



2022 Enlist Technology Cotton Variety Trial – Lonestar Gin

**Lance Williams Farm
Panhandle, 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 2022, nine PhytoGen entries (including four experimental varieties) with Enlist technology were planted in a center-pivot irrigated field in a scientifically valid trial with three replicates. *This trial experienced minimal adverse weather events. The trial escaped various localized hail events that occurred in the surrounding area, and timely rainfall provided badly needed moisture during July. Additional significant rainfall was obtained in September and October which likely delayed maturity. Overall, the trial was able to stay on track with growth and development and excellent in-season, yield and quality data were obtained. The crop maturity was impacted and entries exhibited low micronaire.*

Harvest results indicated that statistically significant differences were observed. Lint yields ranged from a high of 1775 lb/acre (PX22A214 W3FE) to a low of 1550 lb/acre (PHY 411 W3FE), and averaged 1666 lb/acre (Table 1). Average Loan value for varieties from commercially ginned and classed bales varied from a high of \$0.4763/lb (PHY 210 W3FE) to a low of \$0.4184/lb (PX22A213 W3FE). Overall Loan value for the trial across all entries was \$0.4459/lb. When including lint Loan value on a per acre basis and net gin credit (defined as seed credit minus ginning expense), statistically significant differences in net value were found among varieties for net value/acre. PX22A214 W3FE had the highest net value at \$1164/acre, and PHY 411 W3FE had the lowest at \$988/acre.

Table 2 presents in-season data including stand establishment percentage, vigor, nodes above white flower (NAWF) on two sampling dates, plant height on three sampling dates, nodes above cracked boll (NACB) on October 3rd and a visual estimate of storm resistance at harvest.

Table 3 provides the USDA-AMS classing results from each commercial bale for each variety and the variety averages. Averages indicate that color grades were fair to good and typically ranged from about 21 to 31 across all entries. Leaf grades ranged from about 3.4 to 4.8. Staple ranged from about 37.1 (PHY 411 W3FE) to 39.7 32^{nds} inch (PX22A213 W3FE). Micronaire averages were low for all entries and ranged from about 3.1 (PHY 205 W3FE) to 2.7 (PHY 332 W3FE). A fair amount of bark contamination was noted in commercial bales, and was up to about 50% for some entries. Fiber strength ranged from 29.9 to 33.7 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: 3520 ft

Previous crop: corn harvested in 2021

Tillage system: strip-till

Planted: May 5

Replicates: 3 replicates in a randomized complete block design

Plot width: 8-row plots

Plot length: trial was planted in a circle with ~2,500 ft long rows

Seeding rate: 55,000 seed/acre

Days from planting to first bloom: 72 (July 16)

30-inch rows under center pivot irrigation

Total rainfall March through October: ~13.6 inches

March 1.6, April 0.0, May 1.6, June 3.1, July 4.5, August 0.2, September 1.2,
October 1.4

Total irrigation March through August: ~12 inches

March 2.0, April 0.0, May 1.0, June 1.0, July 4.0, August 4.0

Fertility management:

125 lb N/acre using 82-0-0 in strip till operation on October 9, 2021; 20 gal/acre 10-27-0-4(S) during spring strip till operation

Chemical Applications:

Preplant burndown on March 2 – 4 oz/acre Anthem Flex + 3.25 oz/acre Zaltus

April 5 - 1 qt/acre trifluralin

May 5 – 1 qt/acre diuron

May 10 – 1 qt/acre Enlist One

May 31 - 8 oz/acre clethodim

June 22 – 1 qt/acre Enlist Duo

Plant growth regulators: 8 oz/acre mepiquat chloride on June 28, 6 oz/acre mepiquat chloride on July 19

Insecticides: June 31 (early squaring) – 4 oz/acre acephate

Harvest aid application: 1 qt/acre ethephon + 1.5 pt/acre Folex on October 4, 1 qt/acre paraquat on October 18

Harvesting: November 1 and 2 using a John Deere CS770, with harvested area calculated by the GPS on the stripper monitor. An average of ~2100 ft of plot length was harvested. Round modules were weighed using the CS770 scale, and all round modules were weighed at the Lonestar 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 Lonestar 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.

