	34.67	56.80	3.16	14.47	5.67	2.23	0.86
Ward Seed	18180	6.67	36.97	57.05	4.20	17.43	6.29	2.11	0.84
Ward Seed	18182	8.51	36.62	60.58	3.23	14.53	4.63	2.39	0.82
Ward Seed	19011	11.29	34.33	55.16	2.86	12.29	4.05	2.87	1.07
Ward Seed	19102	8.32	38.51	60.64	4.24	17.29	3.77	2.40	0.84
Ward Seed	19186	5.44	35.16	57.01	3.30	15.14	6.98	2.17	0.78
Ward Seed	20268	9.66	34.96	56.69	2.90	12.45	4.19	2.75	1.01
Ward Seed	20270	9.49	36.01	56.87	3.24	14.19	4.64	2.42	0.85
Ward Seed	19011 harvested +25 day	7.69	32.34	48.87	2.76	14.01	7.79	2.71	1.10
Ward Seed	Tifleaf III	12.47	36.55	60.69	3.70	12.24	3.59	2.71	1.34
Wilbur Ellis	Integra 31F65	9.15	35.96	57.34	3.50	13.95	4.25	2.53	0.97
Wilbur Ellis	Integra Ranch Hand	9.34	36.25	58.31	3.31	14.91	3.96	2.52	0.89
Average		9.14	35.64	57.60	3.53	14.93	4.82	2.52	0.96

Table 7b. 2021 Scandia, Kansas Forage Hay Performance Test, Republic County

Company	Variety	Ash	WSC	NFC	NSC	RFV	TDN	NEM	NEG	NEL
Browning Seed	CADAN 99 B WMR	8.05	8.29	23.06	12.44	91.47	61.50	0.62	0.36	0.63
Browning Seed	HEADLESS WONDER	6.14	10.95	24.75	16.60	82.02	57.60	0.56	0.30	0.59
Browning Seed	SWEET SIOUX BMR	8.04	14.17	29.86	19.97	103.79	65.10	0.67	0.40	0.67
Browning Seed	SWEET SIOUX WMR	7.81	8.03	21.31	13.22	85.44	60.30	0.60	0.34	0.62
Channel Seed	Nutri-Cane	6.39	16.02	32.04	21.86	107.35	66.60	0.69	0.42	0.69
Channel Seed	Qualimax	7.75	10.53	25.69	15.00	92.90	62.40	0.63	0.37	0.64
Channel Seed	Sweetleaf	7.43	9.06	21.11	13.84	91.42	63.30	0.64	0.38	0.65
Dyna Gro Seed	Danny Boy II BMR	9.00	10.36	26.12	14.94	97.36	63.30	0.64	0.38	0.65
Dyna Gro Seed	Dynagraz II	7.95	10.55	24.68	14.50	103.03	66.30	0.69	0.42	0.68
Dyna Gro Seed	Dynagraz II BMR	8.18	10.27	23.68	14.87	92.30	63.30	0.64	0.38	0.65
Dyna Gro Seed	Fullgraze II	6.61	7.69	20.61	12.27	79.63	57.90	0.56	0.30	0.59
Dyna Gro Seed	Fullgraze II BMR	6.80	12.16	28.56	17.51	88.53	59.70	0.59	0.33	0.61
Dyna Gro Seed	PearlMil	10.80	6.65	16.58	9.34	92.94	62.40	0.63	0.37	0.64
Dyna Gro Seed	Super Sweet 10	8.40	9.47	24.27	13.47	98.37	63.90	0.65	0.39	0.66
Dyna Gro Seed	Sweet Ton MS	6.52	15.34	32.08	21.14	107.76	66.60	0.69	0.42	0.69
KSU check	Early Sumac	8.10	8.50	22.49	11.95	91.81	61.80	0.62	0.36	0.63
KSU check	Rox Orange	8.06	8.78	24.16	12.65	94.57	63.60	0.65	0.38	0.65
S & W Seed Co	Sordan 79	7.94	8.28	23.62	12.87	89.30	60.90	0.61	0.35	0.62
S & W Seed Co	SP4555	9.10	10.51	27.31	15.06	99.21	63.60	0.65	0.38	0.65

