



**2024 Dryland Cotton Indigo 229 Bio-fungicide
(*Kosakonia cowanii* strain SYM00028) Trial – Edcot Gin**

**Barry Evans 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 2024, a product trial consisting of Indigo 229 bio-fungicide (*Kosakonia cowanii* strain SYM00028, a bacterial species) and an untreated control was established. The variety planted was DP 1822 XF, lot number L3L4L4LVLA. The fungicide seed treatment on the planting seed was Acceleron Basic. The Indigo 229 product was carefully handled by placing into a refrigerator after over-night shipping arrival at the grower's barn site. It was then placed into an ice chest for cooling and transported to the field. At the appropriate time, the product was removed from the ice chest and properly applied to the seed. The product is a hopper box treatment and was applied at the field site using a concrete mixer. The labeled rate of Indigo 229 was applied to an appropriate amount of planting seed per label directions, which was then mixed in the concrete mixer. After application, the treated seed was immediately planted in the trial. The two treatments (treated and untreated) were randomly assigned to experimental units and four pairs or replicates were utilized, which resulted in a scientifically valid field-scale applied research trial. Each individual plot was 16 rows wide with one mile long rows.

This field had good to excellent subsoil moisture, but the surface soil was sub-par at planting, so the trial was dry planted on May 3rd. An excellent, uniform rainfall event (approximately 2 inches) was obtained on May 10, and the trial emerged fairly uniformly, although some skips

and thin stands were noted. The trial escaped hail/wind events and entered bloom at about 8 nodes above white flower (NAWF), indicating promising yield potential. Essentially no adverse weather events were encountered during early season. Extremely high temperatures occurred in late June, July, August, and September. June rainfall was fair, but lack of substantial rainfall during July, August, and September adversely affected crop performance. The oppressive heat encountered in August and September coupled with the lack of rainfall resulted in extreme moisture stress in the plants. Both treatments in the trial bloomed through the terminal on first fruiting position by early August. Low yields and poor quality were noted in the trial. This was a result of the high stress environment that occurred beginning in July and followed through the remainder of the growing season. Water stress during the bloom period induced short staple. By mid-August, sustained wilting resulted in premature boll opening, which in turn resulted in poor maturity and low micronaire. Loan values suffered due to these and other fiber quality issues.

Harvest results indicated that no statistically significant differences with respect to lint yield were observed. Lint yields ranged from a high of 182 lb/acre (untreated check) to a low of 172 lb/acre (Indigo 229 treated), and averaged 177 lb/acre (Table 1). Average Loan value for treatments from commercially ginned and classed bales varied from a high of \$0.3122/lb (untreated check) to a low of \$0.3013/lb (Indigo 229 treated). Overall Loan value for the trial across both treatments was 0.3068/lb. Net gin credit is defined as seed credit minus ginning expense. Net value/acre (defined as gross Loan value plus net gin credit) ranged from a high of \$66/acre (untreated check) to a low of \$60/acre (Indigo 229 treated), a difference of \$6/acre. These differences were statistically significant, and had a low coefficient of variation of about 4%, indicating low variability among treatments across replicates.

Table 2 provides similar information for the trial, but net value/acre is based on cash bid value. Cash bids were obtained for commercially ginned and classed bale quality for each treatment. This was performed on October 11 at 73.40 cent December 2024 futures using the USDA-AMS classing results. These cash bid values ranged from a high of \$0.4826/lb (untreated check) to a low of \$0.4137/lb (Indigo 229 treated) and averaged almost \$0.45/lb. Net value/acre (defined as gross lint cash value plus net gin credit) ranged from a high of \$97/acre (untreated check) to a low of \$80/acre (Indigo 229 treated), a difference of \$17/acre. These differences were statistically significant, and had a low coefficient of variation at just under 4%.

Table 3 presents in-season data including final plant population, stand establishment percentage, a visual estimate of vigor, nodes above white flower (NAWF) and plant height on two observation dates.

Table 4 provides the USDA-AMS classing results from each commercial bale for each treatment and the treatment averages. Averages indicate that color grades were all 21. Leaf grades ranged from 2 to 3. Staple ranged from a high of 31.7 (Indigo 229 treated) to a low of 31.2 32nds inch (untreated check). Average micronaire for treatments were 2.78 and 2.73 for the untreated check and Indigo 229 treated, respectively. Loan chart low micronaire discounts are triggered at values of 3.4 and lower. Therefore, both treatments encountered Loan rate discounts for low micronaire of -920 points/lb. No bark contamination was noted in commercial bales, but a significant percentage was noted with level 1 grass contamination. Grass contamination is attributed to sorghum stalks from the 2023 crop year still standing at cotton harvest in 2024. Fiber strength was lower than normally encountered, again, attributed to the extreme moisture stress the plants encountered. Strength values ranged from 23.8 to 24.5

g/tex, and uniformity was 75.3% for both treatments. Table 5 presents the mean values across all bales for each variety.

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: 3530 ft

Previous crop: Grain sorghum

Tillage system: No-till

Planted: Dry planted May 2 (2 inch rainfall on May 10)

Variety: DP 1822 XF

Replicates: 4 replicates in a randomized complete block design

Row spacing: 30-inch rows

Plot width: 16-row plots

Plot length: Trial was planted in one mile rows, with around 5,200 ft harvested

Seeding rate: 25,000 seed/acre

Days from planting to first bloom: 62 days (post 2-inch rainfall event after dry planting, blooms on July 10)

Total rainfall May through September 15: ~5.25 inches

May 2.11, June 2.41, July 0.11, August 0.61, September 1-15th 0.01

Fertility management: No fertilizers applied

Chemical Applications:

March 3, 2024 - Dicamba 8 oz/acre, Glyphosate 1 qt/acre, Flumioxazone 3 oz/acre, MSO and Hydrostar

June 6, 2024 - Glufosinate 42 oz/acre, Hydrostar water treatment

July 3, 2024 - Glufosinate 1 qt/acre, Glyphosate 1 qt/acre, Metolochlor 1 pt/acre, Surfstar and Hydrostar surfactant and water treatment

Plant growth regulators: 7 oz/acre mepiquat chloride (July 3)

Insecticides: 3.2 oz/acre acephate (June 6)

Harvest aid application: 1 qt/acre of 3-lb/gallon paraquat (September 19)

Harvesting: September 26 using a John Deere CS690, with harvested length determined by the GPS on the stripper monitor. Round modules were weighed using the integral CS690 handler 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 and actual cash market bids for each variety derived from commercial ginning and USDA-AMS classing results.