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Acknowledgements

Lonestar Gin would like to thank Lance Williams with Williams Farms, LLC, for committing equipment, land, and time to conduct and manage the trial. Locke Williams harvested the trial and we are very appreciative of his excellent skills and cooperation. Gratitude is expressed to PhytoGen Cottonseed, Corteva, and Windstar Inc. Detailed ginning was performed by Malcom Jones, Dalton Skinner and the Lonestar ginning crew and a big thank you is extended to this hard-working group.



Table 1. Harvest results for the center pivot irrigated Enlist cotton variety trial, Williams Farm, Panhandle, TX, 2022.

Entry	Lint turnout	Seed turnout	Bur cotton yield	Lint yield	Seed yield	Lint loan value	Lint loan value	Net gin credit	Net value
----- % -----									
PX22A214 W3FE	32.8	46.0	5410	1775	2488	0.4549	807	357	1164 a
PHY 205 W3FE	32.3	44.7	5189	1673	2317	0.4702	787	327	1114 b
PHY 210 W3FE	32.3	45.4	5093	1646	2314	0.4763	784	329	1113 b
PHY 400 W3FE	33.7	44.5	5259	1772	2338	0.4305	763	329	1092 b
PHY 332 W3FE	31.6	45.3	5195	1641	2355	0.4536	745	335	1080 bc
PX22A215 W3FE	31.4	45.3	5407	1696	2447	0.4293	728	348	1076 bc
PX40A383 W3FE	33.1	46.0	4984	1650	2291	0.4271	705	328	1033 cd
PX22A213 W3FE	30.6	46.2	5214	1594	2408	0.4184	667	346	1013 d
PHY 411 W3FE	34.3	44.7	4518	1550	2021	0.4531	702	285	988 d
Test average	32.4	45.3	5141	1666	2331	0.4459	743	332	1075
CV, %	--	--	3.0	3.1	3.0	--	3.1	3.0	3.1
OSL	--	--	0.0001	0.0009	0.0001	--	0.0001	0.0001	0.0002
LSD	--	--	219	73	99	--	33	14	47

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:

\$3.30/cwt commercial ginning cost.

\$430/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 observation results from the center pivot irrigated Enlist cotton variety trial, Williams Farm, Panhandle, TX, 2022.

Entry	Final population	Stand establishment	Vigor	Nodes above white flower		Plant height			Nodes above cracked boll	Storm resistance
				Early bloom	+3 weeks	Early bloom	+3 weeks	+5 weeks		
	plants/acre	%	1-5 visual scale, 5 best	count		inches			count	1-9 visual scale, 9 tight
	15-Jun	15-Jun	15-Jun	26-Jul	17-Aug	26-Jul	17-Aug	3-Oct	3-Oct	2-Nov
PHY 205 W3FE	44,431	80.8	4.0	6.3	4.3	18.4	23.3	24.4	2.9	8.0
PHY 210 W3FE	47,045	85.6	4.2	6.1	3.7	18.5	23.8	25.9	3.1	6.8
PX22A213 W3FE	45,883	83.4	4.2	5.9	3.7	19.3	23.9	25.5	2.7	7.8
PX22A214 W3FE	45,302	82.4	4.3	5.9	3.6	19.1	23.5	24.5	2.8	7.7
PX22A215 W3FE	47,626	86.6	4.0	6.1	3.6	18.9	24.1	25.1	2.8	8.0
PHY 332 W3FE	49,949	90.8	4.0	6.2	4.7	21.7	29.7	31.3	4.0	6.3
PX40A383 W3FE	50,820	92.4	4.2	6.1	4.3	21.1	28.9	29.9	4.1	5.5
PHY 400 W3FE	46,754	85.0	4.0	6.0	3.5	20.0	24.1	25.7	3.5	6.7
PHY 411 W3FE	48,497	88.2	3.7	7.4	5.2	20.9	28.9	33.6	5.3	5.3
Test average	47,367	86.1	4.1	6.2	4.1	19.8	25.6	27.3	3.5	6.9
CV, %	8.4	8.4	4.1	5.4	15.4	5.0	4.7	4.3	12.0	5.3
OSL	0.5850	0.5863	0.0117	0.0020	0.0452	0.0055	0.0001	0.0001	0.0001	0.0001
LSD	NS	NS	0.2	0.5	0.9	1.4	1.7	1.7	0.6	0.52

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 3. Commercial classing data for the center pivot irrigated Enlist cotton variety trial, Williams Farm, Panhandle, TX, 2022.