continued

Table 7b. 2021 Scandia, Kansas Forage Hay Performance Test, Republic County

Company	Variety	Ash	WSC	NFC	NSC	RFV	TDN	NEM	NEG	NEL
Star Seed	Bruiser	8.58	12.23	29.58	17.29	103.71	64.20	0.66	0.39	0.66
Star Seed	Excel II	7.33	11.28	25.80	16.73	89.15	60.00	0.59	0.34	0.61
Star Seed	Magnum Ultra BMR	7.09	13.22	29.77	18.82	105.11	65.70	0.68	0.41	0.68
Star Seed	Nutrimaxx BMR	6.73	14.04	30.58	19.71	97.09	63.90	0.65	0.39	0.66
Ward Seed	18180	6.83	13.65	29.73	19.94	94.11	61.20	0.61	0.35	0.63
Ward Seed	18182	9.03	9.39	22.29	14.03	89.85	61.50	0.62	0.36	0.63
Ward Seed	19011	10.04	9.43	23.99	13.48	98.93	64.20	0.66	0.39	0.66
Ward Seed	19102	8.36	7.94	23.05	11.71	86.69	59.40	0.58	0.33	0.61
Ward Seed	19186	6.19	13.46	31.88	20.44	96.34	63.30	0.64	0.38	0.65
Ward Seed	20268	9.54	9.88	24.56	14.07	97.59	63.30	0.64	0.38	0.65
Ward Seed	20270	9.25	10.06	24.96	14.70	94.64	62.40	0.63	0.37	0.64
Ward Seed	19011 harvested +25 day	8.09	15.05	35.59	22.83	115.90	66.30	0.69	0.42	0.68
Ward Seed	Tifleaf III	9.64	8.48	17.35	12.08	90.10	61.80	0.62	0.36	0.63
Wilbur Ellis	Integra 31F65	8.76	9.47	25.21	13.72	94.25	62.40	0.63	0.37	0.64
Wilbur Ellis	Integra Ranch Hand	9.27	9.11	23.42	13.07	93.17	62.10	0.63	0.36	0.64
Average		8.05	10.66	25.58	15.47	95.17	62.70	0.63	0.37	0.64

Table 8. Silage performance test near Garden City

Company	Variety	Stand Assessment			First Cutting			
		Stand	Vigor	Lodging %	Days to harvest	Height (inches)	DM lb/acre	Moisture
Alta Seeds	ADVF7424	10	10	0	119	71	14240	0.66
Alta Seeds	ADVF8322	9	10	0	119	71	14989	0.64
Alta Seeds	ADVS6504	10	9	0	119	108	14107	0.72
Alta Seeds	ADVS6520	10	10	0	119	104	14497	0.69
Alta Seeds	ADVXF450IG	10	10	0	119	67	15629	0.66
Alta Seeds	ADVXS005	10	10	0	119	106	14830	0.69
Alta Seeds	AF7401	10	10	0	119	65	15009	0.66
Channel Seed	Nutri-Choice	9	10	0	119	74	13157	0.67
Channel Seed	Nutri-Chomp	10	10	0	119	93	12714	0.69
Dyna-Gro Seed	5 Star	10	10	0	98	94	13766	0.70
Dyna-Gro Seed	F70FS91 BMR	9	9	0	105	80	10913	0.67
Dyna-Gro Seed	F71FS72 BMR	10	9	0	98	67	11472	0.70
Dyna-Gro Seed	F72FS05	10	10	0	119	69	15821	0.66
Dyna-Gro Seed	F74FS23 BMR	10	10	0	98	83	12534	0.74
Dyna-Gro Seed	F74FS72 BMR	10	10	0	119	65	13761	0.64
Dyna-Gro Seed	Super Sile 20	9	9	0	119	94	13977	0.67
Dyna-Gro Seed	Super Sile 30	10	9	0	119	89	14805	0.69
Dyna-Gro Seed	Sweet Ton MS	10	9	0	98	89	11643	0.70

continued

Table 8. Silage performance test near Garden City

Company	Variety	Stand Assessment			First Cutting			
		Stand	Vigor	Lodging %	Days to harvest	Height (inches)	DM lb/acre	Moisture
KSU (check)	KS Orange	10	9	0	105	99	12537	0.68
MOJO Seed	Opal	10	10	0	105	69	11247	0.71
MOJO Seed	Pearl	10	10	0	98	70	10660	0.70
Sharp Brothers	Buffalo Sugar Sweet AT	10	10	0	119	86	13446	0.70
Sharp Brothers	SBW7706W	10	10	0	98	66	12987	0.69
Star Seed	Brutis	10	10	0	119	65	13305	0.65
Star Seed	Packer	10	10	0	105	73	11054	0.71
Ward Seed	19040	10	10	0	119	61	10894	0.67
Ward Seed	19042	10	10	0	119	79	15090	0.69
Ward Seed	19156	10	9	0	98	96	13739	0.67
Ward Seed	19181	10	10	0	119	73	12625	0.66
Wilbur Ellis	Integra 33F70	9	10	0	119	63	11050	0.68
Wilbur Ellis	Integra 34F95	9	10	0	105	87	13214	0.69
Wilbur Ellis	Integra 38F80	10	10	0	119	82	12211	0.71
<i>LSD¹</i>						8	2632	0.05

¹Values in bold are in the top LSD group.

