2019 Enlist Technology Cotton Variety Trial – Top of Texas Gin

Gruhlkey Brothers Farm
Wildorado, 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 new Cotton Agronomics Manager position. The objective of this program is to work with local producers to scientifically evaluate varieties in a commercial setting from planting through ginning.

At this site, six PhytoGen varieties with Enlist technology were planted in a center-pivot irrigated field in a scientifically valid trial with three replicates. Although early weather was extremely challenging, subsequent growing conditions were such that excellent yields and quality were obtained.

Harvest results indicated that statistically significant differences were noted. Lint yields ranged from a high of 1741 lbs/acre to a low of 1582 lbs/acre, and averaged 1655 lbs/acre (Table 1). Average Loan value for varieties from commercially ginned and classed bales varied from a high of $0.5508/lb to a low of $0.5052/lb. When including lint loan value on a per acre basis and net gin credit, no statistical differences were found among varieties. Although lint yield differences were noted, the higher yielding varieties had lower loan value for lint and seed, therefore the overall variety effect was negated. Net value/acre (defined as gross lint loan value/acre plus net gin credit) ranged from a high of $892/acre to a low of $848, and were not statistically different.

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 indicate what 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: 3840 ft

Previous crop: wheat harvested in 2018

Tillage system: no-tilled into standing wheat stubble

Planted: May 20

Replicates: 3 replicates in a randomized complete block design

Plot width: 8-row plots

Plot length: length of field (~3,700 ft)

Seeding rate: 56,000 seed/acre

30-inch rows under center pivot irrigation

Total irrigation: ~11 inches of irrigation

Nitrogen fertility: 100 lbs N/acre using 32-0-0 (UAN) plus 3 tons of composted manure for 130 lbs N/acre total

Herbicides: Valor + 2,4-D preplant burndown; Caparol + diruron preemergence; Roundup PowerMax, Enlist One, Outlook postemergence applications

Plant growth regulators: 2 Stance applications (2 oz prebloom, 3 oz early bloom), mepiquat chloride 20 oz/acre late bloom

Insecticides: acephate at squaring

Harvest aids: ethephon

Harvesting: Nov 19 using a John Deere CS690, with harvested area calculated by the GPS on the stripper monitor. Entire plot length was harvested in up to 3 round modules (some small). Round modules were weighed using the CS690 scale, and all round modules from individual plots were weighed at the Top of Texas Gin.

Commercial ginning: Round modules for all 3 reps of each variety were staged together (3 per plot, with 3 reps = up to 9 total) and commercially ginned separately by Top of Texas 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: Table 1 is based on CCC Loan value from commercial ginning and USDA-AMS classing results.

List of Tables

Acknowledgements

Top of Texas Gin would like to thank the Gruhlkey brothers (Braden, Brittan, and Cameron) for committing equipment, land, and time to conduct and manage the trial. A thank you is extended to Dawid Barnard for properly staging the round modules for each variety. Gratitude is expressed to PhytoGen Cotton Seed, Corteva, and Windstar Inc. Detailed ginning was performed by Malcom Jones and the Top of Texas ginning crew and a big thank you is extended to this hard-working group.

2019 Enlist Technology Variety Trial – Top of Texas Gin

Braden Gruhlkey Farm
Wildorado, TX

Dr. Randy Boman
Cotton Agronomics Manager

Variety Descriptions from Company Literature and Websites

PHY 210 W3FE Enlist Technology: Widestrike 3 Bt technology stacked with triple herbicide technologies including Roundup Ready Flex (glyphosate) tolerance, Liberty Link (glufosinate), and Enlist herbicide (2,4-D choline) tolerance. Early maturity. Short growth habit. Smooth leaf, storm tolerance - excellent. Bacterial blight - resistant. Verticillium wilt - excellent. ~36.8 staple, ~31.3 g/tex strength.

PHY 250 W3FE Enlist Technology: Widestrike 3 Bt technology stacked with triple herbicide technologies including Roundup Ready Flex (glyphosate) tolerance, Liberty Link (glufosinate), and Enlist herbicide (2,4-D choline) tolerance. Early maturity. Short growth habit. Smooth leaf, storm tolerance - excellent. Bacterial blight - resistant. Verticillium wilt - excellent. ~37.1 staple, ~31.1 g/tex strength.

PHY 300 W3FE Enlist Technology: Widestrike 3 Bt technology stacked with triple herbicide technologies including Roundup Ready Flex (glyphosate) tolerance, Liberty Link (glufosinate), and Enlist herbicide (2,4-D choline) tolerance. Early-mid maturity. Medium growth habit. Semi-smooth leaf, storm tolerance - excellent. Bacterial blight - resistant. Verticillium wilt - good. ~36.2 staple, ~30.1 g/tex strength.

PHY 320 W3FE Enlist Technology: Widestrike 3 Bt technology stacked with triple herbicide technologies including Roundup Ready Flex (glyphosate) tolerance, Liberty Link (glufosinate), and Enlist herbicide (2,4-D choline) tolerance. Early maturity. Medium growth habit. Semi-smooth leaf, storm tolerance – very good. Bacterial blight - resistant. Verticillium wilt - good. Root knot nematode – highly resistant. ~36.2 staple, ~30.9 g/tex strength.

PHY 350 W3FE Enlist Technology: Widestrike 3 Bt technology stacked with triple herbicide technologies including Roundup Ready Flex (glyphosate) tolerance, Liberty Link (glufosinate), and Enlist herbicide (2,4-D choline) tolerance. Early-mid maturity. Medium-tall plant height. Semi-smooth leaf, storm tolerance – very good. Bacterial blight - resistant. Verticillium wilt - excellent. Root knot nematode – highly resistant. ~36.8 staple, ~30.0 g/tex strength.

PHY 400 W3FE Enlist Technology: Widestrike 3 Bt technology stacked with triple herbicide technologies including Roundup Ready Flex (glyphosate) tolerance, Liberty Link (glufosinate), and Enlist herbicide (2,4-D choline) tolerance. Early-mid maturity. Medium plant height. Semi-smooth leaf, storm tolerance – very good. Bacterial blight - resistant. Verticillium wilt - susceptible. Root knot nematode – moderately resistant. ~36.2 staple, ~31.0 g/tex strength.

For more information go to: https://phytogencottonseed.com/varieties

Table 1. Harvest results for the center pivot-irrigated Enlist technology cotton variety trial, Gruhlkey Farm, Wildorado, TX, 2019.

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 ----------			
PhytoGen PHY 400 W3FE	32.3	35.6	5398	1741	1921	0.5106	890	3	892	a
PhytoGen PHY 250 W3FE	30.8	35.0	5251	1618	1837	0.5508	891	0	891	a
PhytoGen PHY 320 W3FE	30.1	34.2	5440	1637	1861	0.5398	884	-4	880	a
PhytoGen PHY 210 W3FE	31.4	35.2	5039	1582	1774	0.5537	876	1	877	a
PhytoGen PHY 300 W3FE	31.1	36.1	5527	1719	1994	0.5052	869	5	874	a
PhytoGen PHY 350 W3FE	30.5	35.5	5356	1631	1901	0.5187	846	2	848	a
Test average	31.0	35.3	5335	1655	1881	0.5298	876	1	877	
CV, %	--	--	2.2	2.2	2.1	--	2.2	6.2	2.2	
OSL	--	--	0.0059	0.0018	0.0010	--	0.1170	0.0001	0.1556	
LSD	--	--	211	65	73	--	NS	1	NS	

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 0.05 level, NS - not significant.
Note: some columns may not add up due to rounding error.

Assumes:
$3.15/cwt commercial ginning cost.
$180/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 2. Plant observations for the center pivot-irrigated Enlist technology cotton variety trial, Gruhlkey Farm, Wildorado, TX, 2019.