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
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PHY 205 W3FE

882353	31-1	3	1	4	37	2.8	.	.	34.5	80.4	7.2	6	82.1	116	45.75
882354	31-1	3	1	4	38	3.2	.	.	34.7	79.7	7.7	5	83.1	120	48.85
882355	31-1	3	1	4	38	3.1	11	.	34.8	79.7	7.6	6	82.5	118	45.30
882356	31-1	3	1	4	37	3.0	11	.	33.9	79.5	7.9	6	82.2	116	45.25
882357	31-1	3	1	4	37	3.2	11	.	32.6	78.7	8.2	5	81.6	115	45.10
882358	31-1	3	1	4	38	3.0	11	.	34.4	79.2	7.9	6	82.3	118	45.30
882359	31-1	3	1	5	37	3.2	.	.	32.4	79.1	7.8	7	81.7	117	46.35
882360	31-1	3	1	4	38	3.1	.	.	33.6	78.6	8.0	4	83.8	120	48.85
882361	31-1	3	1	4	37	3.0	.	.	34.6	79.7	7.7	6	81.1	117	48.70
882362	21-1	2	1	2	37	3.1	.	.	31.9	80.8	8.2	2	80.0	117	50.75
Average	--	2.9	1.0	3.9	37.4	3.1	4/10 bales	level 1 bark	33.7	79.5	7.8	5.3	82.0	117.4	47.02

PHY 210 W3FE

882363	21-1	2	1	3	39	2.8	.	.	33.2	81.7	7.6	4	82.2	122	47.50
882364	31-1	3	1	4	39	2.9	.	.	31.8	80.0	7.8	4	80.9	121	45.65
882365	31-1	3	1	4	38	2.9	.	.	29.5	80.1	7.8	6	80.6	119	45.40
882366	21-2	2	1	4	39	2.9	.	.	33.8	80.5	7.8	5	81.3	121	46.20
882367	31-1	3	1	4	38	2.9	11	.	32.4	79.8	7.9	6	82.1	120	42.20
882368	31-1	3	1	4	39	3.2	.	.	34.4	80.2	7.8	5	81.9	123	48.75
882369	31-1	3	1	4	39	3.0	.	.	31.6	80.0	7.8	4	80.4	123	48.65
882370	21-2	2	1	3	38	3.3	.	.	31.5	80.7	7.7	3	82.4	120	52.15
882371	21-2	2	1	3	40	3.3	.	.	32.9	80.7	7.7	4	83.5	124	52.20
Average	--	2.6	1.0	3.7	38.8	3.0	1/9 bales	level 1 bark	32.3	80.4	7.8	4.6	81.7	121.4	47.63

PX22A213 W3FE

882372	31-1	3	1	5	40	2.8	11	.	31.6	80.8	7.4	8	79.7	124	39.35
882373	31-1	3	1	4	39	2.8	.	.	33.7	79.0	7.5	6	81.2	122	45.75
882374	31-2	3	1	6	40	2.8	11	.	31.1	79.0	7.3	10	81.6	125	36.85
882375	31-1	3	1	5	40	2.7	11	.	34.7	79.2	7.6	9	80.8	125	39.95
882376	31-1	3	1	5	39	2.8	11	.	31.4	79.7	7.2	8	81.7	123	39.85
882377	31-1	3	1	5	40	2.8	.	.	32.4	79.7	7.4	7	81.0	125	43.35
882378	31-1	3	1	5	40	2.8	.	.	33.7	79.6	7.2	7	81.9	124	43.45
882379	31-1	3	1	4	40	2.7	11	.	32.8	79.8	7.2	5	82.1	124	42.20
882380	31-1	3	1	4	39	2.8	.	.	34.0	80.0	7.1	6	83.4	123	45.85
Average	--	3.0	1.0	4.8	39.7	2.8	5/9 bales	level 1 bark	32.8	79.6	7.3	7.3	81.5	123.9	41.84



Table 3 (continued). Commercial classing data for the center pivot irrigated Enlist cotton variety trial, Williams Farm, Panhandle, TX, 2022.