List of Tables

Table 1. Harvest results for the dryland Indigo 229 trial (lint loan value), Barry Evans Farm, Kress, TX, 2024.

Table 2. Harvest results for the dryland Indigo 229 trial (lint cash value), Barry Evans Farm, Kress, TX, 2024.

Table 3. Plant observation results from the dryland Indigo 229 trial, Barry Evans Farm, Kress, TX, 2024.

Table 4. Commercial classing data for the dryland Indigo 229 trial, Barry Evans Farm, Kress, TX, 2024.

Table 5. Mean commercial classing data across all bales by treatment for the Indigo 229 trial, Barry Evans Farm, Kress, TX, 2024.

Appendix – Amarillo 2024 cotton heat units and weather data.

Acknowledgements

Edcot Gin would like to thank Barry Evans for committing equipment, land, and time to conduct and manage the trial. Gratitude is expressed to Indigo Ag for providing the Indigo 229 product to conduct the trial. Appreciation is also noted for 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 detailed ginning procedures.



Table 1. Harvest results for the dryland Indigo 229 trial (lint loan value), Barry Evans Farm, Kress, TX, 2024.

Treatment	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 -----			\$/lb	----- \$/acre -----		
Without 229 (check)	27.7	42.5	654	182	279	0.3122	57	9	66 a
229 treated	28.0	42.5	613	172	261	0.3013	52	8	60 b
Test average	27.9	42.5	634	177	270	0.3068	55	9	63
CV, %	--	--	3.9	3.7	3.8	--	3.8	4.8	3.5
OSL	--	--	0.1018	0.1276	0.0883	--	0.0426	0.1817	0.0384
LSD	--	--	NS	NS	17	--	4	NS	4

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:

\$3.65/cwt commercial ginning cost.

\$235/ton for seed.

Net gin credit is defined as seed credit minus ginning expense.

Net value is defined as gross loan value/acre plus net gin credit.

Value for lint based on CCC loan value from commercial ginning and USDA-AMS classing results.



Table 2. Harvest results for the dryland Indigo 229 trial (lint cash value), Barry Evans Farm, Kress, TX, 2024.

Treatment	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 -----			\$/lb		----- \$/acre -----	
Without 229 (check)	27.7	42.5	654	182	279	0.4826	88	9	97 a
229 treated	28.0	42.5	613	172	261	0.4137	71	8	80 b
Test average	27.9	42.5	634	177	270	0.4482	80	9	89
CV, %	--	--	3.9	3.7	3.8	--	3.3	4.8	3.9
OSL	--	--	0.1018	0.1276	0.0883	--	0.0030	0.1817	0.0061
LSD	--	--	NS	NS	17	--	4	NS	6

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:

\$3.65/cwt commercial ginning cost.

\$235/ton for seed.

Net gin credit is defined as seed credit minus ginning expense.

Net value is defined as gross cash value/acre plus net gin credit.

Lint value based on cash bids for each treatment on October 11 at 73.40 cent December 2024 futures using commercial ginning and USDA-AMS classing results.



Table 3. Plant observation results from the dryland Indigo 229 trial, Barry Evans Farm, Kress, TX, 2024.

Treatment	Final population	Stand establishment	Vigor	Nodes above white flower		Plant height	
				Early bloom	+3 weeks	Early bloom	+3 weeks
	plants/acre 18-Jun	% 18-Jun	1-5 visual scale, 5 best 18-Jun	count		inches	
				10-Jul	30-Jul	10-Jul	30-Jul
Without 229 (check)	15,900	63.6	4.0	8.4	2.9	17.0	19.3
229 treated	16,117	64.5	4.0	8.5	3.2	16.4	18.3
Test average	16,009	64.1	4.0	8.5	3.1	16.7	18.8
CV, %	6.6	6.6	--	2.2	18.1	3.6	2.4
OSL	0.7889	0.7888	--	0.4950	0.4316	0.2522	0.0508
LSD	NS	NS	--	NS	NS	NS	0.7

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 dryland Indigo 229 trial, Barry Evans Farm, Kress, TX, 2024.

Treatment 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
Without 229 (check)															
4180627	21-4	2	1	2	31	2.8	.	.	24.3	77.3	9.3	3.0	75.3	98	32.85
4180628	21-3	2	1	2	31	2.9	11	level 1 bark	23.6	78.4	9.7	2.0	75.9	97	28.35
4180629	21-4	2	1	3	32	2.8	.	.	24.3	78.0	9.3	3.0	74.8	100	34.00
4180630	21-4	2	1	3	31	2.7	.	.	24.2	76.8	9.3	3.0	75.1	98	32.00
4180631	21-3	2	1	2	31	2.8	21	level 1 grass	23.6	77.6	9.5	2.0	75.7	98	27.55
4180632	21-4	2	1	2	31	2.7	.	.	22.5	77.3	9.4	2.0	74.7	97	32.55
Average	--	2.0	1.0	2.3	31.2	2.78	2/6 bales	level 1 bark/grass	23.8	77.6	9.4	2.5	75.3	98.0	31.22
229 treated															
4180621	21-3	2	1	2	32	2.7	21	.	24.4	77.8	9.4	3	75.0	99	29.10
4180622	21-3	2	1	2	32	2.7	21	.	24.1	77.6	9.7	2	75.1	99	29.10
4180623	21-4	2	1	3	31	2.8	21	.	23.6	77.1	9.4	3	74.1	97	26.70
4180624	21-4	2	1	2	32	2.7	.	.	24.3	77.3	9.3	2	76.3	99	34.25
4180625	21-4	2	1	3	31	2.7	.	.	24.8	77.7	9.2	2	76.2	97	32.00
4180626	21-3	2	1	2	32	2.8	21	.	25.8	77.8	9.5	1	74.8	101	29.60
Average	--	2.0	1.0	2.3	31.7	2.73	4/7 bales	level 1 grass	24.5	77.6	9.4	2.2	75.3	98.7	30.13



Table 5. Mean commercial classing data across all bales by treatment for the Indigo 229 trial, Barry Evans Farm, Kress, TX, 2024.