Entry	Final population	Vigor	Nodes above white flower				Plant height	Nodes above cracked boll
			First flower	+1 week	+2 weeks	+3 weeks		
	plants/acre	1-5 visual scale, 5 best	count				inches	count
	27-Jun	27-Jun	30-Jul	8-Aug	14-Aug	23-Aug	10-Sep	7-Oct
PhytoGen PHY 210 W3FE	43,560	4.0	6.2	3.0	1.9	0.7	18.9	1.7
PhytoGen PHY 250 W3FE	45,012	4.0	5.6	2.4	2.1	1.0	18.7	2.2
PhytoGen PHY 300 W3FE	44,431	3.0	6.8	3.2	2.6	1.5	21.0	3.3
PhytoGen PHY 320 W3FE	43,850	3.3	7.0	3.6	2.7	0.9	21.0	2.8
PhytoGen PHY 350 W3FE	44,722	4.0	5.6	3.2	2.7	0.7	21.7	3.0
PhytoGen PHY 400 W3FE	47,625	4.0	6.6	3.7	2.6	1.3	20.9	3.4
Test average	44,867	3.7	6.3	3.2	2.4	1.0	20.4	2.7
CV, %	9.4	6.3	--	9.9	10.6	38.1	5.7	21.3
OSL	0.8677	0.0010	--	0.0066	0.0084	NS	0.0462	0.0342
LSD	NS	0.4	--	0.6	0.5	NS	2.1	1.1

CV - coefficient of variation.

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

LSD - least significant difference at the 0.05 level, NS - not significant.

Table 3. Commercial classing data for the center pivot-irrigated Enlist technology cotton variety trial, Gruhlkey Farm, Wildorado, TX, 2019.

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															
6991552	22-1	2	2	2	35	4.3	.	.	33.0	77.2	9.9	1	80.8	110	53.95
6991553	12-2	1	2	2	36	4.3	.	.	30.5	77.9	10.1	2	80.4	111	54.95
6991554	22-1	2	2	2	37	4.2	.	.	31.6	76.9	10.3	2	82.2	114	55.50
6991555	22-1	2	2	1	37	4.2	.	.	33.8	76.5	10.5	1	82.3	114	55.60
6991556	22-1	2	2	2	37	4.1	.	.	33.9	76.6	10.5	1	80.8	114	55.55
6991557	22-1	2	2	2	37	4.0	.	.	33.9	76.3	10.6	2	82.1	115	55.60
6991558	22-1	2	2	2	37	4.1	.	.	31.2	77.0	10.3	1	81.0	114	55.45
6991559	22-1	2	2	2	36	4.2	.	.	34.2	77.7	10.0	1	82.3	113	55.35
6991560	22-1	2	2	2	37	4.3	.	.	33.8	77.2	10.1	2	81.9	116	55.45
6991561	22-1	2	2	2	37	4.3	.	.	33.3	76.9	10.5	1	81.2	115	55.45
6991562	22-2	2	2	2	36	4.1	.	.	35.4	75.0	10.5	2	81.2	112	55.30
6991563	12-2	1	2	2	36	4.1	.	.	30.7	76.7	10.6	2	80.5	112	55.05
6991564	22-1	2	2	2	36	4.2	.	.	33.6	77.3	10.1	2	80.6	112	55.30
6991565	22-1	2	2	2	37	4.2	.	.	31.9	77.7	10.0	2	81.4	114	55.45
6991566	22-1	2	2	2	36	4.2	.	.	33.1	77.0	10.1	2	81.9	113	55.30
6991567	21-3	2	1	2	36	4.2	.	.	33.9	77.6	9.9	1	81.5	112	56.70
Average	--	1.9	1.9	1.9	36.4	4.2	none	none	33.0	77.0	10.3	1.6	81.4	113.2	55.37
PHY 250 W3FE															
6991569	22-1	2	2	2	36	4.4	.	.	30.4	77.3	10.1	1	80.8	111	54.95
6991570	22-1	2	2	2	36	4.2	.	.	33.4	76.7	10.3	2	81.5	113	55.30
6991571	22-1	2	2	2	36	4.3	.	.	31.0	76.8	10.5	2	79.7	111	54.60
6991572	22-1	2	2	2	37	4.0	.	.	32.3	76.9	10.4	1	81.1	114	55.45
6991573	22-1	2	2	2	36	4.1	.	.	31.7	76.2	10.5	2	80.4	113	55.20
6991574	22-1	2	2	2	36	4.3	.	.	31.4	77.0	10.4	1	81.7	113	55.10
6991575	22-1	2	2	2	36	4.2	.	.	31.2	76.5	10.4	1	80.0	111	55.20
6991576	22-1	2	2	2	36	4.3	.	.	31.7	76.8	10.1	2	80.3	113	55.10
6991577	22-1	2	2	2	36	4.2	.	.	32.7	77.1	10.2	2	81.0	113	55.20
6991578	22-1	2	2	2	36	4.3	.	.	30.7	77.3	10.1	1	80.8	113	54.95
6991579	22-1	2	2	2	36	4.4	.	.	30.2	77.1	10.0	2	80.3	112	54.95
6991580	22-2	2	2	2	36	4.2	.	.	32.5	76.4	10.1	2	80.2	113	55.20
6991581	22-2	2	2	2	36	4.1	.	.	33.3	75.9	10.1	2	79.6	113	54.80
6991582	22-2	2	2	2	36	4.1	.	.	30.9	76.0	10.0	2	78.7	111	54.45
6991583	22-1	2	2	2	37	4.2	.	.	33.7	77.1	10.2	1	80.2	114	55.55
6991584	22-1	2	2	2	36	4.2	.	.	32.0	77.3	10.1	2	81.7	112	55.20
Average	--	2.0	2.0	2.0	36.1	4.2	none	none	31.8	76.8	10.2	1.6	80.5	112.5	55.08

Table 3 (continued). Commercial classing data for the center pivot-irrigated Enlist technology cotton variety trial, Gruhlkey Farm, Wildorado, TX, 2019.

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 300 W3FE															
6991586	13-2	1	3	2	36	3.8	.	.	32.8	74.8	11.6	2	80.3	111	50.70
6991587	23-1	2	3	2	36	4.0	.	.	32.3	73.8	11.5	2	81.3	113	50.70
6991588	23-1	2	3	2	36	4.0	.	.	31.4	74.2	11.7	1	80.3	112	50.70
6991589	23-1	2	3	2	36	3.9	.	.	33.0	74.1	11.6	2	81.3	113	50.80
6991590	23-1	2	3	2	35	4.0	.	.	31.6	74.3	11.6	2	80.6	110	50.25
6991591	23-1	2	3	2	35	3.7	.	.	32.7	74.1	11.4	1	80.5	109	50.25
6991592	23-1	2	3	2	36	3.8	.	.	32.4	74.9	11.4	1	80.3	111	50.70
6991593	13-2	1	3	2	36	3.6	.	.	31.6	74.6	11.5	2	80.2	112	50.70
6991594	13-2	1	3	2	36	3.9	.	.	31.9	74.6	11.8	2	80.1	112	50.70
6991595	23-1	2	3	2	36	3.9	.	.	31.6	73.9	11.7	2	81.3	112	50.70
6991596	23-1	2	3	2	37	4.1	.	.	30.9	73.5	11.6	2	80.2	114	50.80
6991597	23-1	2	3	2	36	3.9	.	.	30.9	73.2	11.9	2	79.5	111	50.05
6991598	23-1	2	3	2	36	3.8	.	.	32.1	73.5	11.7	2	80.6	112	50.70
6991599	23-1	2	3	2	36	3.7	.	.	32.4	73.9	11.8	2	81.2	112	50.70
6991600	23-1	2	3	3	36	3.6	.	.	31.4	74.1	11.7	2	79.1	112	49.95
6991601	23-1	2	3	2	35	3.8	.	.	31.2	74.0	11.6	2	80.3	110	50.25
6991602	23-1	2	3	2	35	3.9	.	.	32.0	74.2	11.5	2	80.1	109	50.25
Average	--	1.8	3.0	2.1	35.8	3.8	none	none	31.9	74.1	11.6	1.8	80.4	111.5	50.52
PHY 320 W3FE															
6991604	22-1	2	2	2	36	3.9	.	.	31.8	75.5	10.9	2	81.1	111	55.20
6991605	12-2	1	2	2	36	3.7	.	.	34.8	75.8	11.3	1	80.5	113	55.30
6991606	12-2	1	2	2	36	3.9	.	.	33.5	75.6	11.1	1	79.6	111	54.80
6991607	23-1	2	3	2	36	3.9	.	.	32.8	75.1	11.2	2	80.3	113	50.70
6991608	23-1	2	3	3	36	4.0	.	.	32.8	75.3	11.2	3	81.6	113	50.45
6991609	22-1	2	2	3	36	3.8	.	.	32.6	75.6	11.0	2	81.8	111	54.75
6991610	22-1	2	2	3	36	3.9	.	.	32.2	75.2	11.1	3	81.4	112	54.75
6991611	22-1	2	2	3	36	3.8	.	.	32.8	75.2	11.0	2	81.0	112	54.75
6991612	22-1	2	2	2	37	3.8	.	.	33.6	76.2	11.0	2	81.6	114	55.55
6991613	22-1	2	2	2	36	3.7	.	.	30.0	75.5	10.9	2	81.0	113	55.05
6991614	22-1	2	2	3	37	4.0	.	.	35.8	75.3	11.0	3	82.3	114	55.15
6991615	22-1	2	2	3	36	3.6	.	.	31.5	75.2	10.7	3	81.5	113	54.65
6991616	22-1	2	2	2	37	3.9	.	.	33.9	75.6	11.0	2	82.9	114	55.60
6991617	22-1	2	2	3	37	3.8	.	.	34.5	75.4	11.0	2	82.5	115	55.15
6991618	23-1	2	3	3	37	3.7	.	.	35.2	75.0	11.2	3	81.6	114	50.80
6991619	23-1	2	3	2	37	3.8	.	.	33.1	74.7	11.3	2	82.8	114	51.10
Average	--	1.9	2.3	2.5	36.4	3.8	none	none	33.2	75.4	11.1	2.2	81.5	112.9	53.98