Table 8b. 2021 Garden City, Kansas Silage Performance Test, Finney County

Company	Variety	CP	ADF	aNDFom	Lignin	uNDFom240	Starch	EE	TFA
Alta Seeds	ADVF7424	7.01	30.40	49.39	2.40	16.20	8.86	2.75	1.13
Alta Seeds	ADVF8322	7.19	31.99	51.35	3.73	17.16	10.97	2.57	1.09
Alta Seeds	ADVS6504	6.82	33.80	51.79	2.51	16.19	2.53	2.47	0.93
Alta Seeds	ADVS6520	6.37	33.64	51.86	2.49	16.08	3.63	2.40	0.91
Alta Seeds	ADVXF450IG	7.21	33.52	54.49	3.73	18.94	8.24	2.31	0.96
Alta Seeds	ADVXS005	6.91	33.44	51.88	3.12	16.41	3.64	2.49	0.91
Alta Seeds	AF7401	7.97	31.15	48.68	3.17	15.85	10.93	2.69	1.09
Channel Seed	Nutri-Choice	7.43	31.82	49.97	3.56	16.25	11.34	2.41	1.05
Channel Seed	Nutri-Chomp	7.06	31.63	51.93	2.79	14.52	3.43	2.49	0.99
Dyna Gro Seed	5 Star	7.60	30.04	46.10	3.50	14.83	13.62	2.81	1.18
Dyna Gro Seed	F70FS91 BMR	8.31	31.03	46.18	3.41	14.57	13.09	3.01	1.22
Dyna Gro Seed	F71FS72 BMR	7.76	29.87	44.45	3.26	14.79	15.94	3.14	1.29
Dyna Gro Seed	F72FS05	7.64	31.24	48.89	3.20	15.33	9.98	2.65	1.07
Dyna Gro Seed	F74FS23 BMR	7.55	30.61	47.75	2.79	14.61	9.25	2.72	1.13
Dyna Gro Seed	F74FS72 BMR	7.15	31.82	49.87	2.79	16.13	9.28	2.67	1.07
Dyna Gro Seed	Super Sile 20	6.79	33.02	52.69	3.67	17.97	7.52	2.32	0.95
Dyna Gro Seed	Super Sile 30	7.34	33.46	51.70	4.06	17.08	9.38	2.42	0.91
Dyna Gro Seed	Sweet Ton MS	7.54	28.39	43.33	3.05	14.57	12.71	2.93	1.18
KSU check	KS Orange	7.17	31.04	48.46	3.62	17.17	10.86	2.80	1.01
MOJO Seed	Opal	7.97	31.41	48.19	3.46	16.27	11.07	2.62	1.12
MOJO Seed	Pearl	7.73	31.30	48.55	3.43	16.22	13.34	2.79	1.21
Sharp Brothers	Buffalo Sugar Sweet AT	7.43	32.85	50.26	3.92	16.82	8.95	2.47	1.00
Sharp Brothers	SBW7706W	8.15	30.98	46.46	3.76	15.44	17.52	2.95	1.28
Star Seed	Brutis	7.22	31.35	49.31	2.76	15.08	9.14	2.68	1.05
Star Seed	Packer	7.57	32.17	49.75	3.65	16.02	11.03	2.57	1.09
Ward Seed	19040	8.34	32.03	51.10	3.29	16.51	5.69	2.57	1.05
Ward Seed	19042	7.69	33.34	53.87	3.35	17.12	2.91	2.45	0.96
Ward Seed	19156	6.76	32.50	48.61	4.00	16.07	13.08	2.58	1.09
Ward Seed	19181	7.76	29.16	46.69	2.18	14.99	8.66	2.83	1.18
Wilbur Ellis	Integra 33F70	7.53	32.17	50.51	3.49	15.65	13.10	2.52	1.11
Wilbur Ellis	Integra 34F95	8.19	28.01	42.00	2.85	13.46	12.09	3.27	1.19
Wilbur Ellis	Integra 38F80	7.94	32.97	52.83	3.86	16.62	9.04	2.42	1.04
Average		7.47	31.63	49.34	3.28	15.97	9.71	2.65	1.08