Treatment	Color	Color	Leaf	Staple	Micronaire	Extraneous	Remarks	Strength	Rd	+b	Trash	Uniformity	Length	Loan rate	Cash bid*
	digit 1	digit 2	grade	32nds inch	units	matter	--	g/tex	%	%	% area	%	100ths inch	cents/lb	cents/lb
Without 229 (check)	2.0	1.0	2.3	31.2	2.78	2/6 bales	level 1 bark/grass	23.8	77.6	9.4	2.5	75.3	98.0	31.22	48.26
229 treated	2.0	1.0	2.3	31.7	2.73	4/7 bales	level 1 grass	24.5	77.6	9.4	2.2	75.3	98.7	30.13	41.37
Mean	2.0	1.0	2.3	31.4	2.76	.	.	24.1	77.6	9.4	2.3	75.3	98.3	30.67	44.82

*Value based on cash bids for each treatment on October 11 at 73.40 cent December 2024 futures using commercial ginning and USDA-AMS classing results.



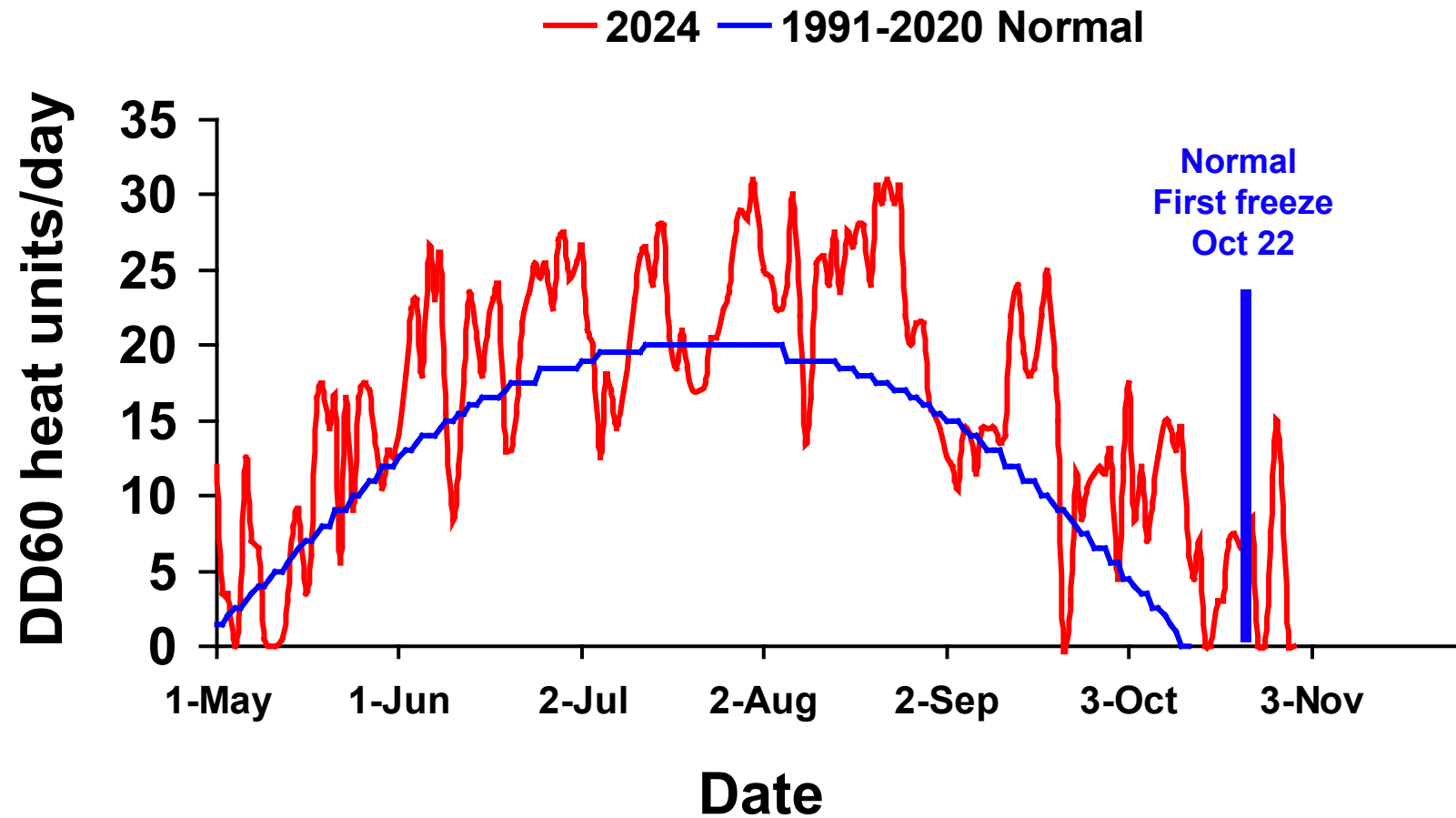
Appendix

Amarillo 2024 cotton heat units and weather data.