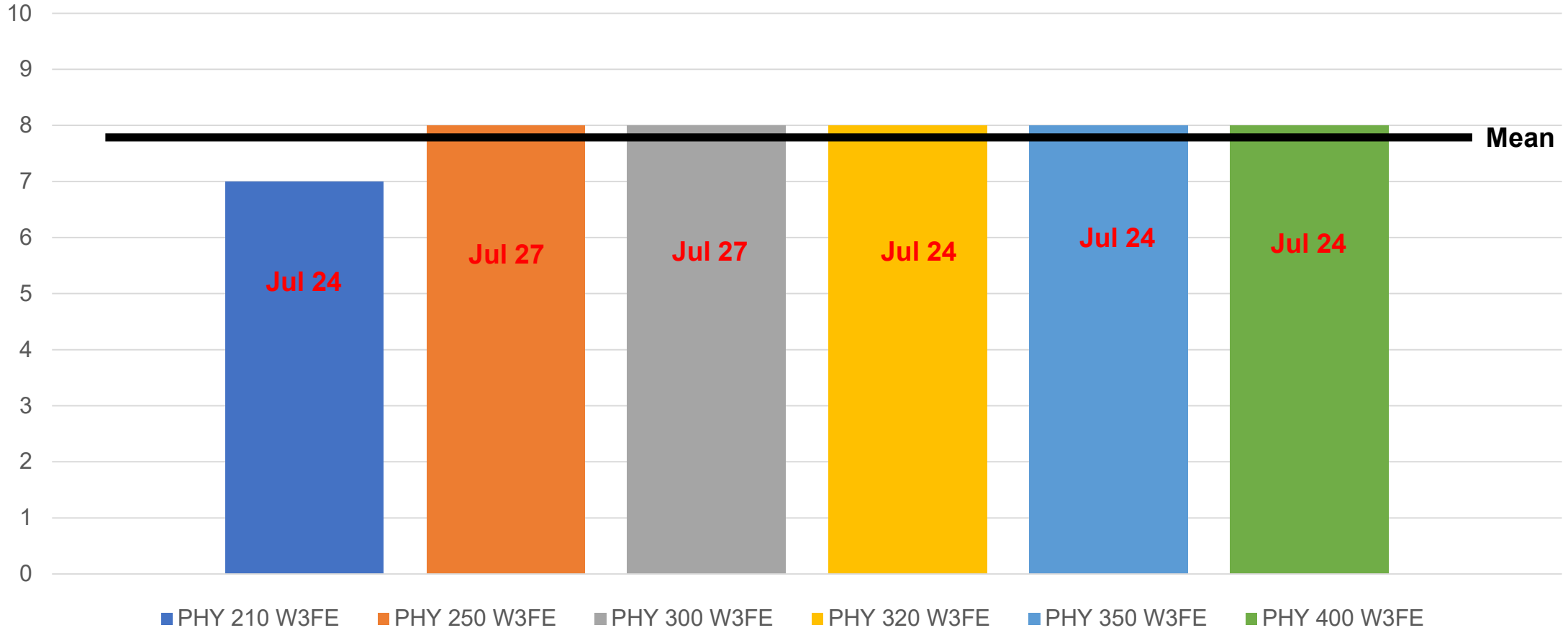
Table 3 (continued). Commercial classing data for the center pivot-irrigated Enlist technology cotton variety trial, Gruhlkey Farm, Wildorado, TX, 2019.

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 350 W3FE															
6991621	12-2	1	2	2	37	4.0	.	.	32.4	76.1	11.2	1	81.2	114	55.45
6991622	23-1	2	3	2	36	4.2	.	.	30.9	75.4	11.4	1	80.1	113	50.55
6991623	22-1	2	2	2	36	4.2	.	.	33.1	75.1	11.1	2	81.2	113	55.30
6991624	12-2	1	2	2	36	4.3	.	.	30.2	75.7	11.2	2	79.8	112	54.45
6991625	23-1	2	3	2	36	4.2	.	.	30.4	75.3	11.3	1	80.8	112	50.55
6991626	22-1	2	2	2	36	3.9	.	.	32.6	75.3	11.1	2	80.4	113	55.20
6991627	23-1	2	3	2	36	3.9	.	.	31.9	74.9	11.4	2	79.6	112	50.20
6991628	23-1	2	3	3	36	3.7	.	.	29.5	74.2	11.4	3	79.8	111	49.60
6991629	23-1	2	3	2	36	3.9	.	.	30.8	75.0	11.4	2	80.8	113	50.55
6991630	23-1	2	3	3	36	4.0	.	.	31.9	73.6	11.5	3	79.9	112	49.95
6991631	23-1	2	3	3	37	4.2	.	.	32.1	73.5	11.4	3	81.7	114	50.70
6991632	23-1	2	3	2	36	4.2	.	.	30.9	74.3	11.4	2	79.8	111	50.05
6991633	13-2	1	3	2	38	4.0	.	.	33.7	75.4	11.5	2	81.6	118	51.05
6991634	23-1	2	3	3	36	3.9	.	.	33.5	74.5	11.2	2	80.1	113	50.55
6991635	23-1	2	3	2	36	4.4	.	.	30.5	75.0	11.3	2	80.6	113	50.55
6991636	22-1	2	2	2	36	4.4	.	.	33.3	74.7	11.0	2	80.7	112	55.20
Average	--	1.8	2.7	2.3	36.3	4.1	none	none	31.7	74.9	11.3	2.0	80.5	112.9	51.87
PX3B07 (PHY 400 W3FE)															
6991638	23-1	2	3	3	37	3.5	.	.	35.0	75.1	11.2	2	79.8	114	50.30
6991639	12-2	1	2	2	36	3.6	.	.	31.5	76.0	11.2	2	80.6	113	55.10
6991640	13-2	1	3	3	36	3.8	.	.	29.8	75.3	11.5	3	79.9	112	49.60
6991641	13-2	1	3	2	36	3.8	.	.	33.0	74.9	11.6	2	79.9	112	50.30
6991642	13-2	1	3	2	37	3.7	.	.	35.0	75.4	11.5	2	80.6	116	51.05
6991643	13-2	1	3	2	36	3.3	.	.	35.4	75.4	11.5	1	80.0	113	47.20
6991644	13-2	1	3	2	36	3.9	.	.	33.0	75.3	11.5	1	80.1	113	50.80
6991645	12-2	1	2	3	37	3.6	.	.	30.0	75.6	11.3	2	79.5	114	54.25
6991646	23-1	2	3	2	35	3.6	.	.	33.8	75.3	11.3	2	77.4	110	49.30
6991647	12-2	1	2	2	37	3.7	.	.	35.5	75.6	11.2	2	80.7	114	55.55
6991648	23-1	2	3	2	37	3.4	.	.	34.7	75.2	11.3	2	79.9	115	46.95
6991649	23-1	2	3	3	36	3.8	.	.	33.2	74.4	11.5	3	80.5	113	50.55
6991650	23-1	2	3	3	36	3.6	.	.	34.4	74.8	11.2	4	78.9	112	49.95
6991651	12-2	1	2	3	35	3.6	.	.	32.5	75.5	11.2	3	78.8	110	52.80
6991652	23-1	2	3	2	35	3.6	.	.	31.2	75.2	11.4	2	79.3	110	49.75
6991653	12-2	1	2	2	36	3.9	.	.	32.6	75.8	11.3	1	80.5	113	55.20
6991654	23-1	2	3	1	36	3.7	.	.	34.4	74.3	11.6	1	79.0	112	50.30
6991655	13-2	1	3	2	36	3.7	.	.	34.3	75.4	11.8	1	78.6	112	50.20
Average	--	1.4	2.7	2.3	36.1	3.7	none	none	33.3	75.3	11.4	2.0	79.7	112.7	51.06