Table 8b. 2021 Garden City, Kansas Silage Performance Test, Finney County

Company	Variety	Ash	WSC	NFC	NSC	RFV	TDN	NEM	NEG	NEL
Alta Seeds	ADVF7424	10.80	14.23	32.71	23.09	119.02	68.67	0.72	0.45	0.71
Alta Seeds	ADVF8322	9.81	10.53	31.53	21.50	112.10	66.60	0.69	0.43	0.69
Alta Seeds	ADVS6504	12.67	17.79	28.92	20.33	108.50	64.80	0.66	0.40	0.67
Alta Seeds	ADVS6520	11.68	17.52	29.98	21.15	108.58	65.10	0.67	0.41	0.67
Alta Seeds	ADVXF450IG	9.93	11.93	28.57	20.18	103.52	65.10	0.67	0.40	0.67
Alta Seeds	ADVXS005	10.88	18.38	30.33	22.02	108.84	65.10	0.67	0.40	0.67
Alta Seeds	AF7401	10.23	11.35	33.18	22.28	119.27	67.80	0.71	0.44	0.70
Channel Seed	Nutri-Choice	10.35	11.11	32.31	22.45	114.63	66.90	0.70	0.43	0.69
Channel Seed	Nutri-Chomp	10.00	18.15	31.12	21.57	111.27	67.20	0.70	0.43	0.69
Dyna Gro Seed	5 Star	9.90	12.82	36.31	26.44	125.42	69.00	0.73	0.45	0.71
Dyna Gro Seed	F70FS91 BMR	10.80	10.13	34.53	23.22	123.95	67.50	0.71	0.44	0.70
Dyna Gro Seed	F71FS72 BMR	10.86	9.79	36.68	25.73	131.01	68.97	0.73	0.45	0.71
Dyna Gro Seed	F72FS05	11.01	11.90	32.50	21.88	117.48	67.80	0.71	0.44	0.70
Dyna Gro Seed	F74FS23 BMR	11.70	14.60	33.00	23.85	120.71	68.10	0.71	0.44	0.70
Dyna Gro Seed	F74FS72 BMR	11.34	11.99	31.74	21.27	113.99	67.20	0.70	0.43	0.69
Dyna Gro Seed	Super Sile 20	9.54	14.30	30.91	21.81	108.23	65.70	0.68	0.41	0.68
Dyna Gro Seed	Super Sile 30	9.66	12.93	31.38	22.32	108.78	65.10	0.67	0.40	0.67
Dyna Gro Seed	Sweet Ton MS	9.08	16.77	39.74	29.49	136.43	70.73	0.75	0.48	0.73
KSU check	KS Orange	9.11	15.18	35.27	26.04	119.61	67.80	0.71	0.44	0.70
MOJO Seed	Opal	10.60	12.70	33.27	23.77	118.55	67.20	0.70	0.43	0.69
MOJO Seed	Pearl	10.81	10.52	32.72	23.86	117.21	67.50	0.71	0.44	0.70
Sharp Brothers	Buffalo Sugar Sweet AT	10.34	13.22	31.96	22.17	111.75	66.00	0.68	0.42	0.68
Sharp Brothers	SBW7706W	10.13	6.45	34.91	23.97	124.51	67.80	0.71	0.44	0.70
Star Seed	Brutis	10.41	12.23	32.99	21.37	117.41	67.20	0.70	0.43	0.69
Star Seed	Packer	10.96	11.92	31.72	22.94	114.15	66.60	0.69	0.43	0.69
Ward Seed	19040	10.80	15.35	29.90	21.04	111.71	66.60	0.69	0.43	0.69
Ward Seed	19042	10.35	15.57	28.26	18.48	105.24	65.40	0.67	0.41	0.67
Ward Seed	19156	10.04	11.42	34.44	24.50	115.82	66.30	0.69	0.42	0.68
Ward Seed	19181	10.91	14.98	34.49	23.63	127.43	70.17	0.75	0.47	0.73
Wilbur Ellis	Integra 33F70	11.10	8.08	30.85	21.18	113.54	66.60	0.69	0.42	0.69
Wilbur Ellis	Integra 34F95	9.56	16.76	39.97	28.85	142.70	71.30	0.76	0.48	0.74
Wilbur Ellis	Integra 38F80	10.67	11.23	28.64	20.28	108.33	65.70	0.68	0.41	0.68
Average		10.50	13.18	32.65	22.90	116.87	67.17	0.70	0.43	0.69

Table 9. Silage performance test near Scandia

Company	Variety	Stand Assessment			First Cutting			
		Stand	Vigor	Lodging %	Days to harvest	Height (inches)	DM lb/acre	Moisture
Channel Seed	Nutri-Choice	9	3	7	99	88	10073	0.74
Channel Seed	Nutri-Chomp	9	2	17	106	121	10271	0.75
Dyna-Gro Seed	5 Star	9	3	7	91	115	9839	0.75
Dyna-Gro Seed	F70FS91 BMR	9	7	13	91	112	11372	0.71
Dyna-Gro Seed	F71FS72 BMR	8	1	0	91	89	7329	0.77
Dyna-Gro Seed	F72FS05	9	0	3	99	85	11832	0.73
Dyna-Gro Seed	F74FS23 BMR	9	8	67	99	99	5360	0.79
Dyna-Gro Seed	F74FS72 BMR	9	0	0	106	73	10736	0.74
Dyna-Gro Seed	Super Sile 20	7	1	0	106	114	9741	0.73
Dyna-Gro Seed	Super Sile 30	8	1	13	99	102	10648	0.75
Dyna-Gro Seed	Sweet Ton MS	9	7	7	91	112	6652	0.75
KSU (check)	KS Orange	7	4	3	99	116	8938	0.70
MOJO Seed	Opal	8	1	0	99	89	8549	0.74
MOJO Seed	Pearl	10	4	13	91	95	7493	0.78
Star Seed	Brutis	9	1	0	99	78	11490	0.73
Star Seed	Packer	10	1	0	91	93	10153	0.76
Ward Seed	19040	8	1	0	106	77	10571	0.73
Ward Seed	19042	9	1	0	106	97	9072	0.74
Ward Seed	19156	9	9	53	91	117	10776	0.72
Ward Seed	19181	9	0	0	99	87	6779	0.77
Wilbur Ellis	Integra 33F70	10	1	0	91	71	10736	0.76
Wilbur Ellis	Integra 34F95	9	5	0	91	113	7702	0.74
Wilbur Ellis	Integra 38F80	9	0	0	99	91	9369	0.74
<i>LSD¹</i>						5	3265	0.04

