2023 Enlist Technology Cotton Variety Trial – Edcot Gin

George Brothers Farm
Kress, TX

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Summary

In 2019, a cotton variety testing program was established as a new service created by Windstar Inc. affiliated gins. These gins are working together to support a Cotton Agronomics Manager position. One of the components of this program is to work with local producers to scientifically evaluate varieties in a commercial on-farm setting from planting through ginning. These unique replicated trials are planted and harvested with the grower's commercial equipment. Each variety's round modules are combined across all replicates and then ginned and classed separately in an extremely detailed manner. Purging and weighing any remnant bale from the press is also performed for each variety. All lint samples from each variety's commercial bales are then classed by the USDA-AMS classing office. This detailed ginning and classing management of all round modules for each variety is key to the success of this program and to the best of our knowledge is without peer in the U.S. ginning industry.

At this site in 2023, eight PhytoGen entries) with Enlist technology were planted in a center-pivot irrigated field in a scientifically valid trial with three replicates. Among the eight entries, one experimental, a "plot seed" PHY 205 W3FE entry with Trio treatment, and two off-the-shelf locally purchased entries with base seed treatment (PHY 205 W3FE and PHY 350 W3FE – denoted as "Grower Seed") were included.

This trial experienced minimal adverse weather events, with the exception of cool, wet conditions during May and June, and a mid-September light hail event which is discussed below. Rainfall was exceptionally high from after planting through June. Substantial seedling disease was noted which resulted in some minor stand loss, and affected early season growth and development. Toward the end of July, rainfall essentially ceased and very hot and typically dry conditions prevailed through the remainder of the growing season. Irrigation capacity was challenged, and moisture stress was noted in late August and early September. Low Verticillium wilt disease pressure was observed in the field. The field's plant growth regulator management was targeted to the remainder of the field, which was planted to PHY 205 W3FE and only one low-rate Stance application was made. Therefore, entries with greater growth potential were able to express that to a certain degree, and taller plant heights were noted for those entries. Plant height data are presented in Table 3, which indicates that all entries were

less than 26 inches tall. The trial escaped various localized early hail events that occurred in the surrounding area. However, a hail storm occurred on September 16 that essentially resulted in about 30% defoliation of the trial. Post-hail event observations on September 19 indicated the crop was near harvest-aid ready at that time, and was about 3 nodes above cracked boll. Therefore, crop loss and micronaire impact were very minimal. The trial area in the field was extremely uniform, which contributed to extremely high-quality yield-related data. Moderate yields and good quality were noted in the trial.

Harvest results indicated that statistically significant differences were observed. Lint yields ranged from a high of 1110 lb/acre (PX1122A214-04 W3FE) to a low of 919 lb/acre (PHY 400 W3FE), and averaged 998 lb/acre (Table 1). Cash bids were obtained for commercially ginned and classed bale quality for each variety. This was performed on October 25 (at 83.80 cent/lb December 2023 futures) using the USDA-AMS classing results. Several entries had cash value for lint of about $0.80/lb. These values ranged from a high of about $0.82/lb (PHY 350 W3FE - Grower Seed) to a low of about $0.75/lb (PHY 205 W3FE - Grower Seed) and averaged just over $0.78/lb. Net gin credit is defined as seed credit minus ginning expense. Net value/acre (defined as gross lint cash value plus net gin credit) ranged from a high of $915/acre (PX1122A214-04 W3FE) to a low of $784/acre (PHY 400 W3FE), a difference of $131/acre. These differences were statistically significant, and had a low coefficient of variation at just under 3%.

Table 2 provides similar information for the trial, but net value/acre is based on lint CCC Loan value. Average Loan value for varieties from commercially ginned and classed bales varied from a high of $0.5675/lb (PHY 350 W3FE - Grower Seed) to a low of $0.5553/lb (PHY 205 W3FE - Grower Seed). Overall Loan value for the trial across all entries was 0.5388/lb. Net value/acre (defined as gross Loan value plus net gin credit) ranged from a high of $653/acre (PX1122A214-04 W3FE) to a low of $558/acre (PHY 400 W3FE), a difference of $95/acre (Table 2). These differences were statistically significant, and had a low coefficient of variation at 3%.

Table 3 presents in-season data including stand establishment percentage, vigor, nodes above white flower (NAWF) on two observation dates, plant height on three observation dates, nodes above cracked boll on September 19 and a visual estimate of storm resistance at harvest. Final plant heights ranged from a high of 25.9 inches for PHY 332 W3FE to a low of 21.3 inches for PHY 205 W3FE - Grower Seed.

Table 4 provides the USDA-AMS classing results from each commercial bale for each variety and the variety averages. Averages indicate that color grades were typically 11, 21 with a few 22 values. The 22 color grades were noted exclusively in PHY 332 W3FE. Leaf grades ranged from 1 to 3. Staple ranged from a high of 36.4 (PHY 332 W3FE) to a low of 33.3 32nds inch (PHY 205 W3FE – Grower Seed). Average micronaire for varieties ranged from a low of 3.6 (PHY 400 W3FE) to a high of 4.3 (PHY 210 W3FE). Loan chart low micronaire discounts are triggered at values of 3.4 and lower. Therefore, none of the entries encountered Loan rate discounts for low micronaire. No bark contamination was noted in commercial bales. Fiber strength ranged from 29.0 to 30.3 g/tex, and uniformity ranged from 79.5 to 82.0%.

Disclaimer: Readers should realize that results from one trial do not represent conclusive evidence that the same response would occur where conditions vary. Multi-site and multi-year data are always best. For this trial, good scientific techniques were

used and the results are presented to indicate what actually occurred in the trial. Context of the environment, overall growing season impact, management techniques, and trial methodology used are important and must be considered.

Site Information and Methods

Elevation: 3585 ft

Previous crop: Grazed out wheat in 2022

Tillage system: No-till

Planted: May 6

Replicates: 3 replicates in a randomized complete block design

Plot width: 8-row plots

Plot length: Trial was planted on the west half of the center pivot in straight rows that ranged from ~2,500 ft for long rows and ~2,200 ft for short rows

Seeding rate: 45,000 seed/acre

Days from planting to first bloom: 73 (July 18)

Row spacing: 30-inch rows

Total rainfall April through October: ~16.0 inches

April 1.2, May 7.6, June 3.0, July 2.2, August 0.4, September 0.8, October 0.8

Total irrigation May through September: ~6.7 inches

May 1.0, June 0.0, July 1.5, August 2.0, September 2.2

Fertility management: 15 gal/acre 32-0-0 fertigated through pivot on July 1, 15 tons/acre feedyard manure applied 2022, no other fertilizers applied

Chemical Applications:

Spring burndown – 2 oz/acre Panther, 22 oz/acre 2,4-D LV6, 32 oz/acre Roundup (April 15)

Preemergence – 1 qt/acre diuron + 22 oz/acre 2,4-D LV6 + 32 oz/acre Dual (May 12)

Post emergence – 1 qt/acre Enlist One (June 5)

Post emergence – 1 qt/acre Enlist One + 32 oz/acre Roundup + 1 pt/acre Outlook (July 12)

Plant growth regulators: 2 oz/acre Stance (July 3)

Insecticides: 4 oz/acre acephate (June 5)

Harvest aid application: 3 pt/acre ethephon (October 7)

Harvesting: October 18 using a John Deere CS690, with harvested length determined by the GPS on the stripper monitor. Round modules were weighed using the integral CS690 scale, and all round modules from each variety were weighed at Edcot Gin.

Commercial ginning: Round modules for all 3 reps of each variety were staged together (1 per plot, with 3 reps = 3 total per variety) and commercially ginned separately by Edcot Gin. Commercial ginning included: cleaning module feeder, clearing gin stream, dumping seed rolls, and purging remnant bale in press. This process was initiated before the first variety module was ginned and then repeated for each variety module in trial.

Remnants were ejected from the bale press and weighed, but not sampled for USDA-AMS classing. Only data from commercial bales are included in classing data for each variety.

Lint value: based on CCC Loan value from commercial ginning and USDA-AMS classing results.

List of Tables

Acknowledgements

Edcot Gin would like to thank Brennen George and Gentry George for committing equipment, land, and time to conduct and manage the trial. Gratitude is expressed to PhytoGen Cotton Seed, Corteva, and Windstar Inc. Detailed ginning was performed by “Ginner Ernie” and the crew and a big thank you is extended to this hard-working group. Landon Kidd provided capable assistance with in-season data collection and module supervision and ginning.

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Table 1. Harvest results for the center pivot irrigated Enlist technology cotton variety trial (lint cash value), George Farm, Kress, TX, 2023.