Amarillo

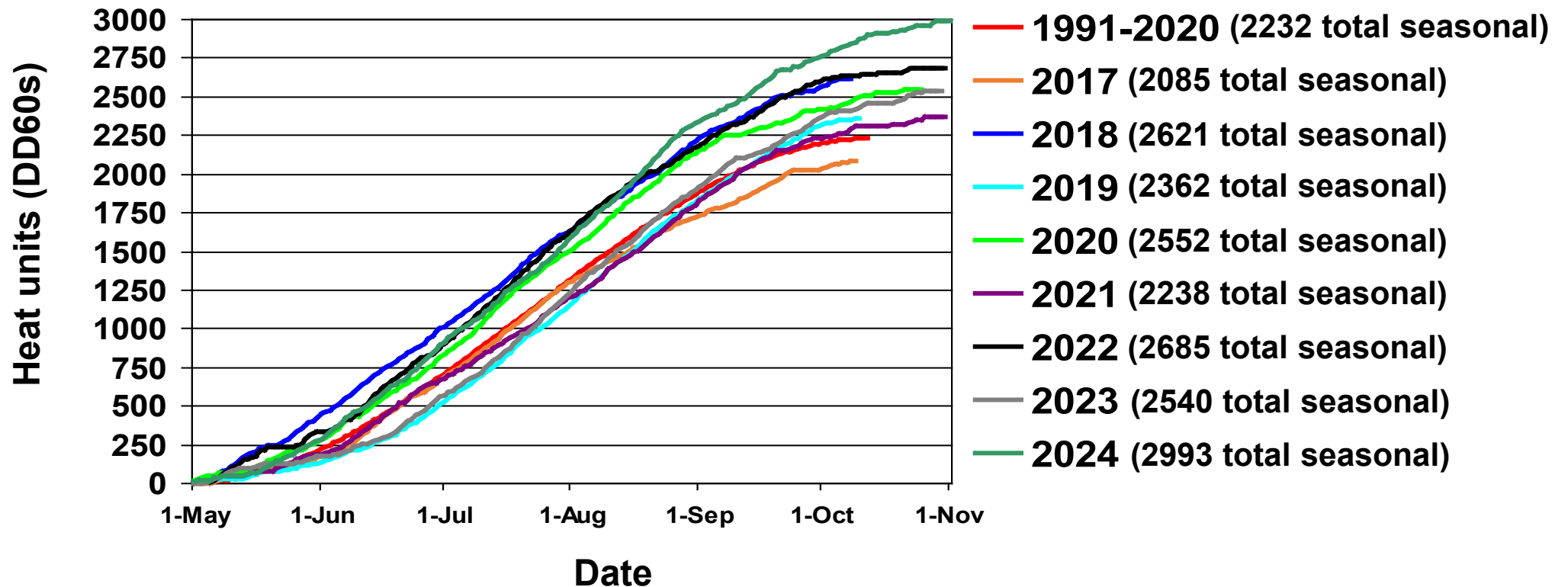
30-Year Normal (1991-2020) and 2024 Daily Heat Units



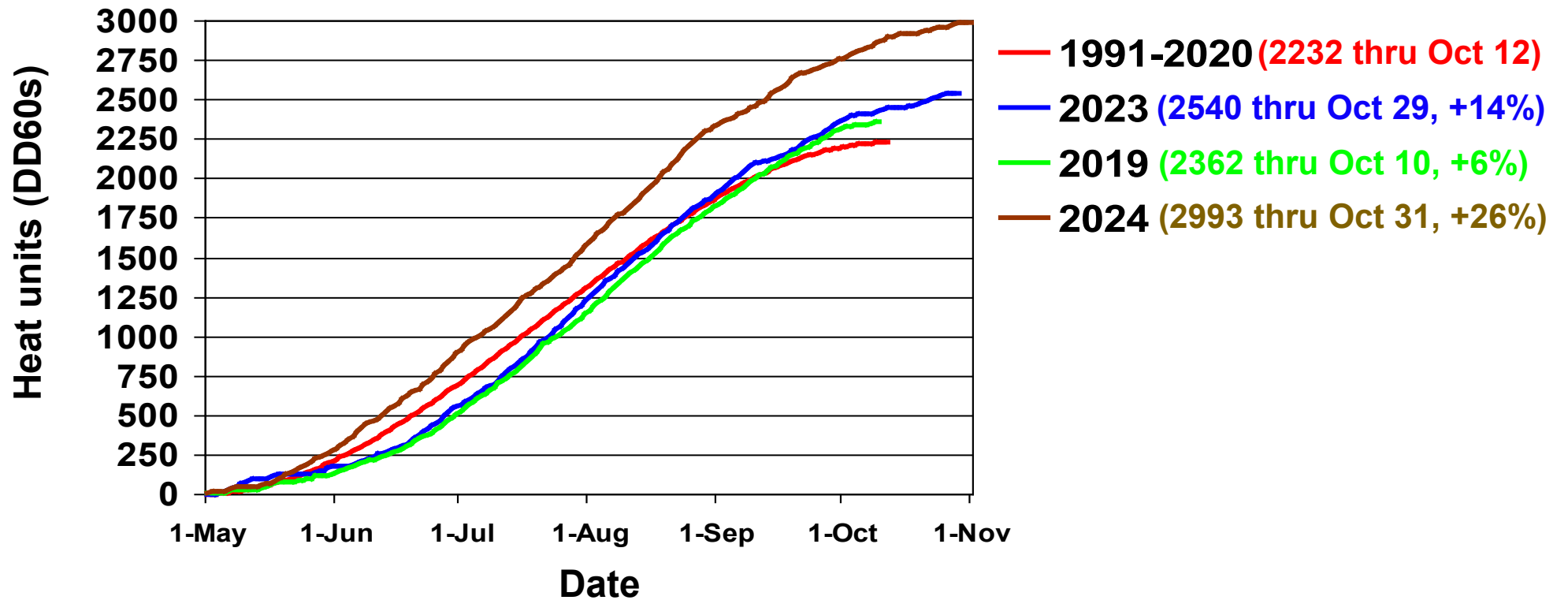
Amarillo 30-Yr Normal (1991-2020) vs. 2017 through 2024

Cotton Heat Unit Accumulation

From May 1 Through First Hard Freeze



Amarillo 30-Yr Normal (1991-2020) vs. 2019, 2023 and 2024 Cotton Heat Unit Accumulation From May 1