¹Values in bold are in the top LSD group.

Table 9b. 2021 Scandia, Kansas Silage Performance Test, Republic County

Company	Variety	CP	ADF	aNDFom	Lignin	uNDFom240	Starch	EE	TFA
Channel Seed	Nutri-Choice	6.72	37.38	58.73	4.23	17.08	3.60	2.32	0.83
Channel Seed	Nutri-Chomp	6.48	30.30	48.55	2.59	11.66	3.33	2.67	0.91
Dyna Gro Seed	5 Star	7.53	32.88	51.40	3.36	15.79	3.63	2.42	1.03
Dyna Gro Seed	F70FS91 BMR	8.73	31.64	50.12	3.27	14.09	8.10	2.97	1.27
Dyna Gro Seed	F71FS72 BMR	7.98	30.31	47.08	2.99	13.65	10.32	2.79	1.26
Dyna Gro Seed	F72FS05	7.05	37.91	60.82	4.95	17.44	4.54	2.34	0.92
Dyna Gro Seed	F74FS23 BMR	8.94	35.76	56.47	3.23	15.44	0.98	2.55	1.05
Dyna Gro Seed	F74FS72 BMR	7.86	33.19	52.61	3.16	14.70	7.05	2.76	1.16
Dyna Gro Seed	Super Sile 20	6.77	31.68	50.09	3.37	15.08	6.48	2.37	1.00
Dyna Gro Seed	Super Sile 30	6.88	36.06	56.46	4.15	17.28	3.03	2.21	0.91
Dyna Gro Seed	Sweet Ton MS	8.39	29.14	46.65	2.75	13.82	5.96	2.80	1.17
KSU check	KS Orange	7.10	32.49	51.75	3.61	16.88	5.18	2.59	0.86
MOJO Seed	Opal	6.38	32.39	51.78	3.04	15.58	3.43	2.62	0.93
MOJO Seed	Pearl	7.65	36.81	58.38	4.31	16.91	3.26	2.40	0.97
Star Seed	Brutis	8.97	32.42	51.97	3.27	14.63	7.50	2.76	1.13
Star Seed	Packer	7.14	36.24	57.64	4.44	16.17	3.38	2.36	0.99
Ward Seed	19040	7.50	31.10	48.48	3.05	14.10	4.98	2.74	1.09
Ward Seed	19042	7.28	32.60	52.45	3.17	14.64	2.31	2.53	1.08
Ward Seed	19156	6.77	38.87	59.90	4.44	18.69	1.53	2.14	0.85
Ward Seed	19181	6.75	32.79	52.59	2.49	15.46	1.97	2.71	1.01
Wilbur Ellis	Integra 33F70	7.91	33.90	54.09	3.31	14.38	6.37	2.51	1.14
Wilbur Ellis	Integra 34F95	7.82	28.85	47.02	2.41	13.30	5.53	2.90	1.19
Wilbur Ellis	Integra 38F80	5.62	34.79	56.13	3.72	15.97	4.57	2.21	0.92
Average		7.40	33.46	53.10	3.45	15.34	4.65	2.55	1.03