Entry	Lint turnout	Seed turnout	Bur cotton yield	Lint yield	Seed yield	Lint cash value	Lint cash value	Net gin credit	Net value	
	---------- % ----------		---------- lb/acre ----------			$/lb	---------- $/acre ----------			
PX 1122A214-04 W3FE	33.5	42.0	3312	1110	1391	0.7565	840	75	915	a
PHY 332 W3FE	29.2	43.2	3406	995	1472	0.8109	807	83	889	ab
PHY 250 W3FE	30.8	42.6	3270	1005	1394	0.7976	802	77	879	bc
PHY 350 W3FE - Grower Seed	30.1	42.7	3200	964	1366	0.8242	794	76	870	bcd
PHY 210 W3FE	31.1	43.2	3108	966	1343	0.7956	769	76	844	cde
PHY 205 W3FE - Grower Seed	30.7	41.5	3333	1023	1383	0.7445	761	73	835	de
PHY 205 W3FE	30.7	42.1	3277	1005	1380	0.7466	750	75	826	e
PHY 400 W3FE	31.1	42.6	2951	919	1258	0.7781	715	69	784	f
Test average	30.9	42.5	3232	998	1373	0.7818	780	76	855	
CV, %	--	--	3.2	3.1	3.1	--	3.0	3.0	2.9	
OSL	--	--	0.0025	0.0002	0.0026	--	0.0004	0.0005	0.0005	
LSD	--	--	148	45	62	--	33	3	36	

For net value/acre, means within a column with the same letter are not significantly different.
CV - coefficient of variation.
OSL - observed significance level, or probability of a greater F value.
LSD - least significant difference at the 0.10 level, NS - not significant.
Note: some columns may not add up due to rounding error.

Assumes:
$3.40/cwt commercial ginning cost.
$270/ton for seed.
Net gin credit is defined as seed credit minus ginning expense.
Lint value based on cash bids for each variety on October 25 at 83.80 cent December 2023 futures using commercial ginning and USDA-AMS classing results.

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Table 2. Harvest results for the center pivot irrigated Enlist technology cotton variety trial (lint loan value), George Farm, Kress, TX, 2023.

Entry	Lint turnout	Seed turnout	Bur cotton yield	Lint yield	Seed yield	Lint loan value	Lint loan value	Net gin credit	Net value	
	---------- % ----------		---------- lb/acre ----------			$/lb	---------- $/acre ----------			
PX 1122A214-04 W3FE	33.5	42.0	3312	1110	1391	0.5204	578	75	653	a
PHY 332 W3FE	29.2	43.2	3406	995	1472	0.5583	555	83	638	ab
PHY 250 W3FE	30.8	42.6	3270	1005	1394	0.5441	547	77	624	bc
PHY 350 W3FE - Grower Seed	30.1	42.7	3200	964	1366	0.5675	547	76	622	bc
PHY 210 W3FE	31.1	43.2	3108	966	1343	0.5475	529	76	605	c
PHY 205 W3FE - Grower Seed	30.7	41.5	3333	1023	1383	0.5185	530	73	604	c
PHY 205 W3FE	30.7	42.1	3277	1005	1380	0.5230	526	75	601	c
PHY 400 W3FE	31.1	42.6	2951	919	1258	0.5314	488	69	558	d
Test average	30.9	42.5	3232	998	1373	0.5388	538	76	613	
CV, %	--	--	3.2	3.1	3.1	--	3.0	3.0	3.0	
OSL	--	--	0.0025	0.0002	0.0026	--	0.0005	0.0005	0.0008	
LSD	--	--	148	45	62	--	23	3	26	

For net value/acre, means within a column with the same letter are not significantly different.
CV - coefficient of variation.
OSL - observed significance level, or probability of a greater F value.
LSD - least significant difference at the 0.10 level, NS - not significant.
Note: some columns may not add up due to rounding error.

Assumes:
$3.40/cwt commercial ginning cost.
$270/ton for seed.
Net gin credit is defined as seed credit minus ginning expense.
Value for lint based on CCC loan value from commercial ginning and USDA-AMS classing results.

Table 3. Plant observation results from the center pivot irrigated Enlist technology cotton variety trial, George Farm, Kress, TX, 2023.

Entry	Final population	Stand establishment	Vigor	Nodes above white flower		Plant height			Nodes above cracked boll	Storm resistance
				Early bloom	Late bloom	Prebloom	Early bloom	Final		
	plants/acre	%	1-5 visual scale, 5 best	count		inches			count	1-9 visual scale, 9 tight
	12-Jun	12-Jun	12-Jun	31-Jul	14-Aug	5-Jul	31-Jul	19-Sep	19-Sep	18-Oct
PHY 205 W3FE - Grower Seed	35,429	78.7	2.8	6.1	0.8	11.1	21.7	21.3	1.9	8.3
PHY 350 W3FE - Grower Seed	30,492	67.8	2.3	6.5	2.1	11.5	23.7	25.3	3.2	6.2
PHY 205 W3FE	34,558	76.8	2.8	5.5	0.7	11.6	21.8	22.2	2.1	8.2
PHY 210 W3FE	37,752	83.9	2.8	5.5	0.9	12.1	22.0	22.6	1.8	7.7
PHY 250 W3FE	34,848	77.4	2.7	5.8	0.6	12.0	22.1	23.3	2.1	7.3
PHY 332 W3FE	35,719	79.4	2.5	6.3	2.0	11.8	25.9	25.9	3.0	6.7
PHY 400 W3FE	36,881	82.0	2.5	6.4	1.6	11.7	21.6	22.7	3.2	7.7
PX 1122A214-04 W3FE	35,719	79.4	3.0	5.5	0.5	11.7	21.7	24.1	1.5	8.2
Test average	35,175	78.2	2.7	6.0	1.2	11.7	22.6	23.4	2.4	7.5
CV, %	10.7	10.8	6.3	6.5	25.3	3.0	4.3	2.9	24.1	3.1
OSL	0.4831	0.4852	0.0036	0.0211	0.0001	0.1163	0.0011	0.0001	0.0094	0.0001
LSD	NS	NS	0.2	0.6	0.4	NS	1.4	1.0	0.8	0.3

CV - coefficient of variation.

OSL - observed significance level, or probability of a greater F value.

LSD - least significant difference at the 0.10 level, NS - not significant.

Table 4. Commercial classing data for the center pivot irrigated Enlist technology cotton variety trial, George Farm, Kress, TX, 2023.

Variety and Bale Number	Color Grade-Quadrant grade-quadrant	Color digit 1	Color digit 2	Leaf grade	Staple 32nds inch	Micronaire units	Extraneous matter	Remarks --	Strength g/tex	Rd %	+b %	Trash % area	Uniformity %	Length 100ths inch	Loan rate cents/lb
PHY 205 W3FE Grower Seed															
4166330	21-1	2	1	2	34	4.1	.	.	28.2	78.6	9.2	2	81.1	105	53.70
4166331	21-3	2	1	3	33	4.4	.	.	28.5	78.3	9.4	2	81.7	102	51.00
4166332	21-3	2	1	2	33	4.3	.	.	29.2	78.5	9.5	2	82.0	102	51.35
4166333	21-3	2	1	2	33	4.2	.	.	29.1	78.7	9.6	3	79.8	103	50.90
4166334	11-2	1	1	2	32	4.0	.	.	27.9	79.6	9.3	1	78.4	101	49.00
4166335	31-3	3	1	2	34	4.0	.	.	29.3	77.3	9.0	2	80.2	106	53.10
4166336	21-1	2	1	2	34	3.7	.	.	30.5	78.5	9.0	1	81.2	105	53.90
Average	--	2.0	1.0	2.1	33.3	4.10	none	none	29.0	78.5	9.3	1.9	80.6	103.4	51.85
PHY 350 W3FE Grower Seed															
4166337	21-1	2	1	2	35	4.1	.	.	30.5	79.3	9.1	2	82.8	109	55.70
4166338	21-3	2	1	1	36	4.1	.	.	30.4	78.4	9.8	1	82.3	112	57.45
4166339	21-3	2	1	2	36	3.6	.	.	30.7	78.4	9.6	2	82.6	112	57.35
4166340	21-3	2	1	2	36	4.0	.	.	29.8	78.3	9.6	2	81.7	112	57.25
4166341	11-4	1	1	2	36	3.9	.	.	29.7	78.6	9.8	2	81.9	112	57.25
4166342	21-1	2	1	2	35	3.9	.	.	29.7	79.0	9.3	2	80.8	110	55.50
Average	--	1.8	1.0	1.8	35.7	3.93	none	none	30.1	78.7	9.5	1.8	82.0	111.2	56.75
PHY 205 W3FE															
4166343	21-2	2	1	2	35	4.1	.	.	27.7	78.3	9.1	2	79.7	108	54.95
4166344	21-1	2	1	2	33	4.3	.	.	28.6	78.9	9.3	2	80.8	102	51.25
4166345	21-3	2	1	2	33	4.4	.	.	31.2	78.1	9.6	2	80.0	102	51.60
4166346	21-2	2	1	3	33	4.4	.	.	28.5	78.0	9.1	2	80.4	102	51.00
4166347	21-4	2	1	2	34	4.2	.	.	30.7	78.4	9.3	2	80.0	105	53.90
4166348	21-1	2	1	2	33	4.0	.	.	31.6	79.1	9.0	2	81.5	103	51.70
4166349	21-1	2	1	2	33	4.2	.	.	32.0	78.8	9.1	2	80.9	103	51.70
Average	--	2.0	1.0	2.1	33.4	4.23	none	none	30.0	78.5	9.2	2.0	80.5	103.6	52.30

Table 4 (continued). Commercial classing data for the center pivot irrigated Enlist technology cotton variety trial, George Farm, Kress, TX, 2023.