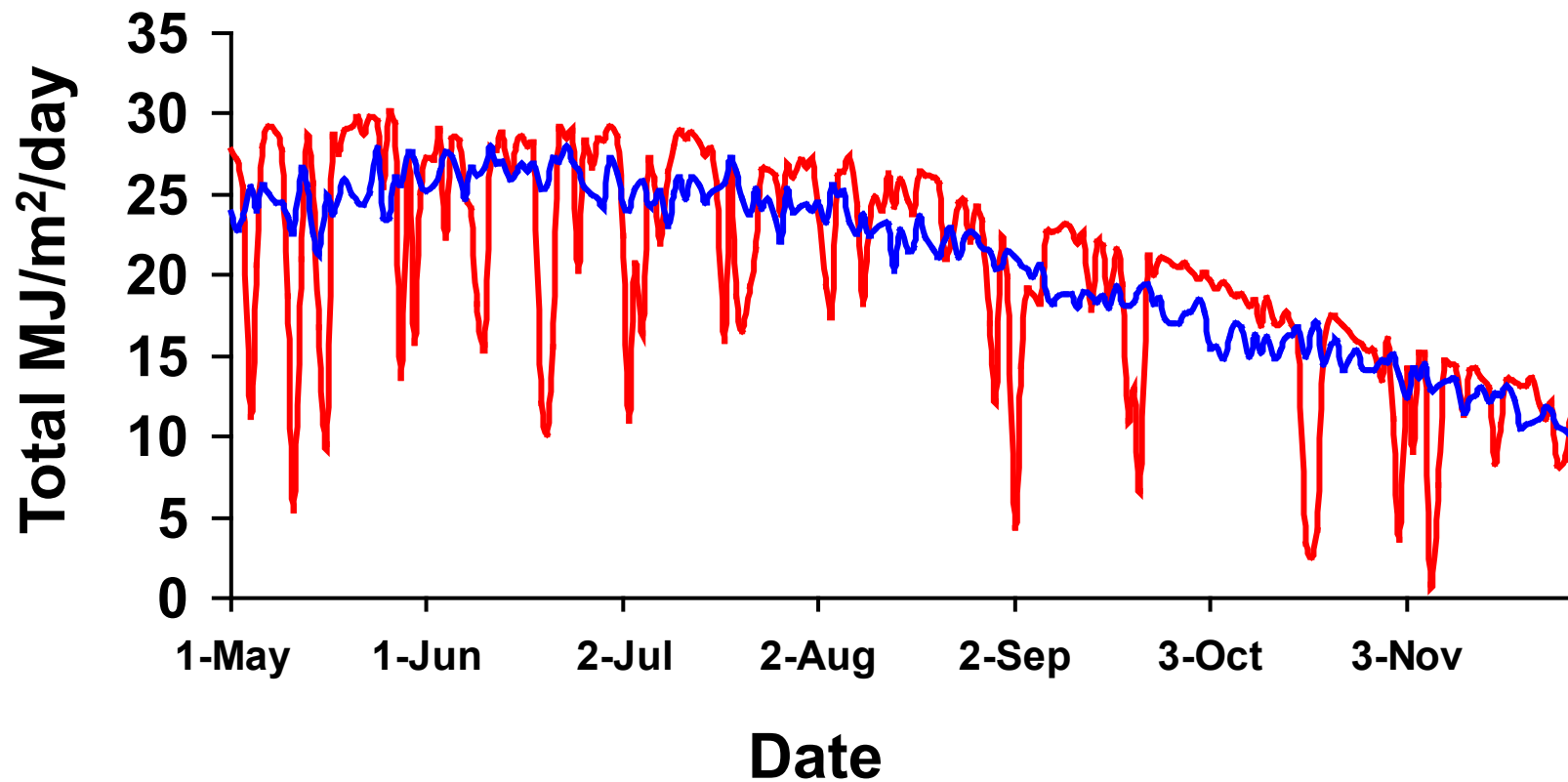


Muleshoe

18-Year Mean (2004-2021) and **2024**

Daily Total Solar Radiation (MJ/meter²)

— 2024 — Muleshoe 18-Yr Mean

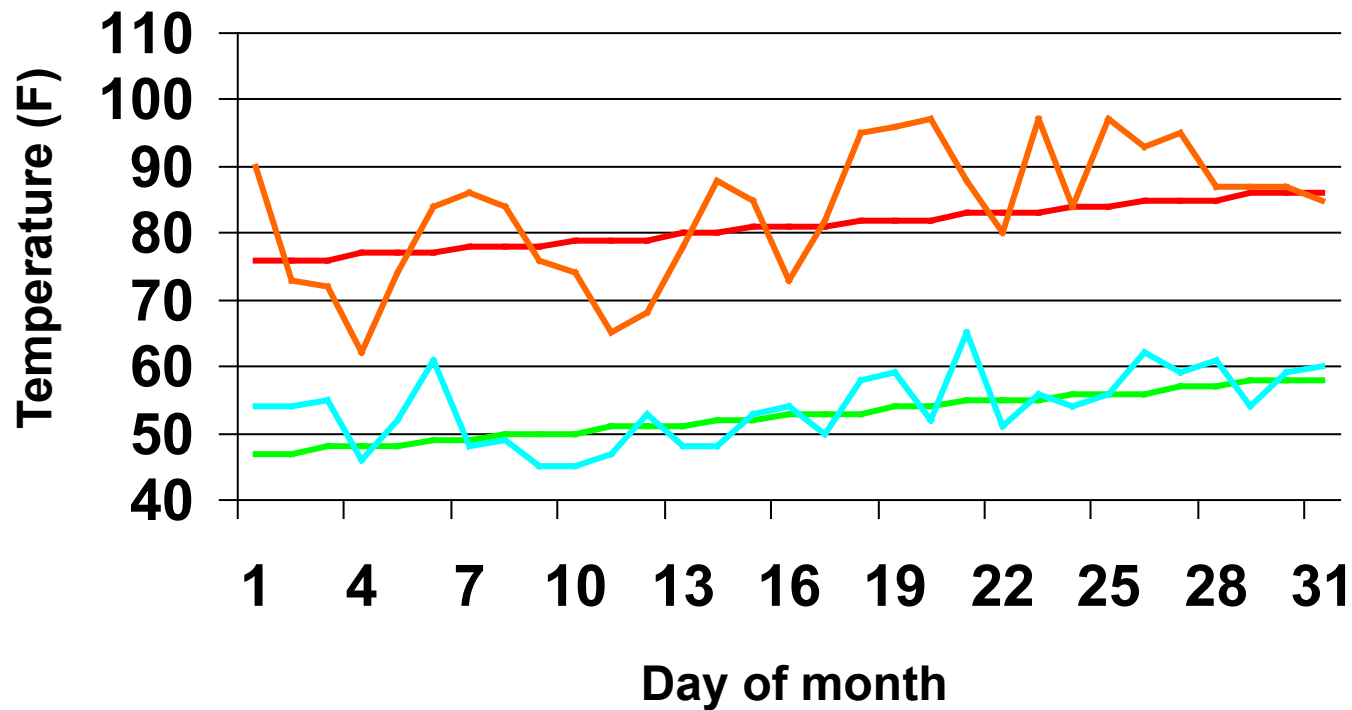


Total solar energy, in MJ/meter², calculated from the hourly average global solar radiation rates and converted to energy by integrating over time.