Table 9b. 2021 Scandia, Kansas Silage Performance Test, Republic County

Company	Variety	Ash	WSC	NFC	NSC	RFV	TDN	NEM	NEG	NEL
Channel Seed	Nutri-Choice	9.87	12.14	25.21	15.74	91.21	60.90	0.61	0.35	0.62
Channel Seed	Nutri-Chomp	9.13	23.04	35.93	26.37	119.04	68.67	0.72	0.45	0.71
Dyna Gro Seed	5 Star	9.79	18.79	31.74	22.43	108.96	66.00	0.68	0.42	0.68
Dyna Gro Seed	F70FS91 BMR	10.30	12.22	30.96	20.32	115.75	66.90	0.70	0.43	0.69
Dyna Gro Seed	F71FS72 BMR	10.64	14.00	34.56	24.32	122.76	68.67	0.72	0.45	0.71
Dyna Gro Seed	F72FS05	9.44	9.02	23.18	13.55	88.90	60.30	0.60	0.34	0.62
Dyna Gro Seed	F74FS23 BMR	12.81	11.46	22.42	12.44	96.78	62.40	0.63	0.37	0.64
Dyna Gro Seed	F74FS72 BMR	11.33	11.49	28.41	18.54	109.26	65.37	0.67	0.40	0.67
Dyna Gro Seed	Super Sile 20	9.91	19.55	33.24	26.03	113.69	66.87	0.70	0.43	0.69
Dyna Gro Seed	Super Sile 30	9.88	15.34	27.24	18.36	96.26	62.10	0.63	0.36	0.64
Dyna Gro Seed	Sweet Ton MS	9.46	19.32	35.60	25.29	124.72	69.87	0.74	0.46	0.72
KSU check	KS Orange	8.68	18.51	32.99	23.69	109.64	66.00	0.68	0.42	0.68
MOJO Seed	Opal	9.08	19.41	33.04	22.84	109.99	66.27	0.69	0.42	0.68
MOJO Seed	Pearl	10.21	12.51	24.26	15.77	92.62	61.50	0.62	0.36	0.63
Star Seed	Brutis	10.76	11.30	28.66	18.80	109.50	66.30	0.69	0.42	0.68
Star Seed	Packer	10.00	13.11	25.67	16.50	93.58	61.80	0.62	0.36	0.63
Ward Seed	19040	10.19	18.94	33.89	23.92	117.83	67.50	0.71	0.44	0.70
Ward Seed	19042	9.89	18.67	30.70	20.98	106.67	66.00	0.68	0.42	0.68
Ward Seed	19156	10.13	12.94	23.77	14.47	87.28	59.40	0.58	0.33	0.61
Ward Seed	19181	10.61	18.11	30.43	20.08	107.42	65.70	0.68	0.41	0.68
Wilbur Ellis	Integra 33F70	11.69	10.31	26.64	16.68	102.39	64.50	0.66	0.39	0.66
Wilbur Ellis	Integra 34F95	9.83	20.20	35.38	25.74	125.31	70.13	0.75	0.47	0.73
Wilbur Ellis	Integra 38F80	8.82	17.20	29.64	21.77	100.36	63.60	0.65	0.38	0.65
Average		10.11	15.55	29.72	20.20	106.52	65.08	0.67	0.40	0.67

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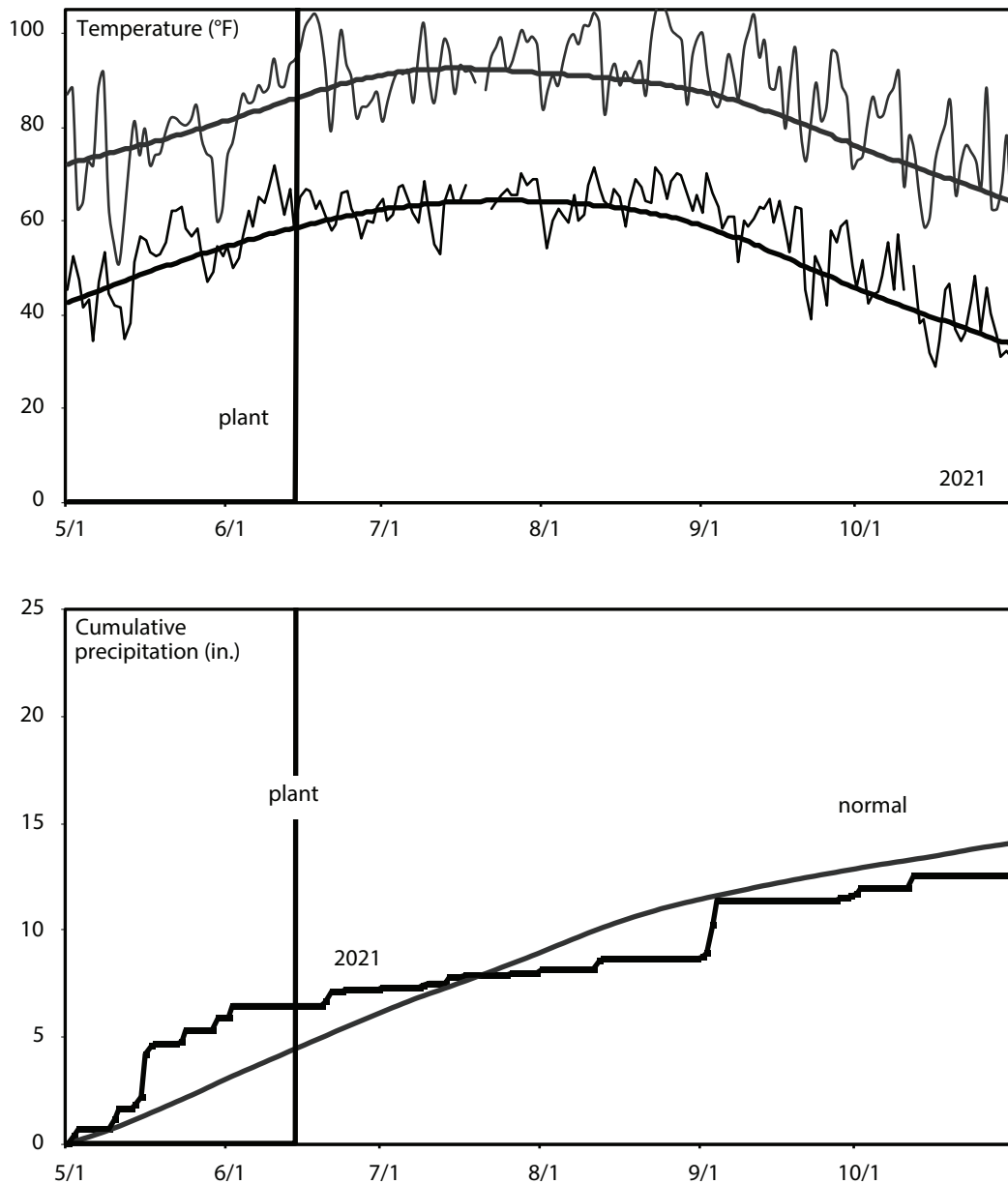