Variety and Bale Number	Color Grade-Quadrant grade-quadrant	Color digit 1	Color digit 2	Leaf grade	Staple 32nds inch	Micronaire units	Extraneous matter	Remarks --	Strength g/tex	Rd %	+b %	Trash % area	Uniformity %	Length 100ths inch	Loan rate cents/lb
PHY 210 W3FE															
4166350	21-1	2	1	2	35	4.4	.	.	30.6	79.2	9.3	2	81.6	110	55.55
4166351	21-1	2	1	2	34	4.3	.	.	30.5	78.5	9.3	1	81.2	107	53.80
4166352	21-1	2	1	2	34	4.8	.	.	26.2	78.9	9.3	1	81.6	107	53.60
4166353	21-1	2	1	2	34	4.2	.	.	30.1	78.9	9.1	2	81.6	107	53.90
4166354	21-1	2	1	2	35	4.2	.	.	31.7	79.5	9.1	2	82.4	110	55.85
4166355	21-1	2	1	2	35	4.0	.	.	31.4	79.1	9.3	2	81.2	110	55.80
Average	--	2.0	1.0	2.0	34.5	4.32	none	none	30.1	79.0	9.2	1.7	81.6	108.5	54.75
PHY 250 W3FE															
4166356	21-3	2	1	3	35	4.0	.	.	29.7	78.4	9.4	4	81.2	110	54.95
4166357	21-1	2	1	2	34	4.2	.	.	29.0	79.0	9.3	1	79.6	107	53.25
4166358	21-1	2	1	2	34	4.2	.	.	28.8	78.8	9.1	2	80.2	107	53.70
4166359	21-3	2	1	3	35	4.2	.	.	27.8	79.1	9.4	3	81.0	109	54.90
4166360	21-1	2	1	2	34	4.2	.	.	29.6	78.8	9.2	2	81.2	106	53.75
4166361	31-3	3	1	4	36	3.7	.	.	30.8	76.5	9.0	5	81.7	111	55.10
4166362	21-2	2	1	3	35	3.8	.	.	31.0	78.4	9.0	2	80.6	109	55.25
Average	--	2.1	1.0	2.7	34.7	4.04	none	none	29.5	78.4	9.2	2.7	80.8	108.4	54.41
PHY 332 W3FE															
4166363	21-3	2	1	2	37	4.1	.	.	29.8	78.4	9.6	2	83.1	115	58.05
4166364	22-1	2	2	2	36	3.9	.	.	30.5	77.0	10.3	2	81.3	113	55.30
4166365	22-1	2	2	2	36	4.0	.	.	30.5	77.6	10.0	2	80.4	113	55.30
4166366	22-1	2	2	2	37	3.9	.	.	31.6	77.4	10.5	2	83.0	114	56.05
4166367	22-1	2	2	2	36	4.2	.	.	29.3	77.3	10.4	2	80.2	112	55.15
4166368	12-2	1	2	2	37	3.9	.	.	30.2	78.0	10.2	1	81.2	115	55.80
4166369	22-1	2	2	2	36	4.1	.	.	29.9	78.4	10.0	2	80.0	112	55.15
Average	--	1.9	1.9	2.0	36.4	4.01	none	none	30.3	77.7	10.1	1.9	81.3	113.4	55.83

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Table 4 (continued). Commercial classing data for the center pivot irrigated Enlist technology cotton variety trial, George Farm, Kress, TX, 2023.

Variety and Bale Number	Color Grade-Quadrant grade-quadrant	Color digit 1	Color digit 2	Leaf grade	Staple 32nds inch	Micronaire units	Extraneous matter	Remarks --	Strength g/tex	Rd %	+b %	Trash %	Uniformity %	Length 100ths inch	Loan rate cents/lb
PHY 400 W3FE															
4166370	11-4	1	1	2	34	3.6	.	.	30.4	78.5	9.7	1	81.4	105	53.80
4166371	21-3	2	1	2	34	3.7	.	.	30.1	78.8	9.6	2	78.9	106	53.30
4166372	11-4	1	1	2	34	3.6	.	.	29.3	78.6	9.7	2	79.2	106	53.15
4166373	21-3	2	1	3	35	3.6	.	.	30.6	79.0	9.6	2	80.0	108	55.00
4166374	11-2	1	1	2	34	3.7	.	.	29.5	79.9	9.3	2	78.3	107	53.15
4166375	21-1	2	1	2	35	3.4	.	.	31.1	79.4	9.2	2	81.6	110	51.10
4166376	11-2	1	1	2	34	3.5			28.9	79.7	9.4	1	77.0	106	52.50
Average	--	1.4	1.0	2.1	34.3	3.59	none	none	30.0	79.1	9.5	1.7	79.5	106.9	53.14
PX 1122A214-04 W3FE															
4166377	21-1	2	1	2	34	3.8	.	.	29.9	79.7	8.8	2	79.1	106	53.25
4166378	21-1	2	1	2	32	4.0	.	.	28.7	79.2	9.3	1	80.0	100	49.60
4166379	21-1	2	1	2	34	4.2	.	.	30.0	79.9	8.9	2	80.8	105	53.90
4166380	21-1	2	1	2	34	4.1	.	.	27.7	79.4	9.0	1	78.9	106	53.10
4166381	21-1	2	1	2	34	4.0	.	.	28.0	79.4	9.2	2	79.1	105	53.20
4166382	21-1	2	1	2	32	3.8	.	.	29.0	80.3	8.9	2	78.8	101	49.05
4166383	21-1	2	1	1	34	3.6	.	.	29.4	80.1	8.9	1	79.6	105	53.15
4166384	21-1	2	1	2	33	3.8	.	.	30.2	79.2	9.0	2	79.6	103	51.05
Average	--	2.0	1.0	1.9	33.4	3.91	none	none	29.1	79.7	9.0	1.6	79.5	103.9	52.04

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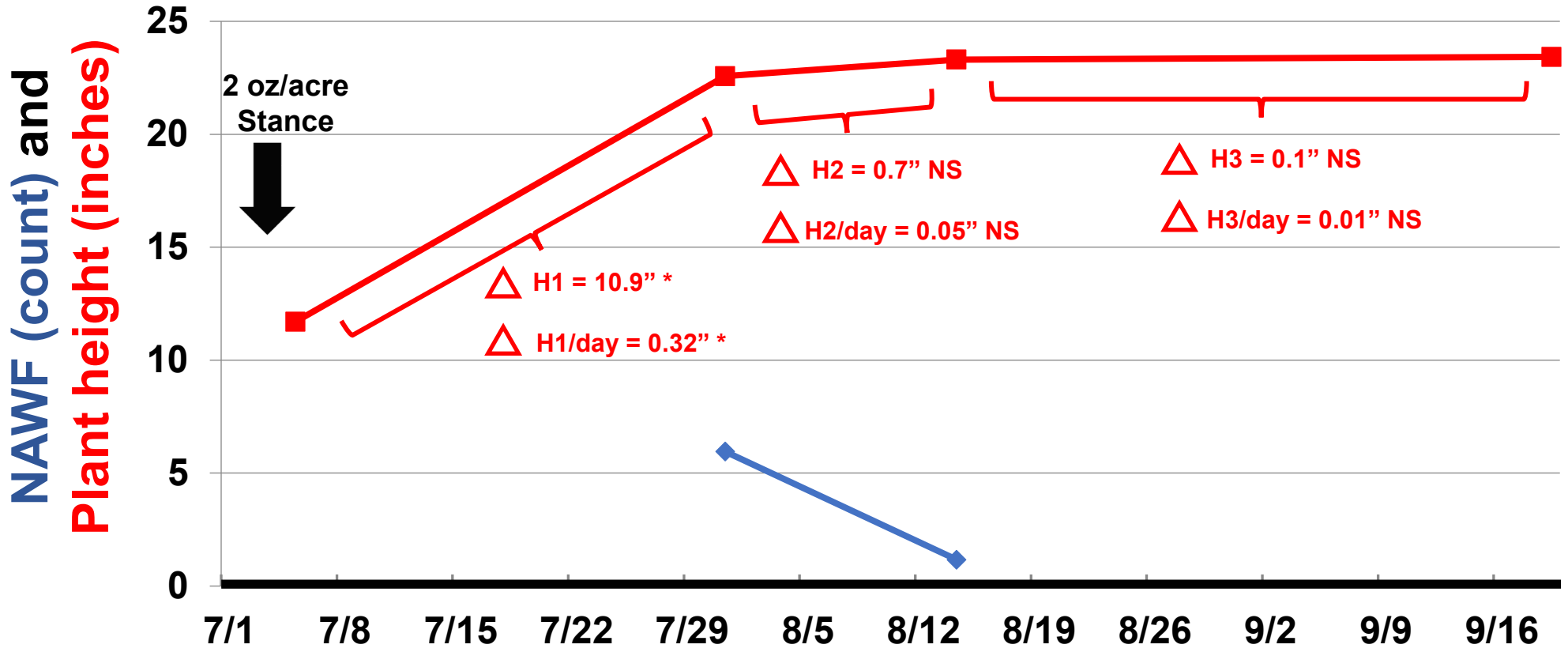
Appendix

George Brothers 2023 PhytoGen Enlist Variety Trial – Plant height and NAWF graphs, Amarillo 2023 cotton heat units and weather data.