Amarillo

30-Yr Normal (1991-2020) and May 2024 Air Temperatures

— Normal High — Actual High — Normal Low — Actual Low



Heat Units

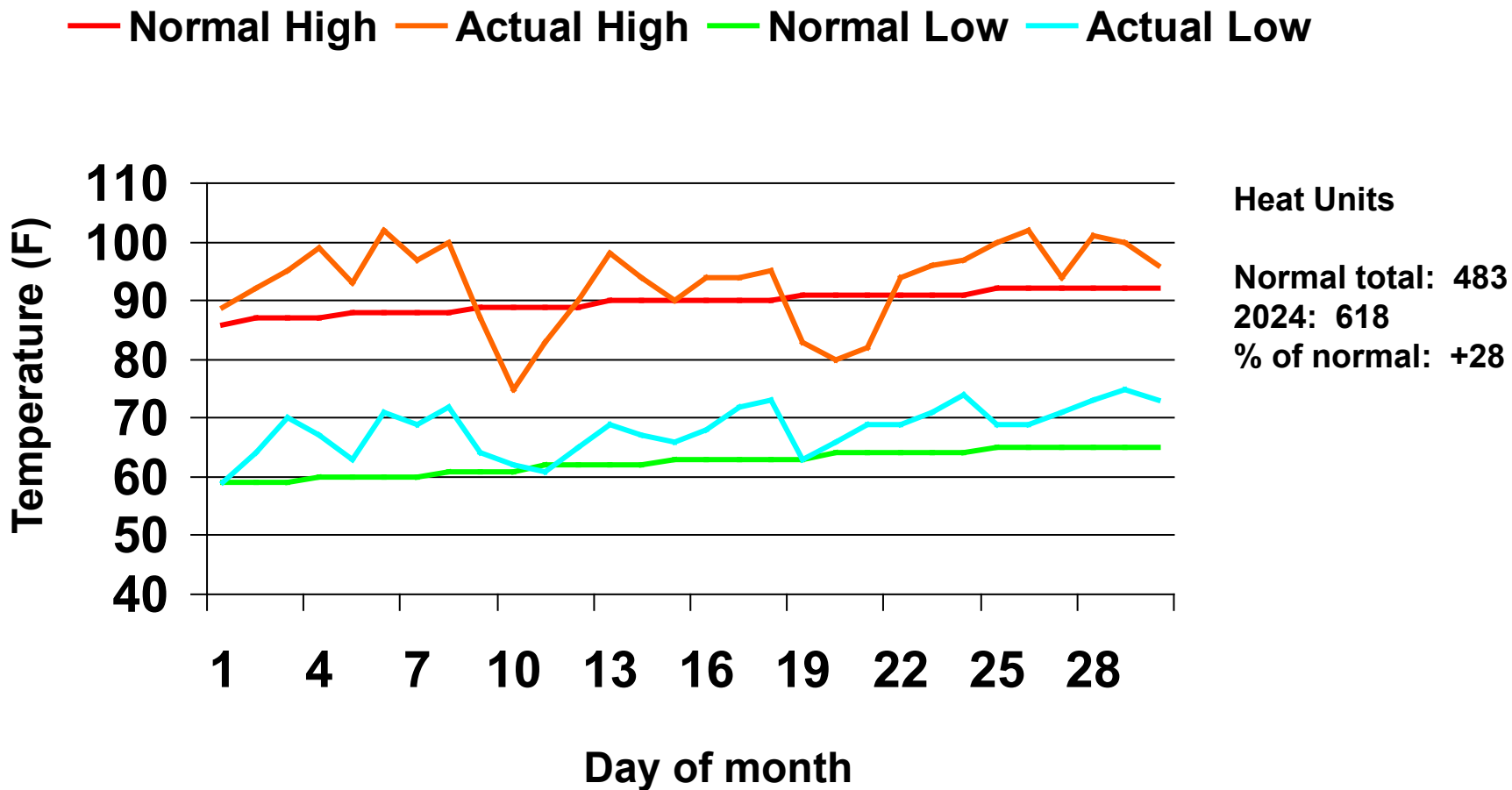
Normal total: 210

2024: 276

% of normal: +32