Figure 1. Precipitation and temperature during the 2021 growing season near Garden City, KS. Top pane: daily and mean (1981 to 2010) high and low temperature. Bottom pane: daily and mean (1981 to 2010) cumulative precipitation.

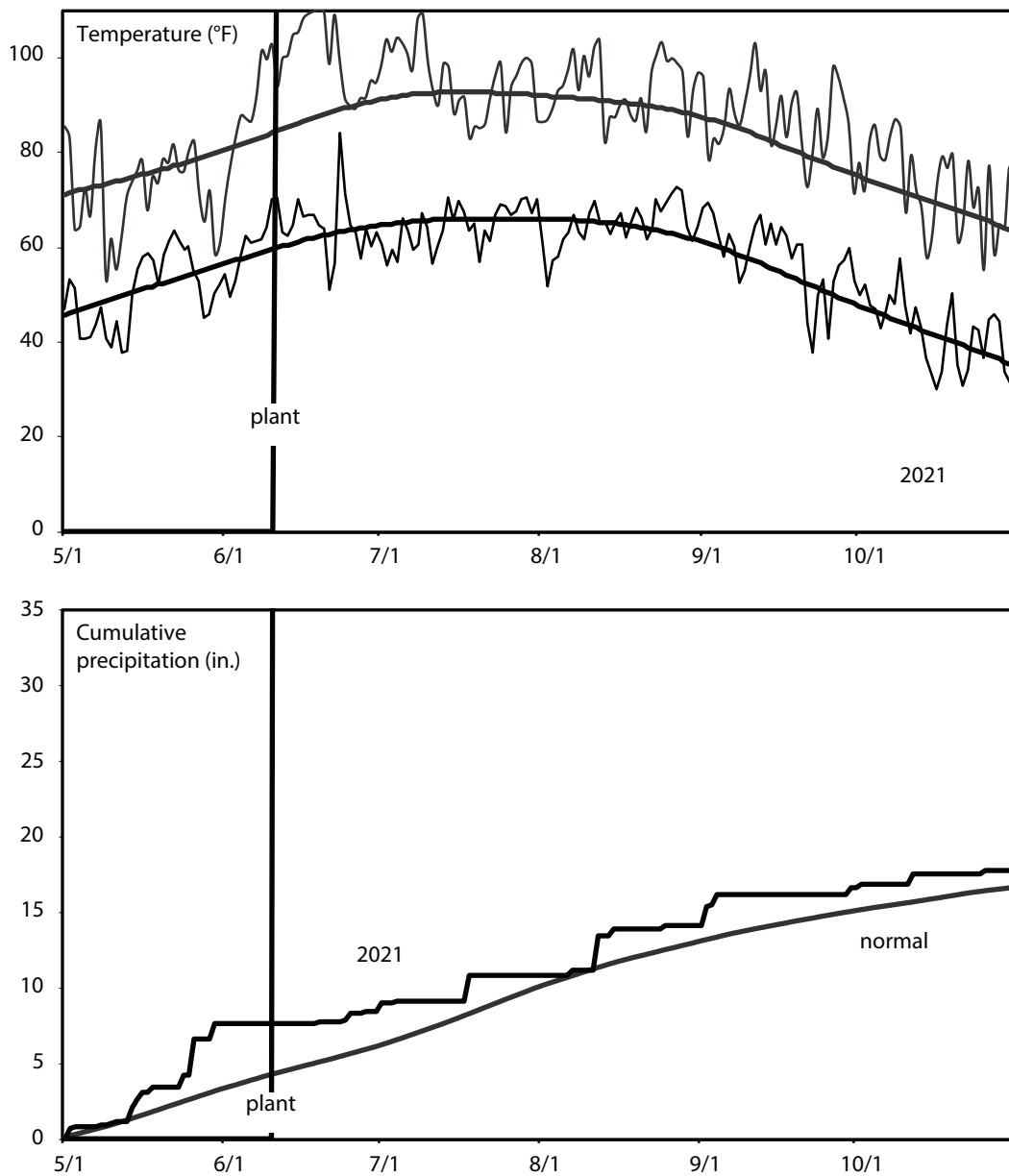


Figure 2. Precipitation and temperature during the 2021 growing season near Hays, KS. Top pane: daily and mean (1981 to 2010) high and low temperature. Bottom pane: daily and mean (1981 to 2010) cumulative precipitation.