George Enlist Variety Trial (Across All Entries) Kress – 2023



Rainfall (inches): April 1.2, May 7.6, June 3.0, July 2.2, August 0.4, September 0.8, October 0.8 = 16.0

Irrigation (inches): April 1.0, May 1.0, June 0, July 1.5, August 2.0, September 2.2 = 7.7

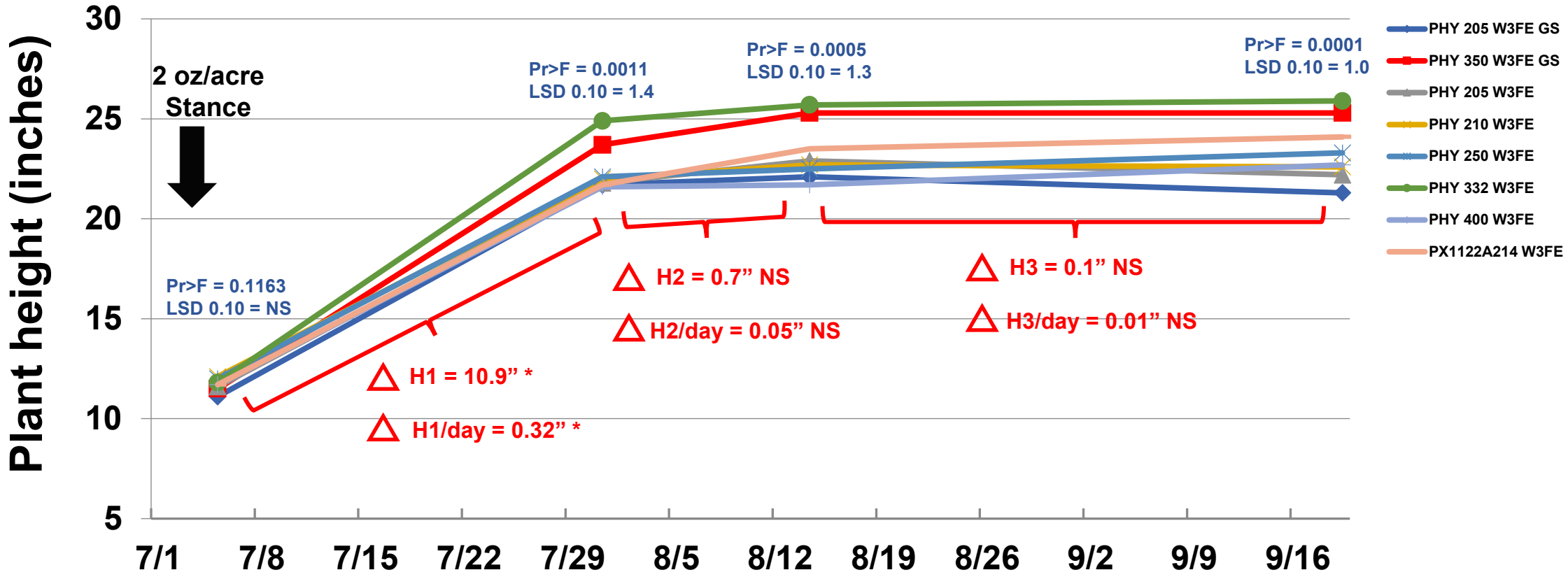
Planted: May 6

Days to bloom: 73

First bloom date: Jul 18

WINDSTAR GINS

George Enlist Variety Trial
Kress – 2023



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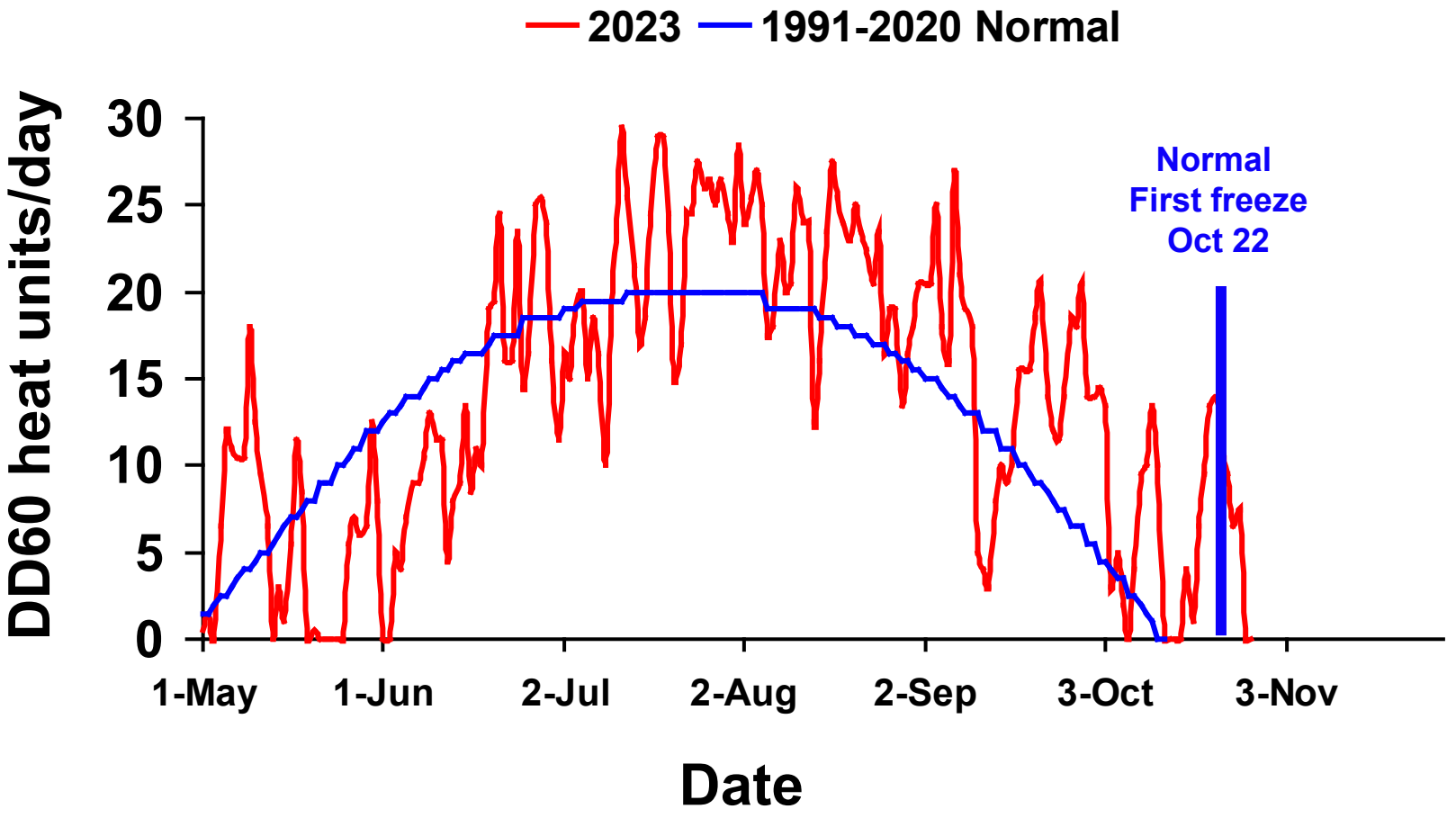
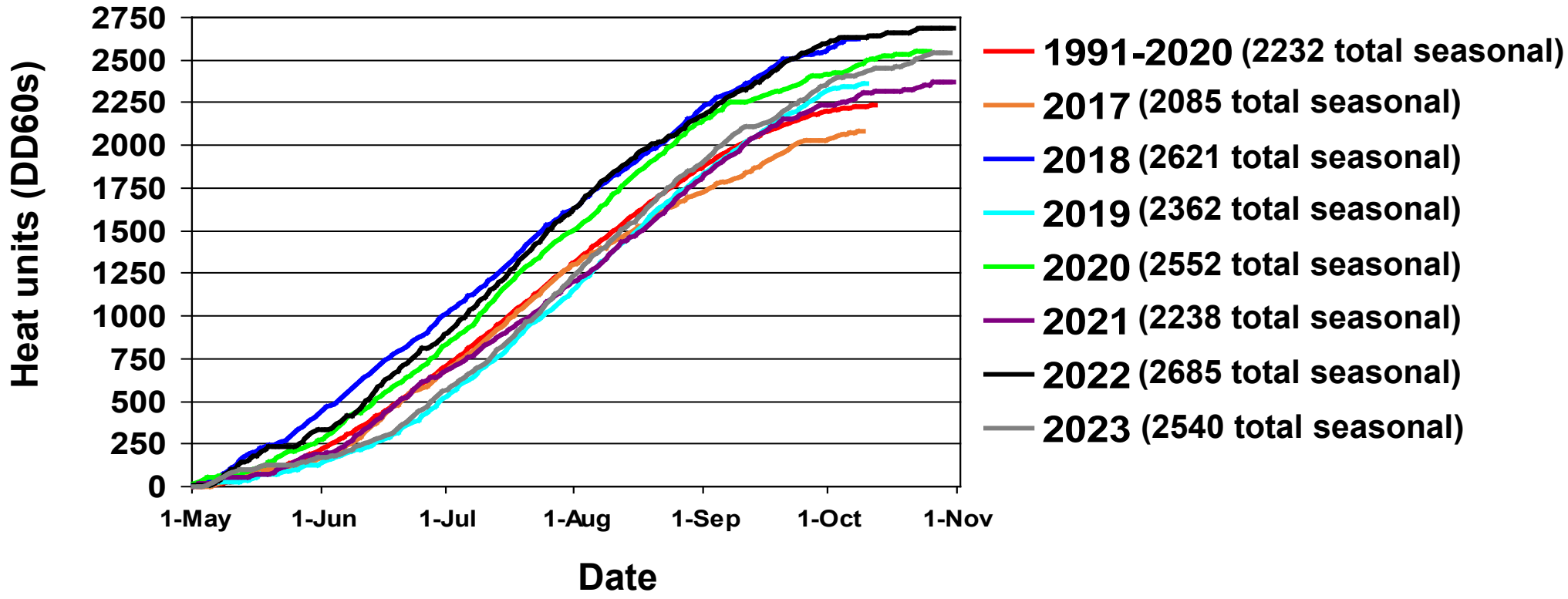
Amarillo
30-Year Normal (1991-2020) and 2023
Daily Heat Units