Appendix

Nodes above white flower at first bloom, days from planting to first bloom, trial average nodes above white flower by observation date, and Amarillo 2019 weather data.

Gruhlkey Enlist Trial – 2019
Nodes Above White Flower at First Bloom



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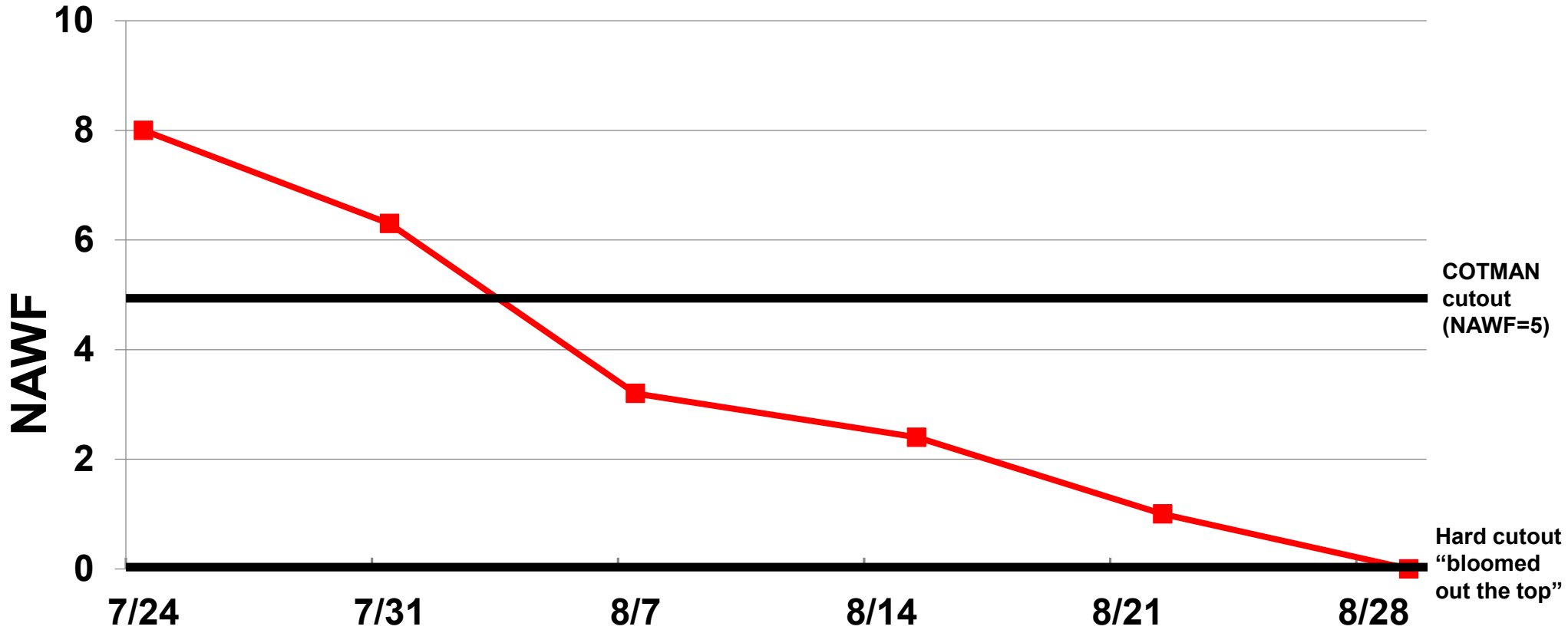
First bloom dates:
Jul 24 = 65 Days After Planting
Jul 27 = 68 Days After Planting

Gruhlkey Enlist Trial – 2019
Mean Nodes Above White Flower by Week



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Amarillo 2019 Weather vs. 30-Year Normal

Month	Normal DD60 (Actual)	Percent of Normal
May	177 (130)	-27%
June	433 (383)	-12%
July	566 (632)	+12%
August	522 (677)	+30%
September	286 (494)	+73%
October	19 (48)	+152 Hard freeze on Oct 11
Season (May 1 to end of season)	2001 (2362)	+18%

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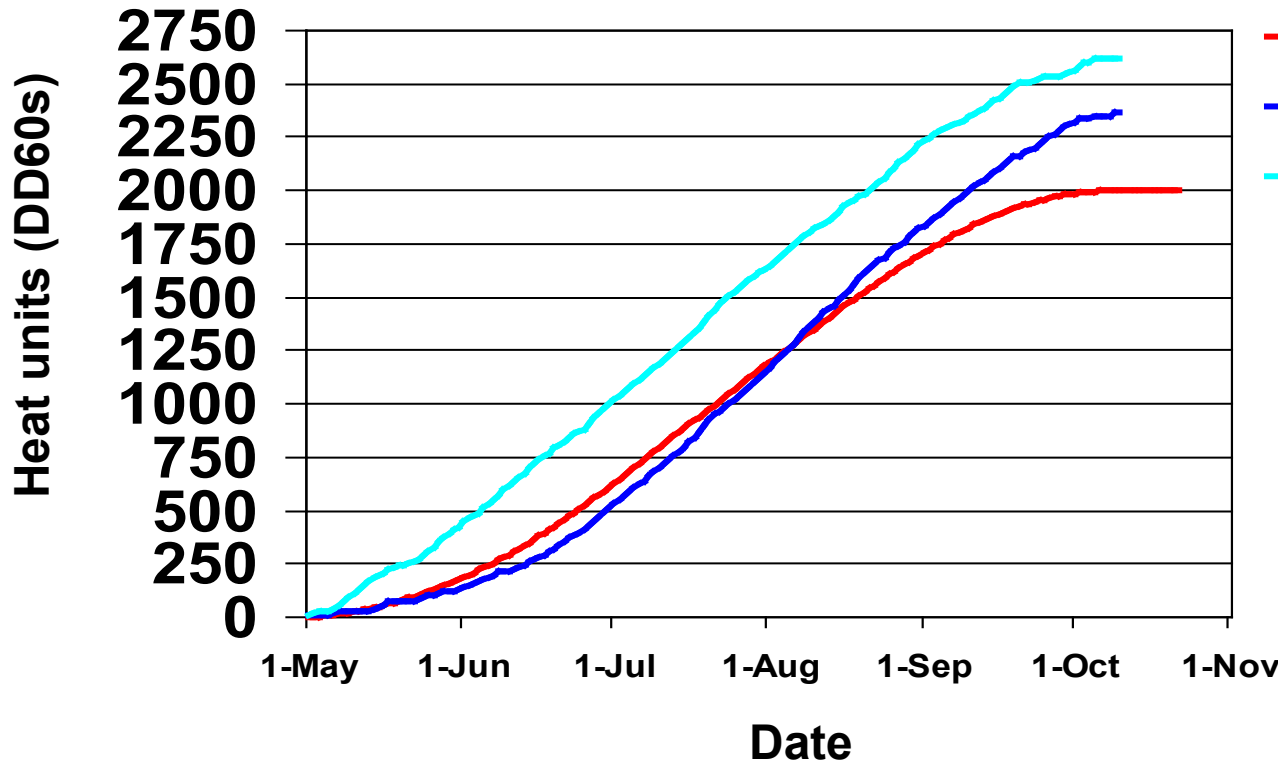
Amarillo 30-Yr Normal (1981-2010) vs. 2018 and 2019 Cotton Heat Unit Accumulation for May 1 Through October 10