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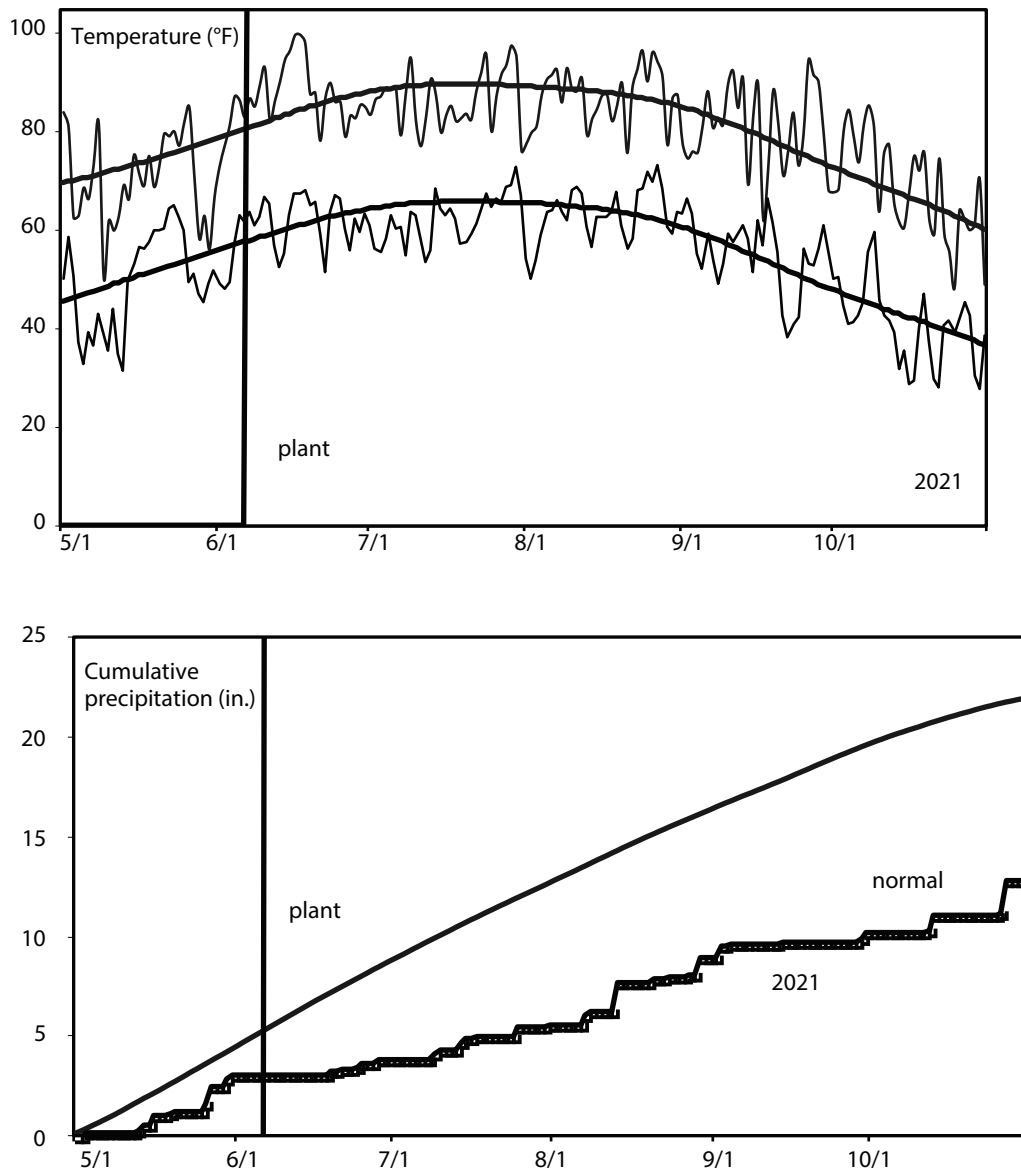


Figure 3. Precipitation and temperature during the 2021 growing season near Scandia, KS. Top pane: daily and mean (1981 to 2010) high and low temperature. Bottom pane: daily and mean (1981 to 2010) cumulative precipitation.

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