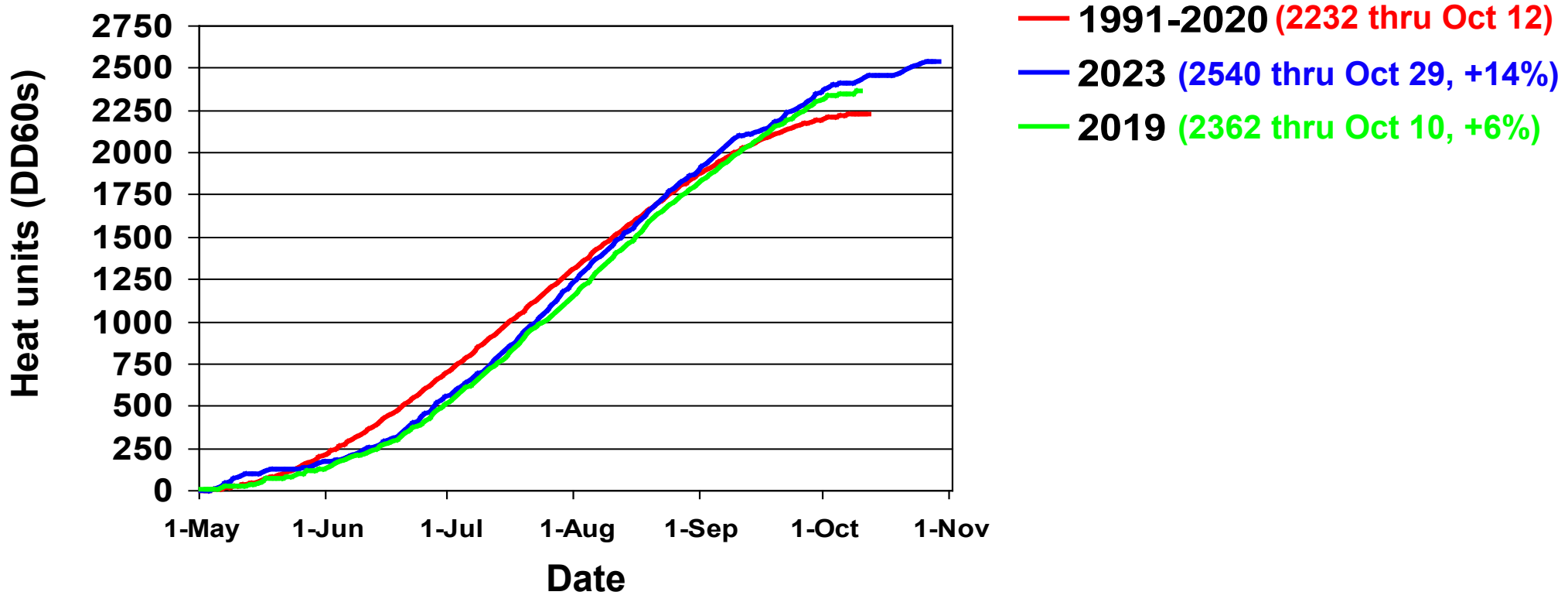


Amarillo 30-Yr Normal (1991-2020) vs. 2017, 2018, 2019, 2020, 2021, 2022, and 2023 Cotton Heat Unit Accumulation