From May 1 through October 10
Normal: 2001

2019: 2362
% of Normal: +18%
Hard freeze Oct 11

2018: 2621
% of Normal: +30%

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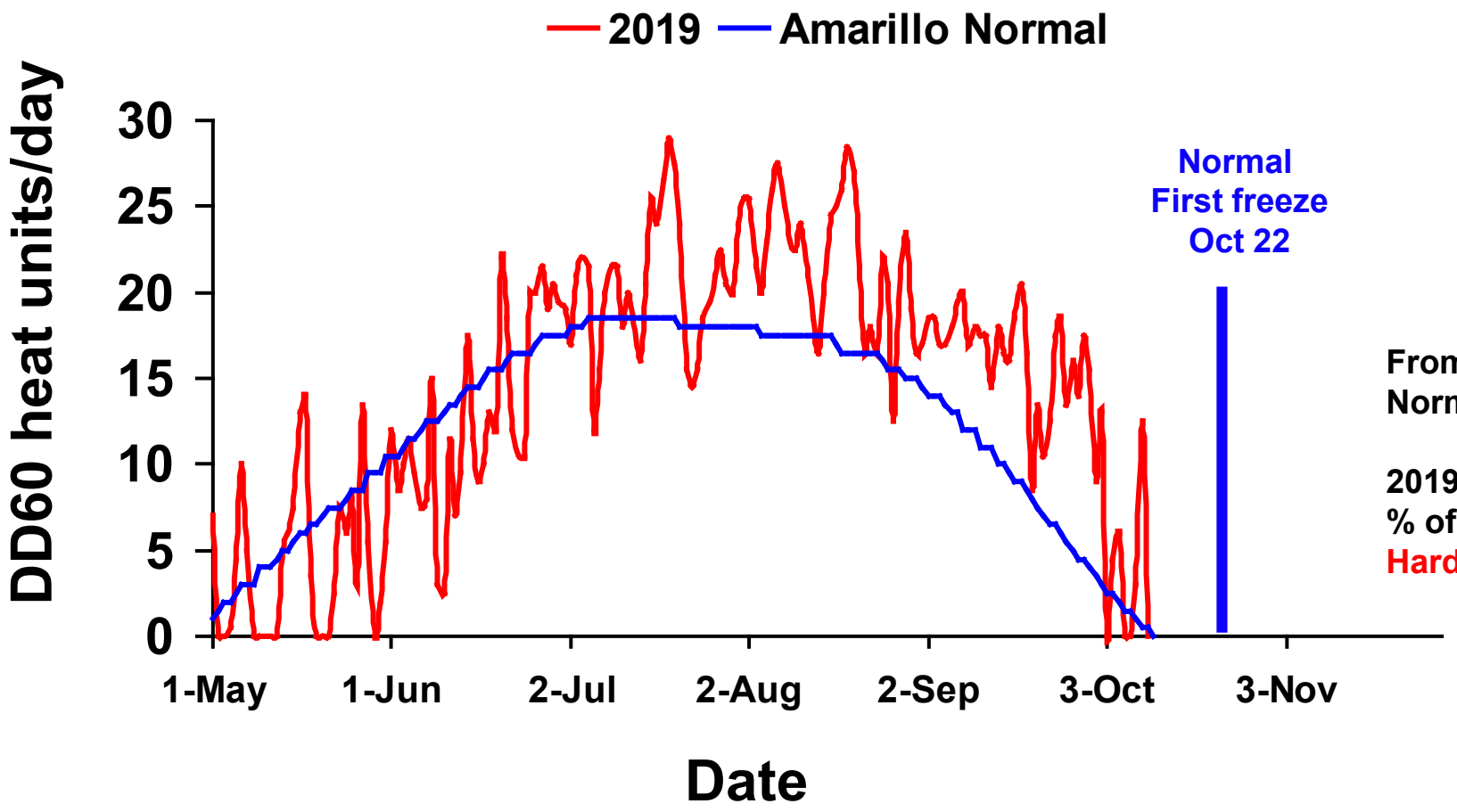
Amarillo
30-Year Normal (1981-2010) and 2019
Daily Heat Units



From May 1 through Oct 10
Normal: 2001

2019: 2362
% of Normal: +18%
Hard freeze Oct 11

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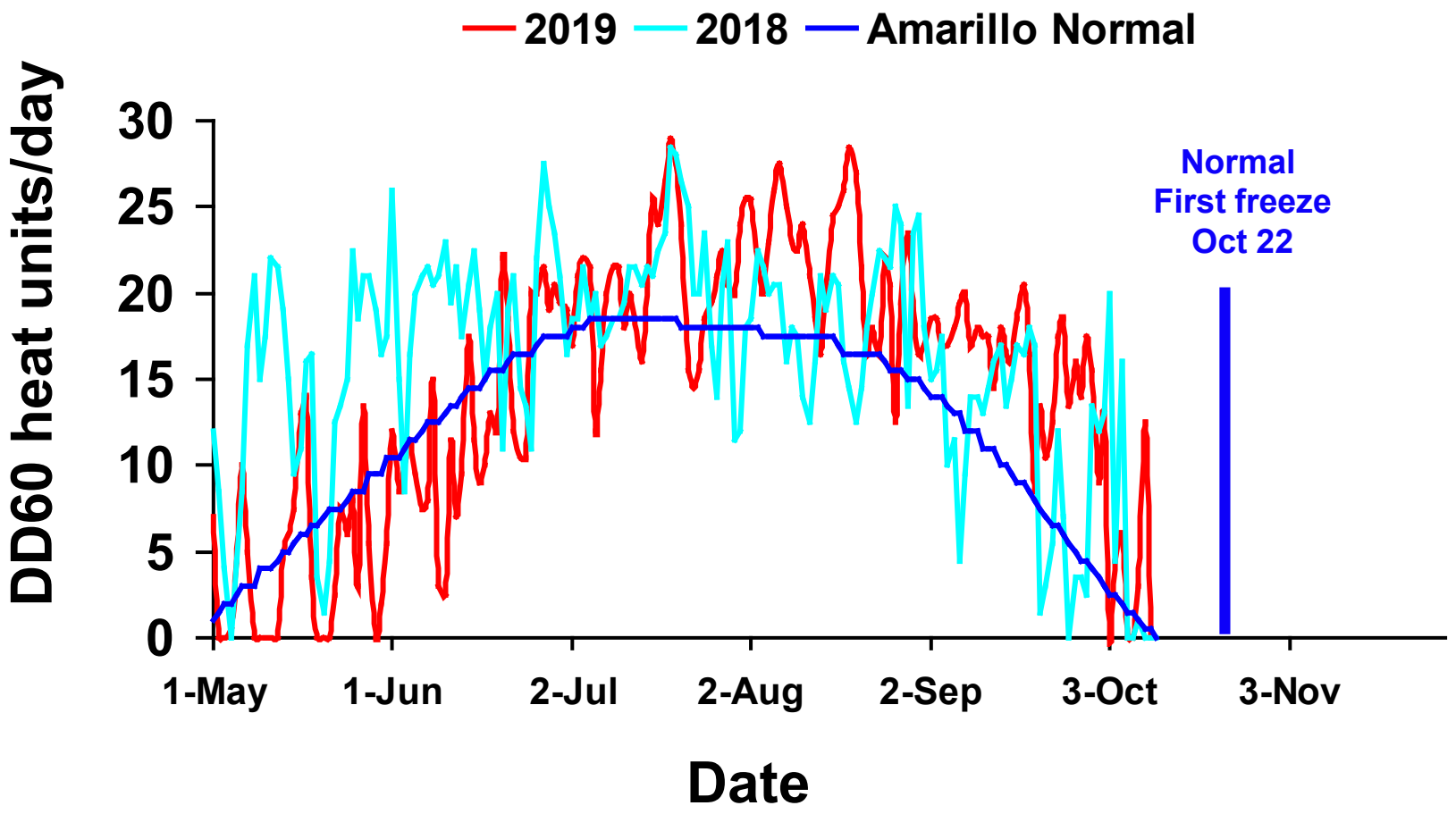
Amarillo
30-Year Normal (1981-2010), 2018 and 2019
Daily Heat Units