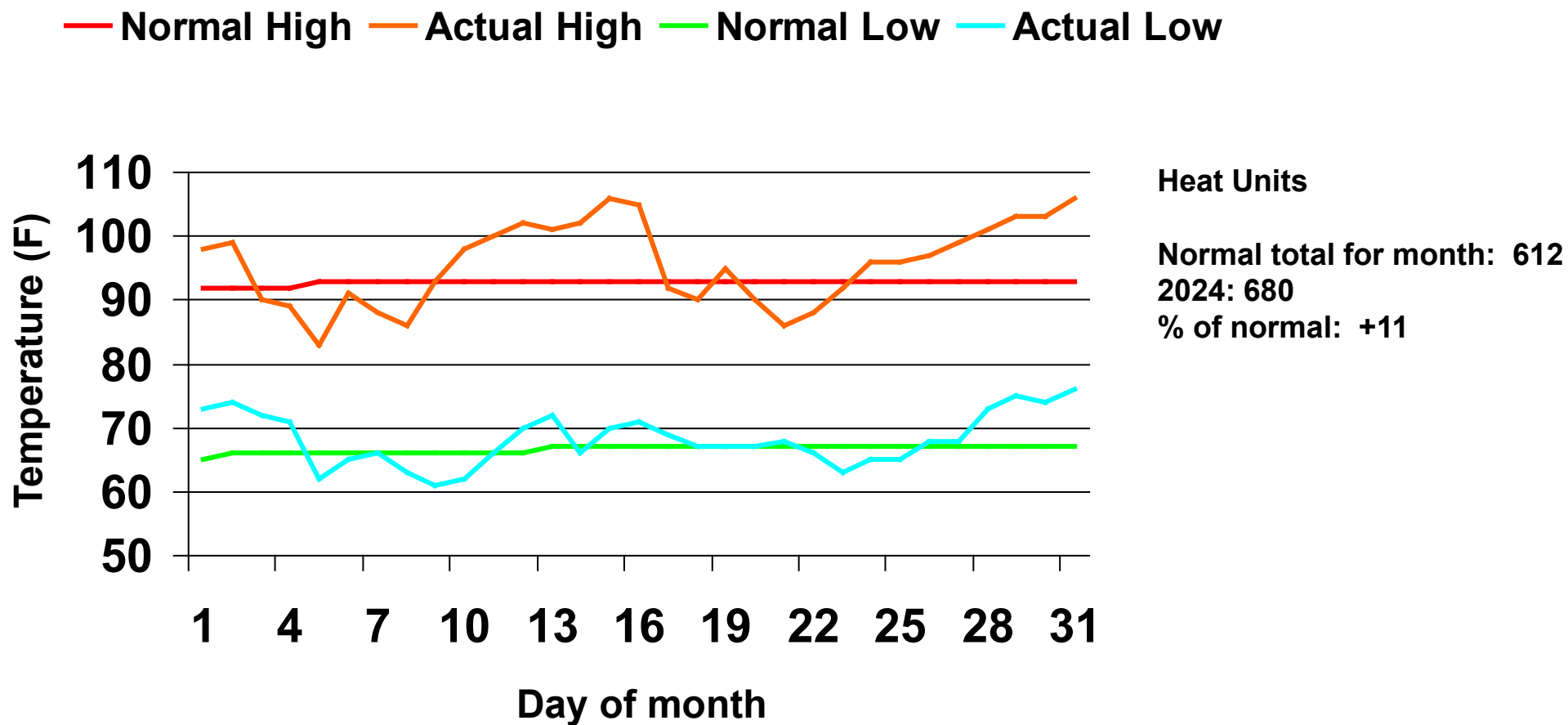
Amarillo

30-Yr Normal (1991-2020) and June 2024 Air Temperatures



Amarillo

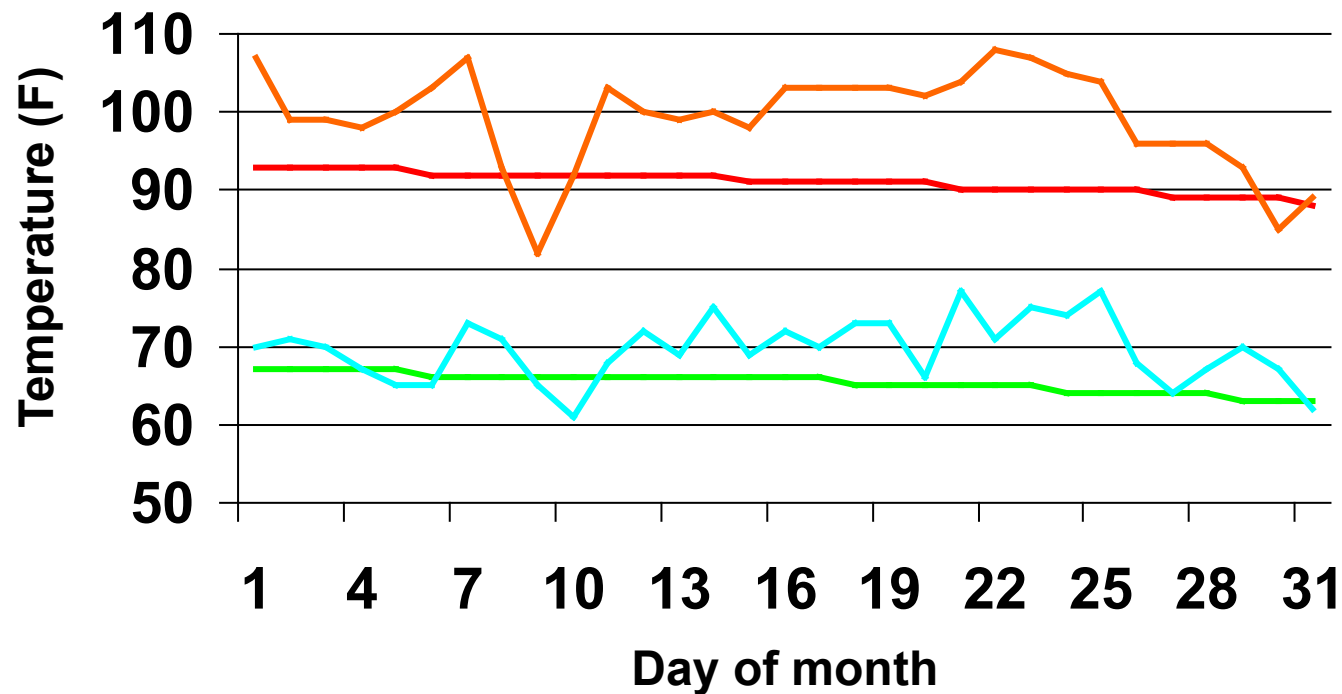
30-Yr Normal (1991-2020) and July 2024 Air Temperatures