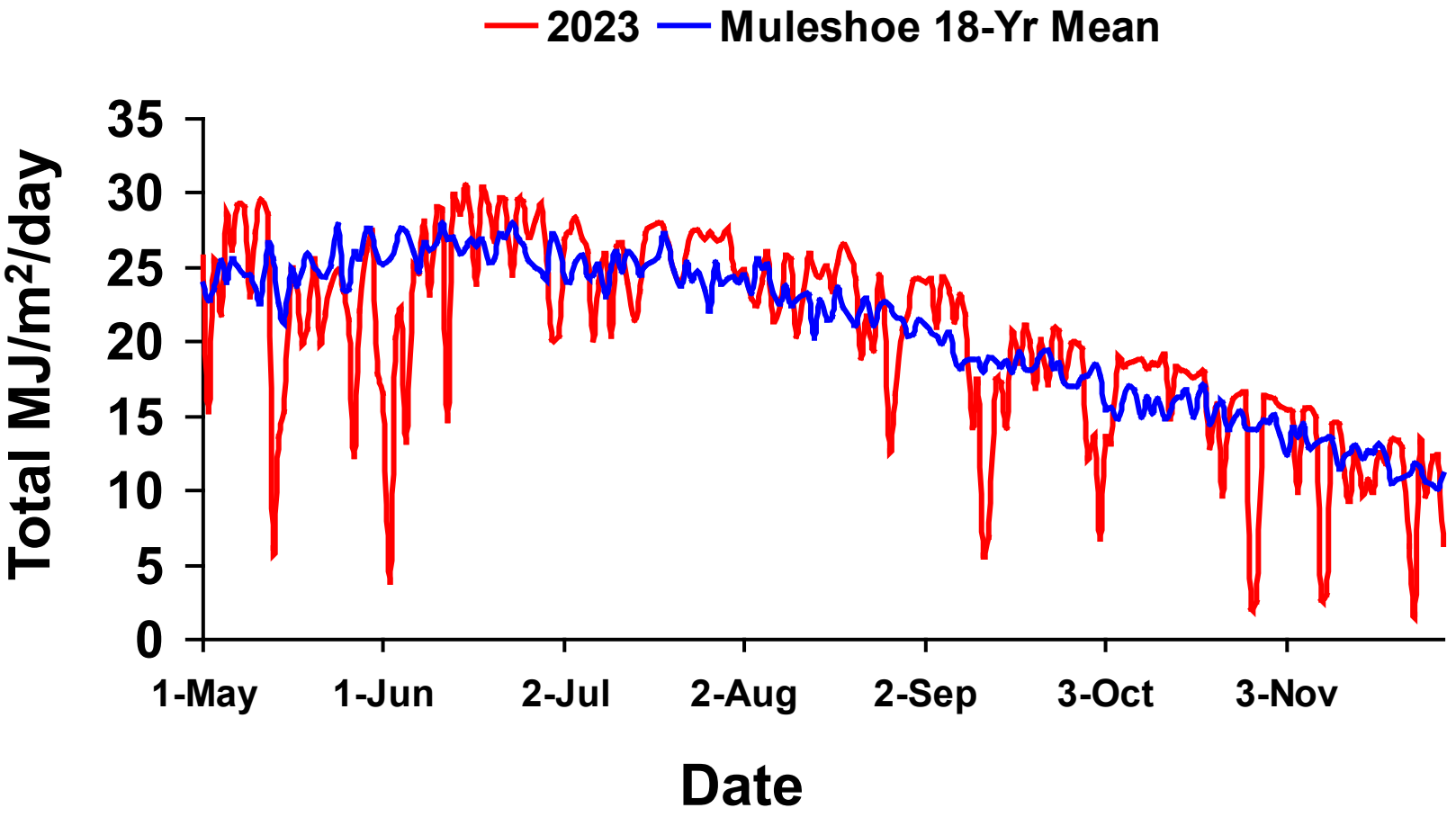
From May 1 Through First Hard Freeze



Amarillo 30-Yr Normal (1991-2020) vs. 2019 and 2023 Cotton Heat Unit Accumulation From May 1



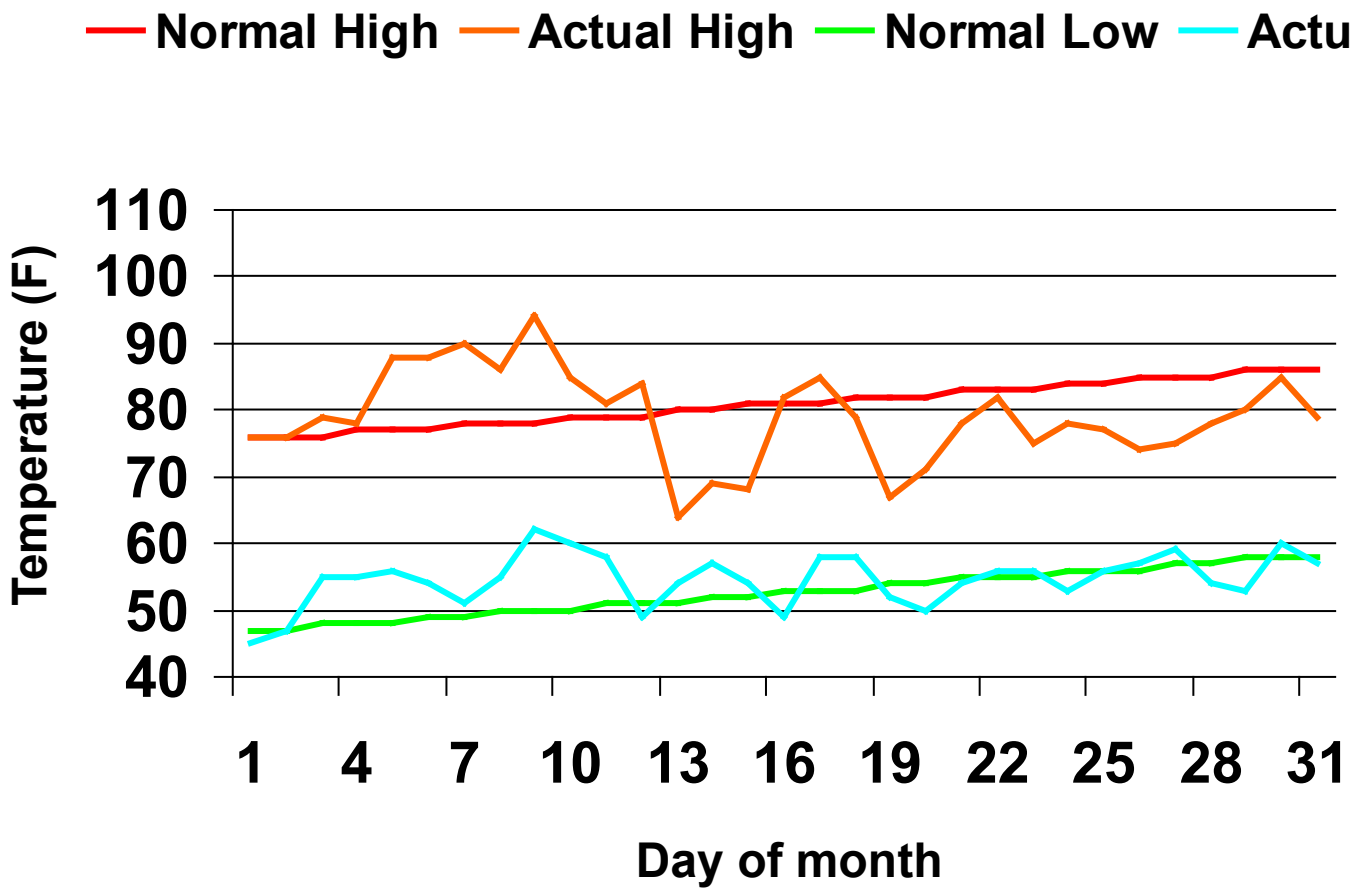
Muleshoe
18-Year Mean (2004-2021) and 2023
Daily Total Solar Radiation (MJ/meter^2)



Total solar energy, in MJ/meter^2, calculated from the hourly average global solar radiation rates and converted to energy by integrating over time.

Source: https://www.ncei.noaa.gov/pub/data/uscrn/products/daily01/2023/

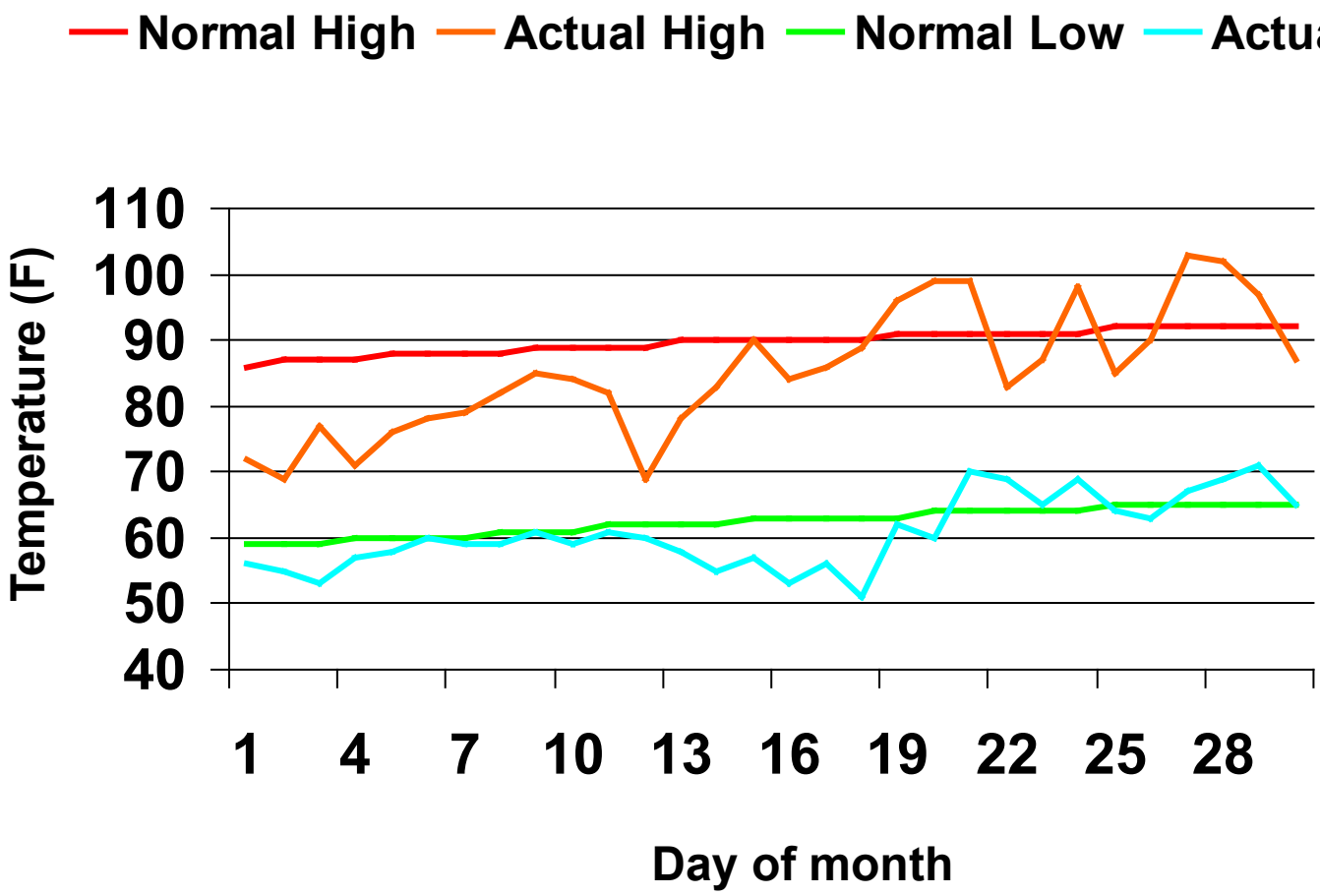
Amarillo
30-Yr Normal (1991-2020) and May 2023 Air Temperatures