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
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PX22A214 W3FE

882381	21-2	2	1	2	38	2.6	.	.	32.0	81.7	7.4	3	80.2	120	43.20
882382	21-2	2	1	3	38	2.8	.	.	33.1	81.6	7.5	4	82.4	120	47.50
882383	21-2	2	1	4	39	2.7	.	.	35.3	80.9	7.6	4	82.3	121	46.25
882384	31-1	3	1	3	38	2.9	.	.	32.1	81.0	7.4	3	79.2	120	46.50
882385	21-2	2	1	4	38	3.0	.	.	32.4	80.5	7.6	4	80.3	120	49.10
882386	31-1	3	1	4	39	2.8	.	.	32.5	80.6	7.4	6	83.4	122	45.75
882387	31-1	3	1	4	39	2.9	.	.	34.0	79.7	7.5	7	80.8	121	45.75
882388	31-1	3	1	5	39	2.7	.	.	32.1	79.9	7.5	8	81.1	121	43.35
882389	31-1	3	1	4	39	2.8	11	.	31.4	79.6	7.5	5	81.1	122	42.15
882390	31-1	3	1	4	39	3.0	11	.	34.0	80.3	7.6	6	82.5	123	45.30
Average	--	2.6	1.0	3.7	38.6	2.8	2/10 bales	level 1 bark	32.9	80.6	7.5	5.0	81.3	121.0	45.49

PX22A215 W3FE

882391	31-1	3	1	3	39	2.8	.	.	32.9	81.3	7.5	4	82.2	121	47.05
882392	21-2	2	1	4	41	2.8	11	.	32.9	80.5	7.6	5	81.2	127	42.60
882393	31-1	3	1	4	39	2.7	11	.	32.4	80.2	7.6	4	81.3	121	42.15
882394	31-1	3	1	4	39	2.9	.	.	33.5	80.5	7.5	6	81.1	122	45.75
882395	31-1	3	1	4	39	3.0	11	.	33.7	80.1	7.5	6	80.1	121	45.25
882396	31-1	3	1	5	39	2.9	.	.	32.7	80.0	7.5	6	81.5	121	43.35
882397	31-1	3	1	5	39	2.9	11	.	31.1	79.7	7.5	7	80.1	123	39.85
882398	31-1	3	1	6	40	2.9	.	.	34.2	79.1	7.6	9	82.2	124	40.50
882399	31-2	3	1	5	39	2.7	11	.	32.9	78.8	7.4	7	82.0	123	39.90
Average	--	2.9	1.0	4.4	39.3	2.8	5/9 bales	level 1 bark	32.9	80.0	7.5	6.0	81.3	122.6	42.93

PHY 332 W3FE

882400	21-1	2	1	3	38	2.7	.	.	29.1	80.9	8.6	4	79.0	120	46.60
882401	21-1	2	1	3	39	2.6	.	.	31.9	78.7	9.2	3	80.3	121	42.70
882402	21-1	2	1	3	39	2.8	.	.	28.6	79.8	8.9	4	79.0	123	46.55
882403	21-1	2	1	4	38	2.7	.	.	29.4	79.0	9.2	5	78.1	120	45.25
882404	21-1	2	1	3	39	2.7	.	.	28.9	78.9	9.2	2	80.9	122	47.05
882405	21-1	2	1	3	39	2.7	.	.	31.3	79.3	8.9	5	79.3	123	46.85
882406	21-1	2	1	4	39	2.8	.	.	28.7	79.1	9.2	4	80.5	122	45.80
882407	21-2	2	1	4	39	2.9	11	.	30.3	78.4	9.1	6	78.5	121	41.85
882408	21-1	2	1	4	39	2.7	.	.	31.3	78.5	9.0	5	79.9	123	45.60
Average	--	2.0	1.0	3.4	38.8	2.7	1/9 bales	level 1 bark	29.9	79.2	9.0	4.2	79.5	121.7	45.36



Table 3 (continued). Commercial classing data for the center pivot irrigated Enlist cotton variety trial, Williams Farm, Panhandle, TX, 2022.