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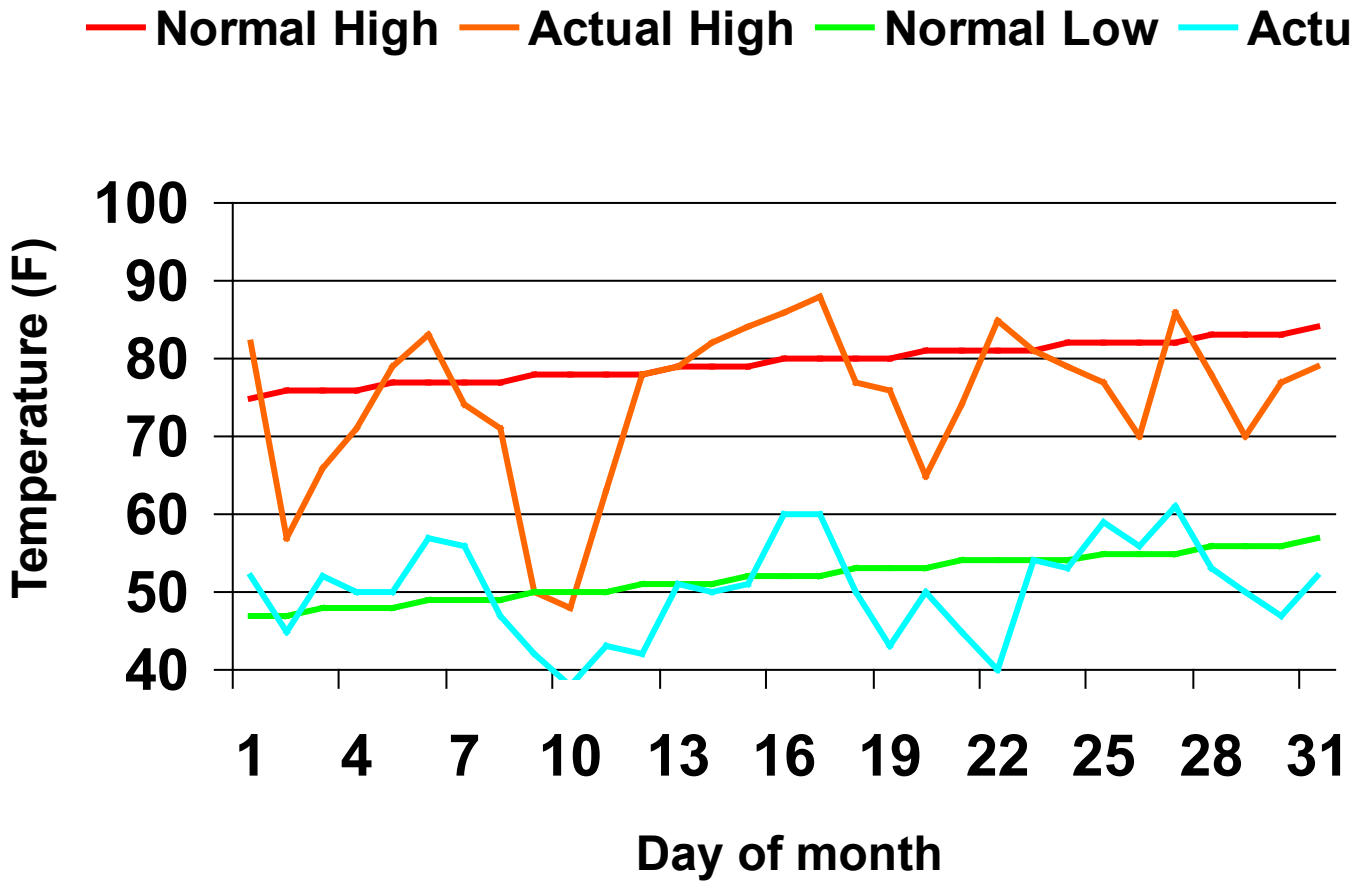
Amarillo
30-Yr Normal (1981-2010) and May 2019 Air Temperatures



Heat Units

Normal: 177
2019: 130
% of normal: -27%

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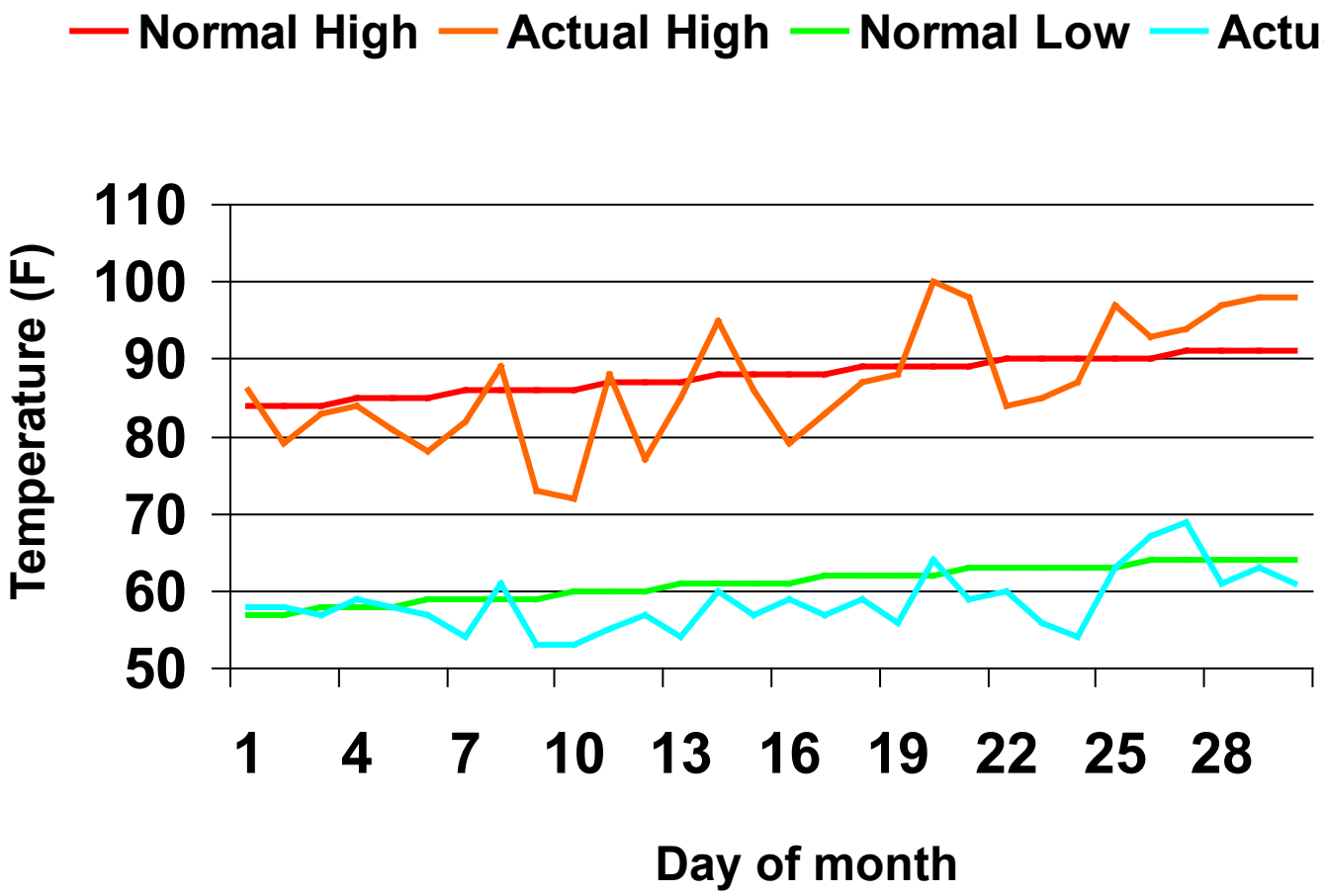
Amarillo
30-Yr Normal (1981-2010) and June 2019 Air Temperatures