Heat Units

Normal total: 210
2023: 175
% of normal: -17

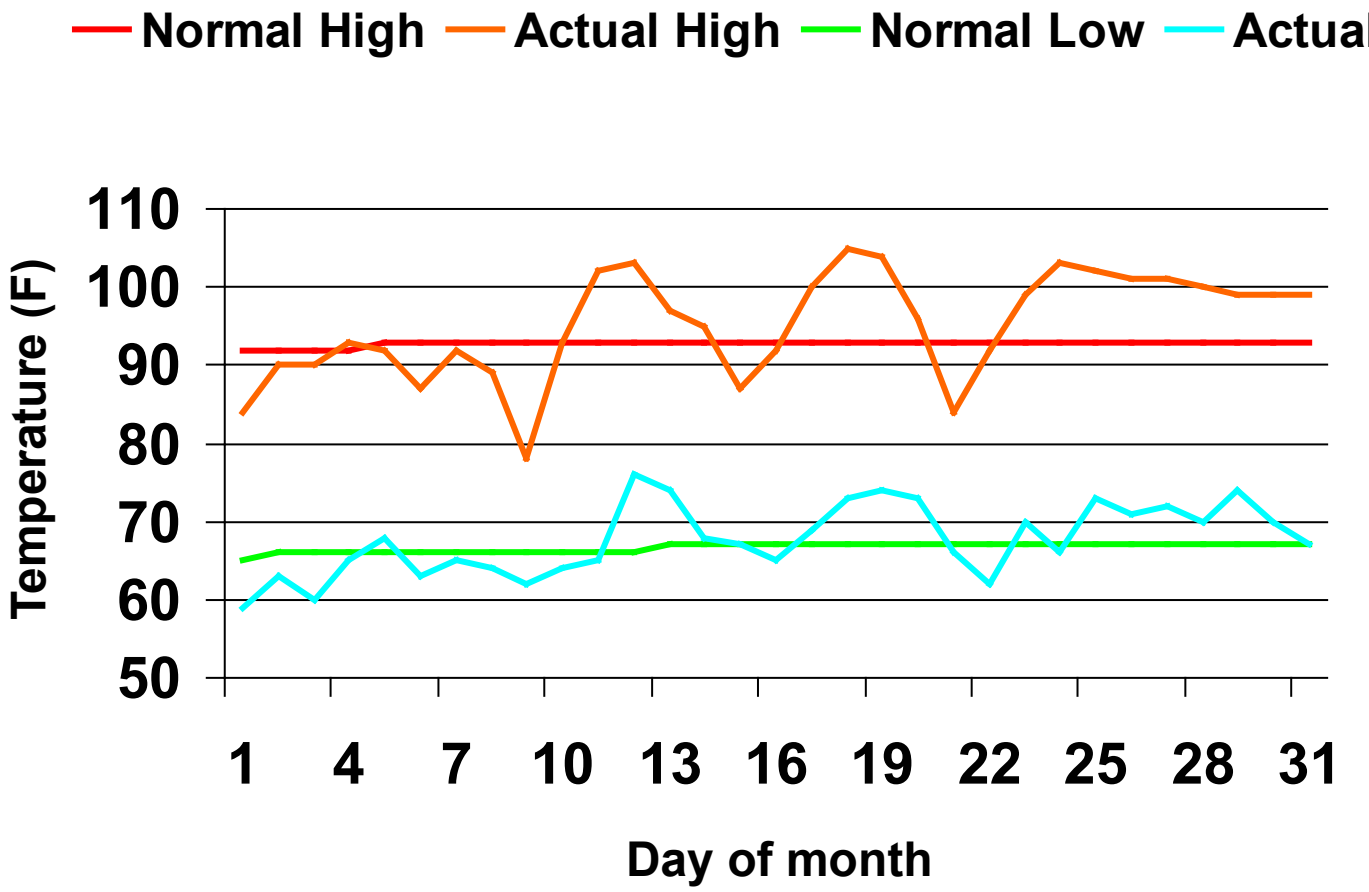
Amarillo
30-Yr Normal (1991-2020) and June 2023 Air Temperatures



Heat Units

Normal total: 483
2023: 385
% of normal: -20

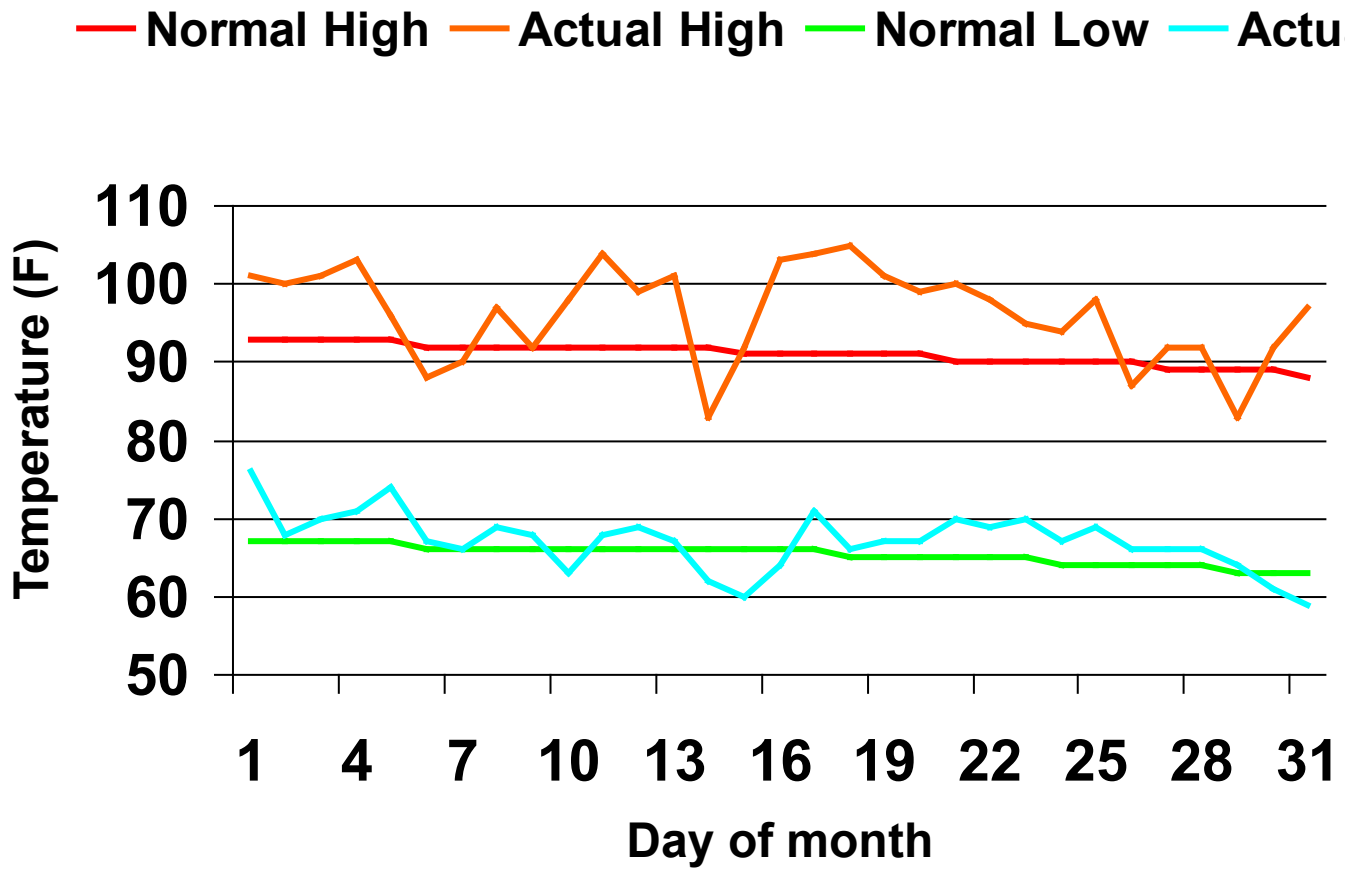
Amarillo
30-Yr Normal (1991-2020) and July 2023 Air Temperatures