Amarillo

30-Yr Normal (1991-2020) and August 2024 Air Temperatures

— Normal High — Actual High — Normal Low — Actual Low



Heat Units

Normal total for month: 565

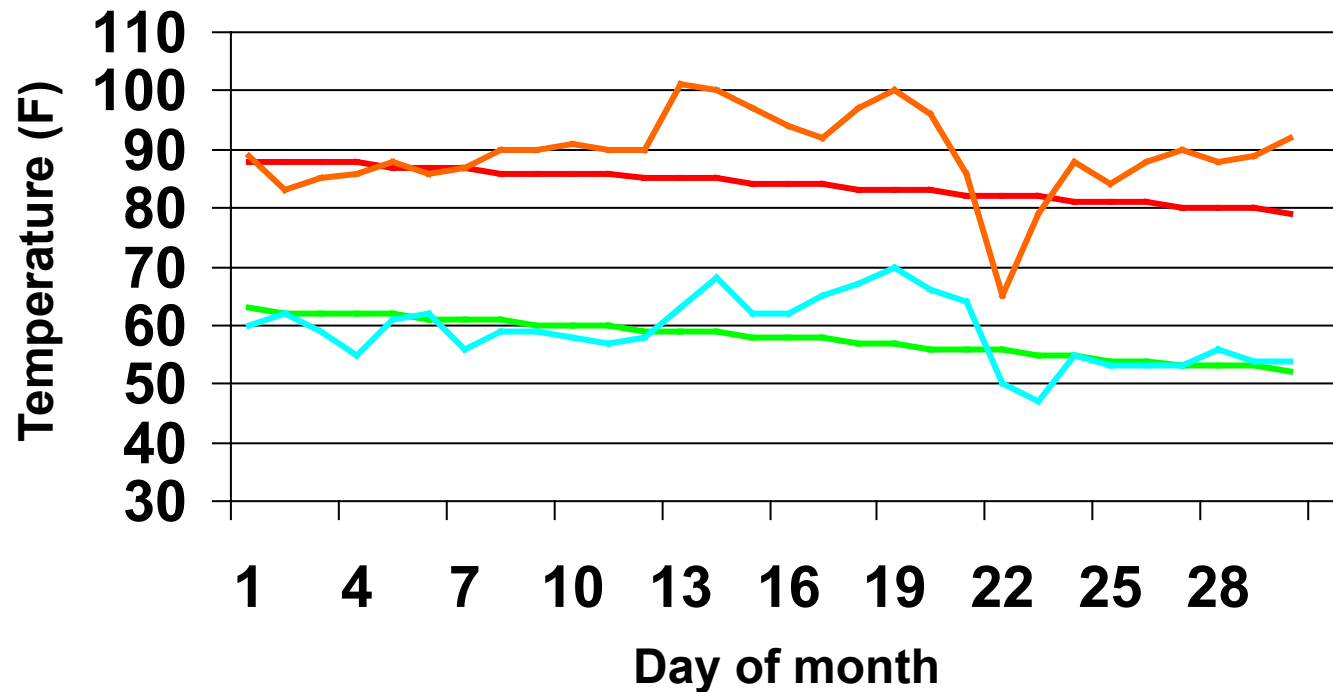
2024: 757

% of normal: +34

Amarillo

30-Yr Normal (1991-2020) and September 2024 Air Temperatures

— Normal High — Actual High — Normal Low — Actual Low



Heat Units

Normal total for month: 329

2024: 427

% of normal: +30

Normal Heat Units/Day

Sep 1: 16

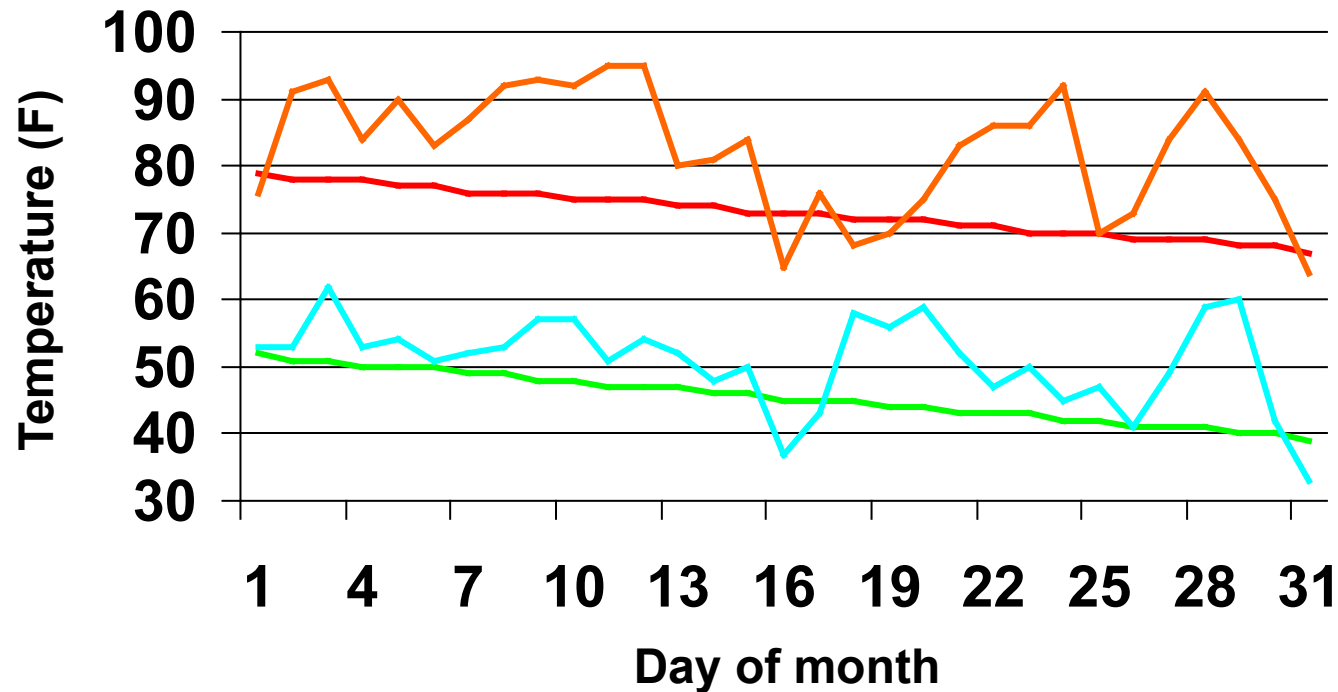
Sep 30: 6

Goes to zero on Oct 12

Amarillo

30-Yr Normal (1991-2020) and October 2024 Air Temperatures

— Normal High — Actual High — Normal Low — Actual Low



Heat Units

Normal total for month: 35

2024: 235

% of normal: +571

Normal Heat Units/Day

Oct 1: 6

Oct 12: 0

Goes to zero on Oct 12

No first freeze in Oct;
first freeze on Nov 9 (32 degrees).
No hard freeze in Oct;
hard freeze on Nov 29 (25 degrees).

Amarillo 2024 DD60s vs Normal (1991-2020)

Month	May	June	July	August	September
Normal	210	483	612	565	329
Actual	276	618	680	757	427
% of Normal	+32	+28	+11	+34	+30
Number of days ≥ 100 degrees	0	6	10	17	3