Heat Units

Normal: 433
2019: 383
% of normal: -12

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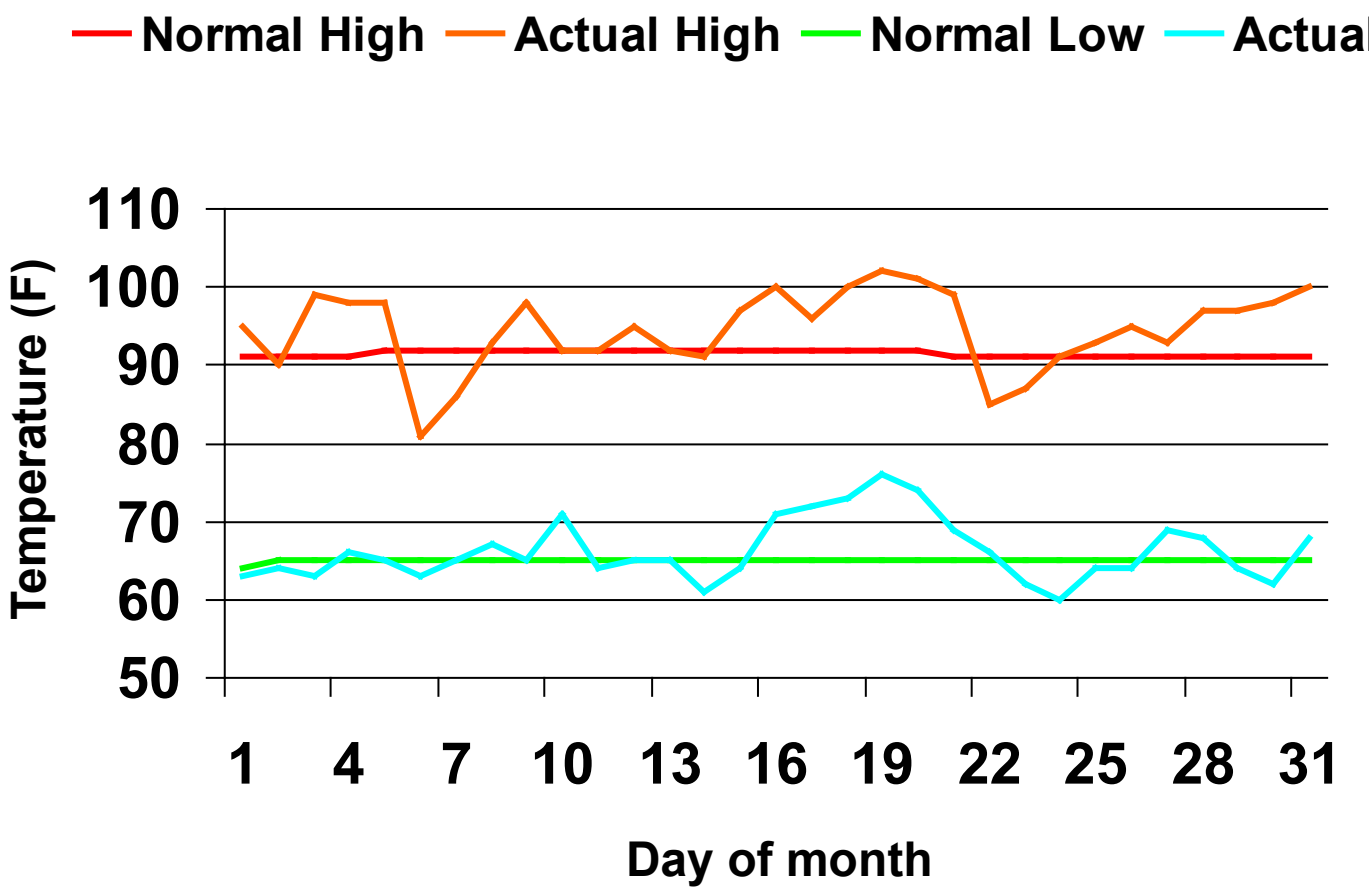
Amarillo
30-Yr Normal (1981-2010) and July 2019 Air Temperatures



Heat Units

Normal total: 566

2019: 632
% of normal: +12%

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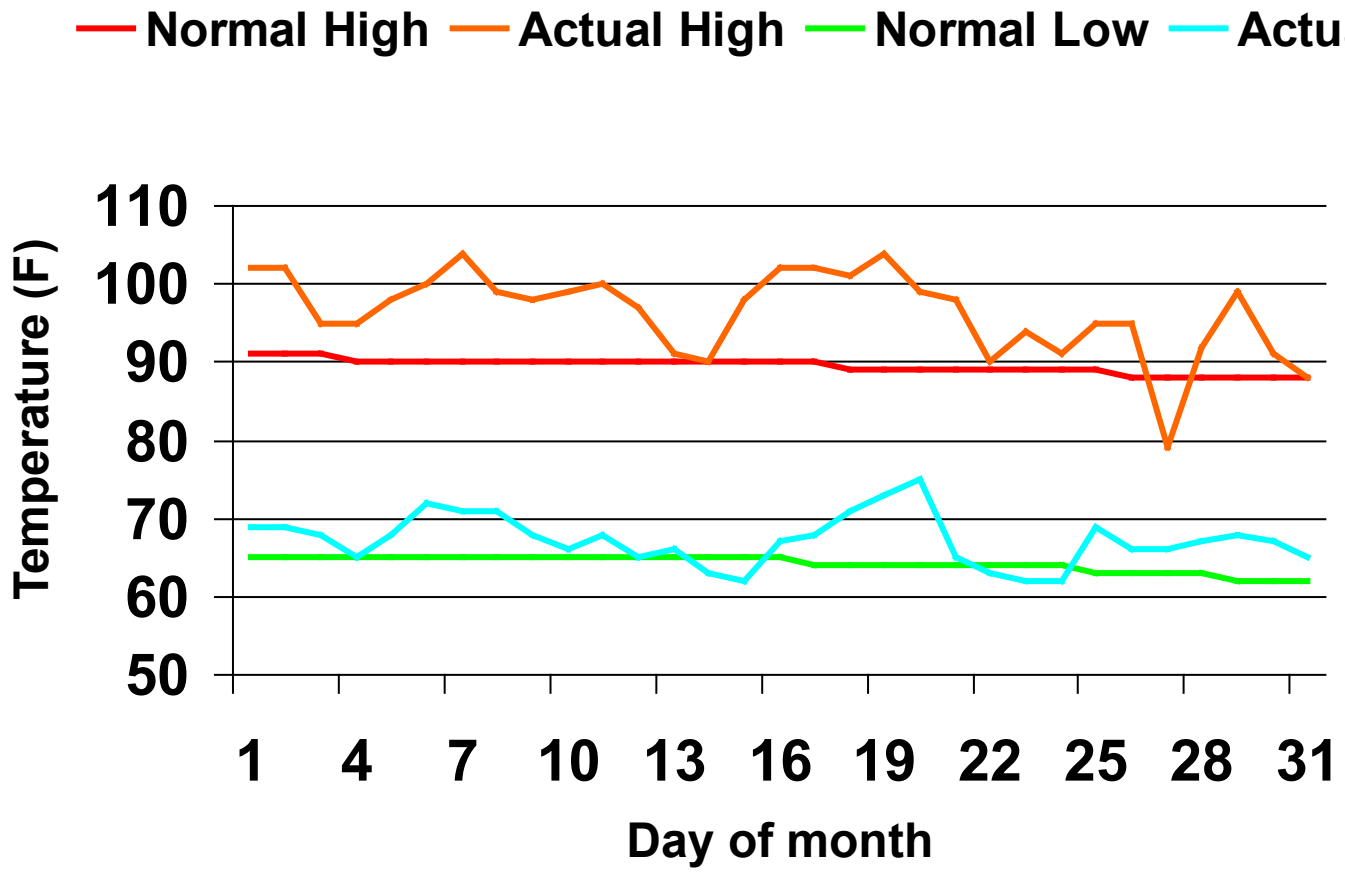
Amarillo
30-Yr Normal (1981-2010) and August 2019 Air Temperatures