Heat Units

Normal total for month: 612
2023: 663
% of normal: +8

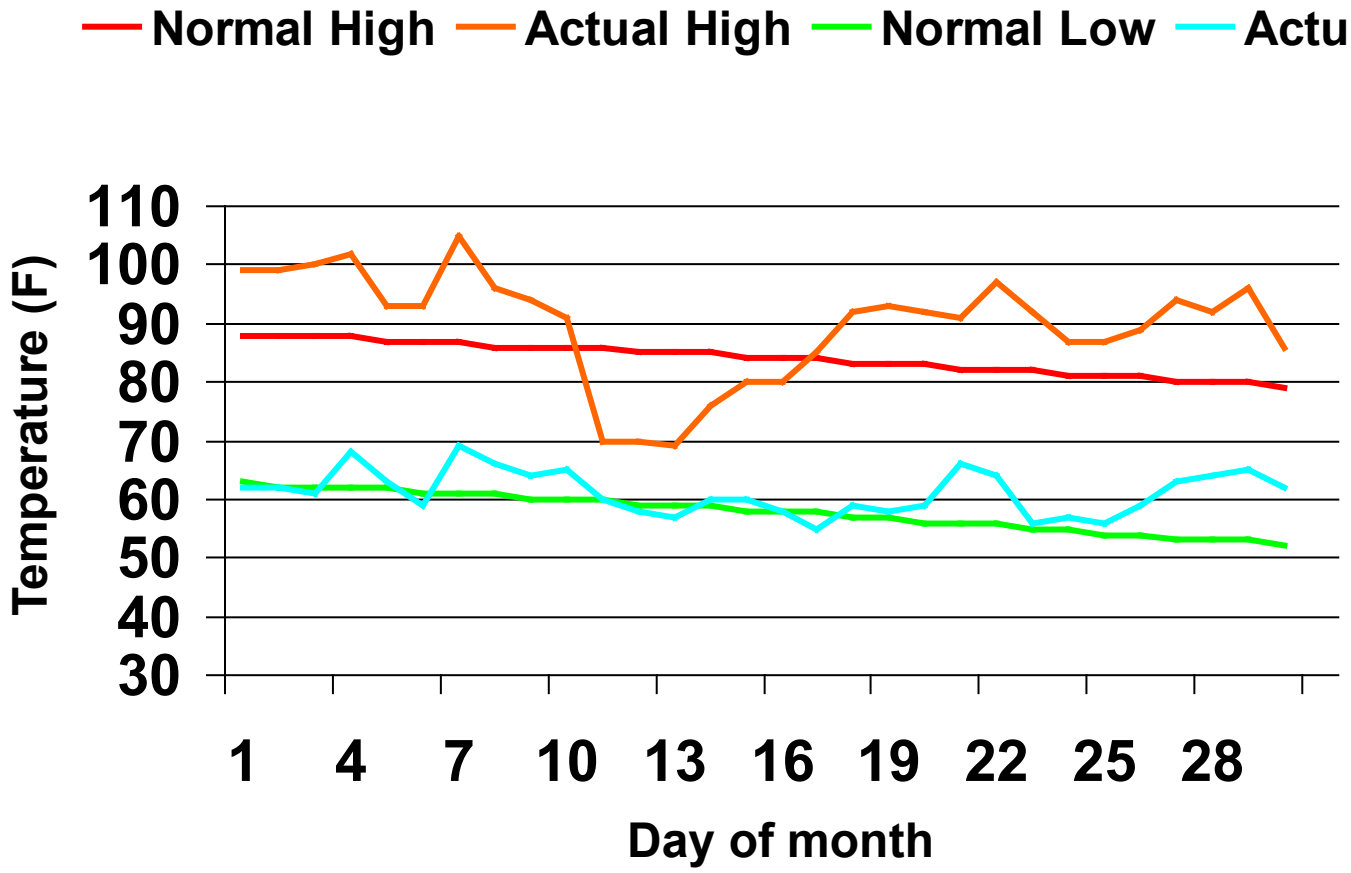
Amarillo
30-Yr Normal (1991-2020) and August 2023 Air Temperatures



Heat Units

Normal total for month: 565
2023: 673
% of normal: +19

Amarillo
30-Yr Normal (1991-2020) and September 2023 Air Temperatures

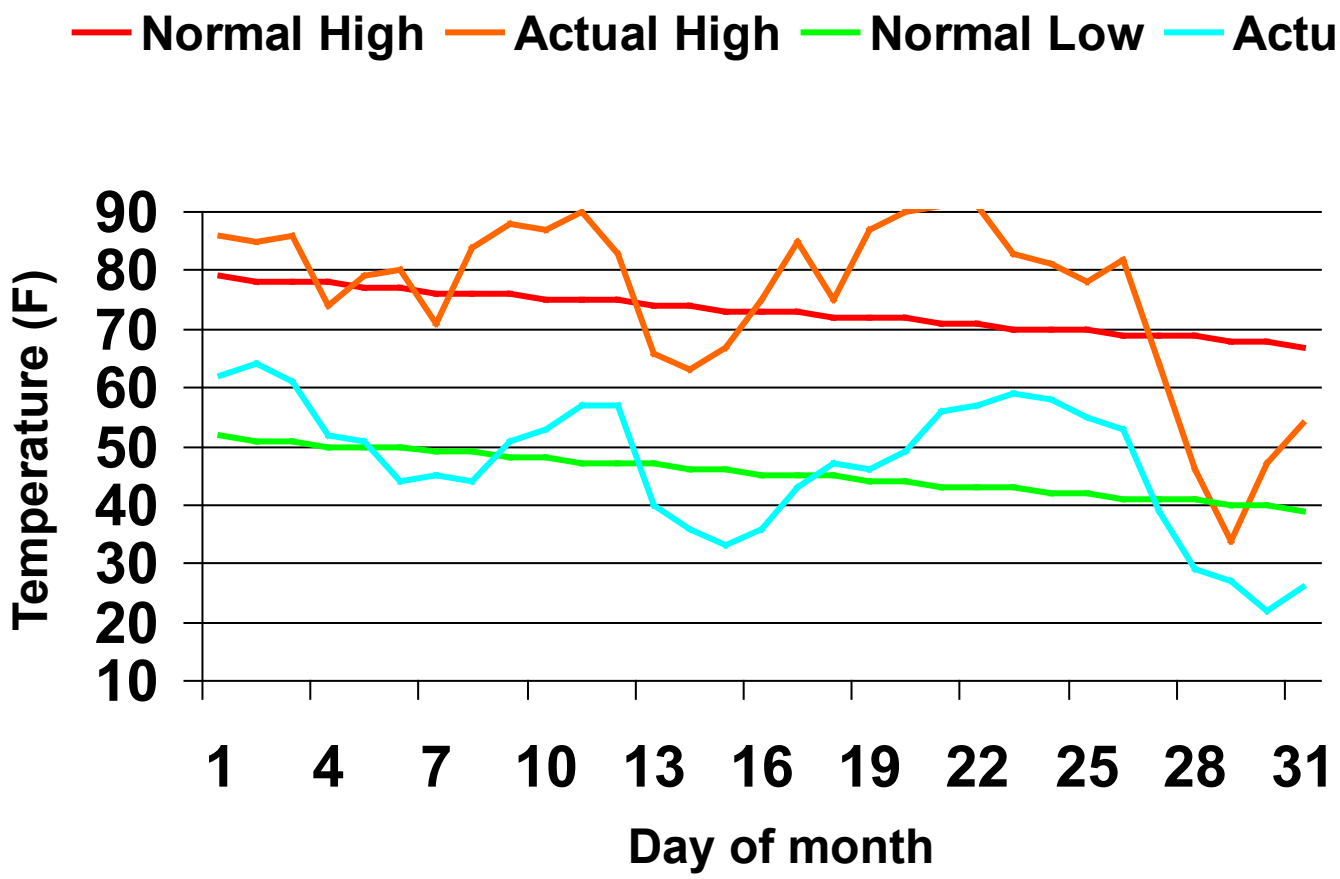


Heat Units

Normal total for month: 329
2023: 463
% of normal: +41

Normal Heat Units/Day
Sep 1: 16
Sep 30: 6
Goes to zero on Oct 12

Amarillo
30-Yr Normal (1991-2020) and October 2023 Air Temperatures



Heat Units

Normal total for month: 35
2023: 182
% of normal: +420

Normal Heat Units/Day
Oct 1: 6
Oct 12: 0
Goes to zero on Oct 12

First freeze on Oct 29 (27 degrees)
Hard freeze on Oct 30 (22 degrees)

Amarillo – 26 Total Days ≥100 Degrees

- 2 in June
- 10 in July
- 11 in August
- 3 in September, last was 105 on Sep 7

- 30-Year normal highest temperatures
  - 93 degrees from July 6 through August 5