Heat Units

Normal for Month: 522

2019: 677
% of normal: +30%

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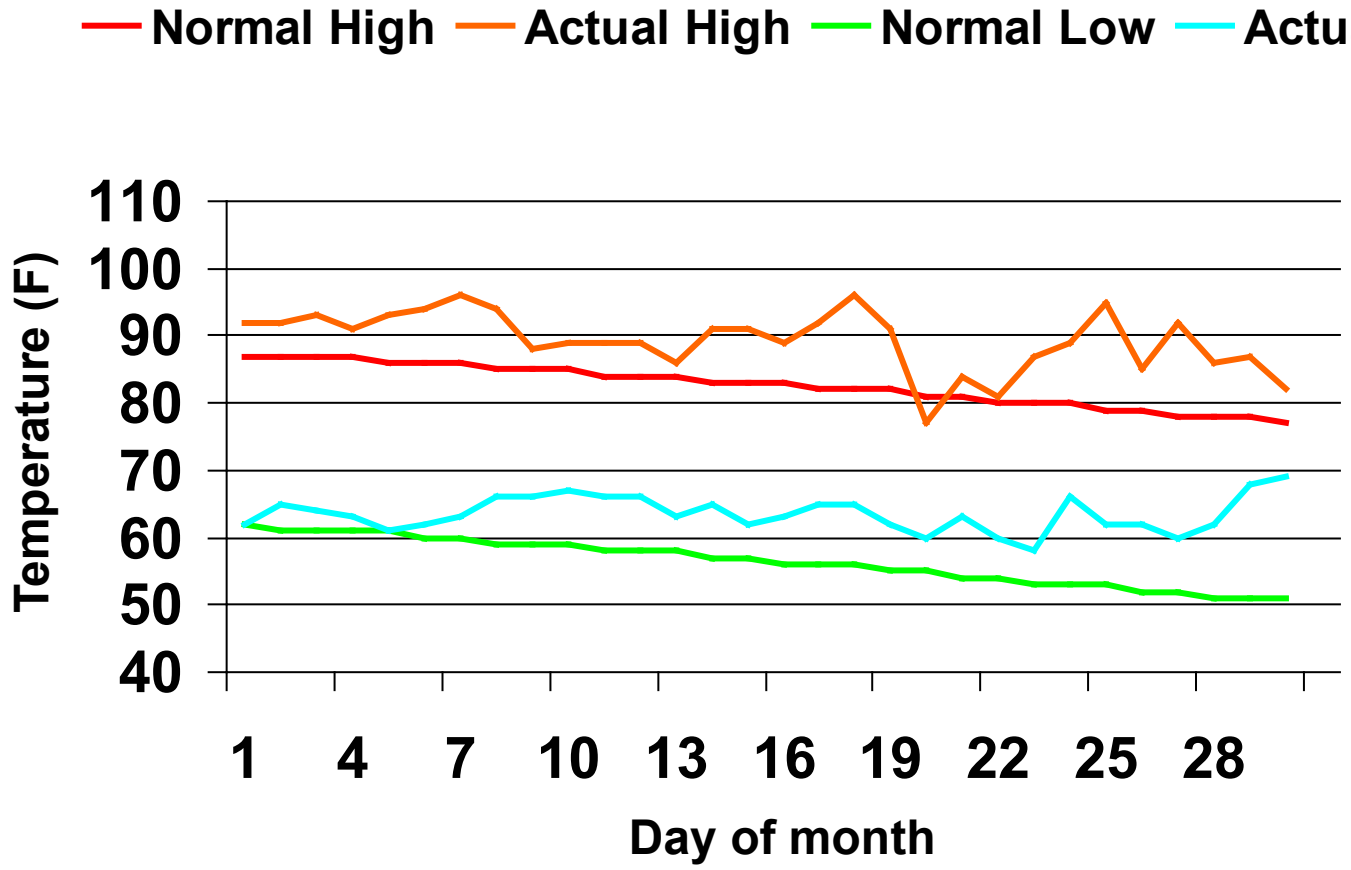
Amarillo
30-Yr Normal (1981-2010) and September 2019 Air Temperatures



Heat Units

Normal for Month: 286

2019: 494
% of normal: +73

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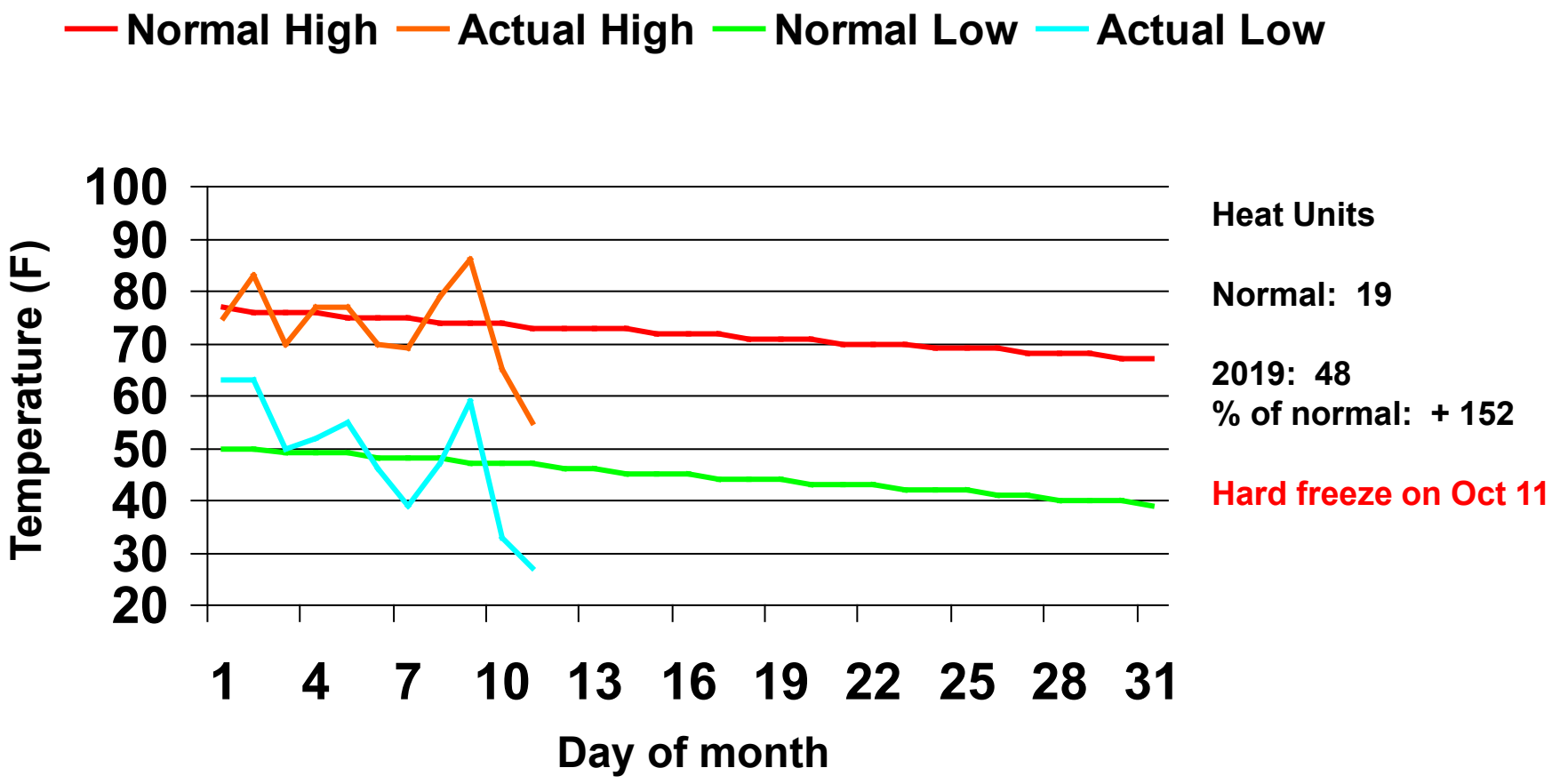
Amarillo
30-Yr Normal (1981-2010) and October 2019 Air Temperatures



Heat Units

Normal: 19

2019: 48
% of normal: + 152

Hard freeze on Oct 11

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