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
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PX40A383 W3FE

882409	21-2	2	1	4	38	2.8	.	.	28.5	79.6	8.3	6	77.7	119	44.90
882410	31-1	3	1	5	40	2.6	.	.	30.7	78.3	8.4	8	80.8	125	38.55
882411	21-2	2	1	5	41	2.7	11	.	33.3	78.5	8.6	8	81.0	127	40.60
882412	21-2	2	1	5	39	2.6	.	.	30.6	78.6	8.6	6	79.8	121	38.70
882413	31-1	3	1	4	38	3.2	.	.	32.6	78.1	8.6	5	81.7	118	48.65
882414	31-1	3	1	4	39	2.8	11	.	31.2	78.6	8.4	6	79.4	122	41.65
882415	31-1	3	1	5	39	2.8	.	.	30.1	78.8	8.4	8	80.3	122	43.20
882416	31-1	3	1	4	39	2.8	.	.	30.1	78.8	8.4	6	78.4	121	44.90
882417	21-2	2	1	5	39	2.7	.	.	29.7	78.7	8.7	8	79.0	122	43.25
Average	--	2.6	1.0	4.6	39.1	2.8	2/9 bales	level 1 bark	30.8	78.7	8.5	6.8	79.8	121.9	42.71

PHY 400 W3FE

882418	21-1	2	1	3	40	2.5	.	.	32.9	81.7	7.6	4	81.1	124	42.70
882419	31-1	3	1	5	39	2.9	.	.	32.3	78.9	8.0	8	81.1	122	43.35
882420	31-1	3	1	5	39	2.8	.	.	32.7	79.4	7.9	7	80.5	121	43.35
882421	31-1	3	1	5	38	2.8	11	.	32.9	79.4	8.2	7	79.6	119	39.35
882422	31-1	3	1	4	38	2.7	11	.	30.5	79.0	8.3	6	80.6	119	42.00
882423	31-1	3	1	4	39	2.7	11	.	31.3	79.1	8.4	6	79.7	122	41.65
882424	31-1	3	1	4	39	2.8	11	.	31.7	79.2	8.2	7	79.2	122	41.65
882425	21-2	2	1	3	38	2.8	.	.	31.2	79.8	8.3	4	79.4	120	46.85
882426	21-2	2	1	5	38	2.8	.	.	32.2	79.6	8.2	8	79.9	118	43.50
882427	21-1	2	1	4	38	2.8	.	.	32.3	80.7	8.2	6	80.0	119	46.10
Average	--	2.6	1.0	4.2	38.6	2.8	4/10 bales	level 1 bark	32.0	79.7	8.1	6.3	80.1	120.6	43.05

PHY 411 W3FE

882428	21-1	2	1	4	38	2.5	.	.	30.8	80.8	8.3	5	80.4	118	41.30
882429	21-1	2	1	4	37	2.8	.	.	31.6	80.4	8.5	5	80.2	115	46.10
882430	21-1	2	1	4	37	2.9	.	.	31.3	80.5	8.5	6	81.3	117	46.10
882431	21-1	2	1	4	37	3.1	.	.	28.9	80.6	8.7	5	81.1	117	48.80
882432	11-2	1	1	4	37	2.8	.	.	29.8	80.7	8.9	5	80.5	117	45.85
882433	21-1	2	1	4	37	2.9	.	.	31.4	80.7	8.7	6	82.0	117	46.15
882434	21-1	2	1	4	38	3.0	.	.	32.0	80.9	8.5	5	80.7	120	49.10
882435	21-1	2	1	4	37	2.7	11	.	28.6	81.2	8.5	5	80.8	115	42.30
882436	21-1	2	1	4	36	3.1	11	.	29.6	80.6	8.4	6	80.1	113	45.00
882437	21-1	2	1	4	37	2.8	11	.	29.3	80.6	8.6	6	81.2	115	42.35
Average	--	1.9	1.0	4.0	37.1	2.9	3/10 bales	level 1 bark	30.3	80.7	8.6	5.4	80.8	116.4	45.31



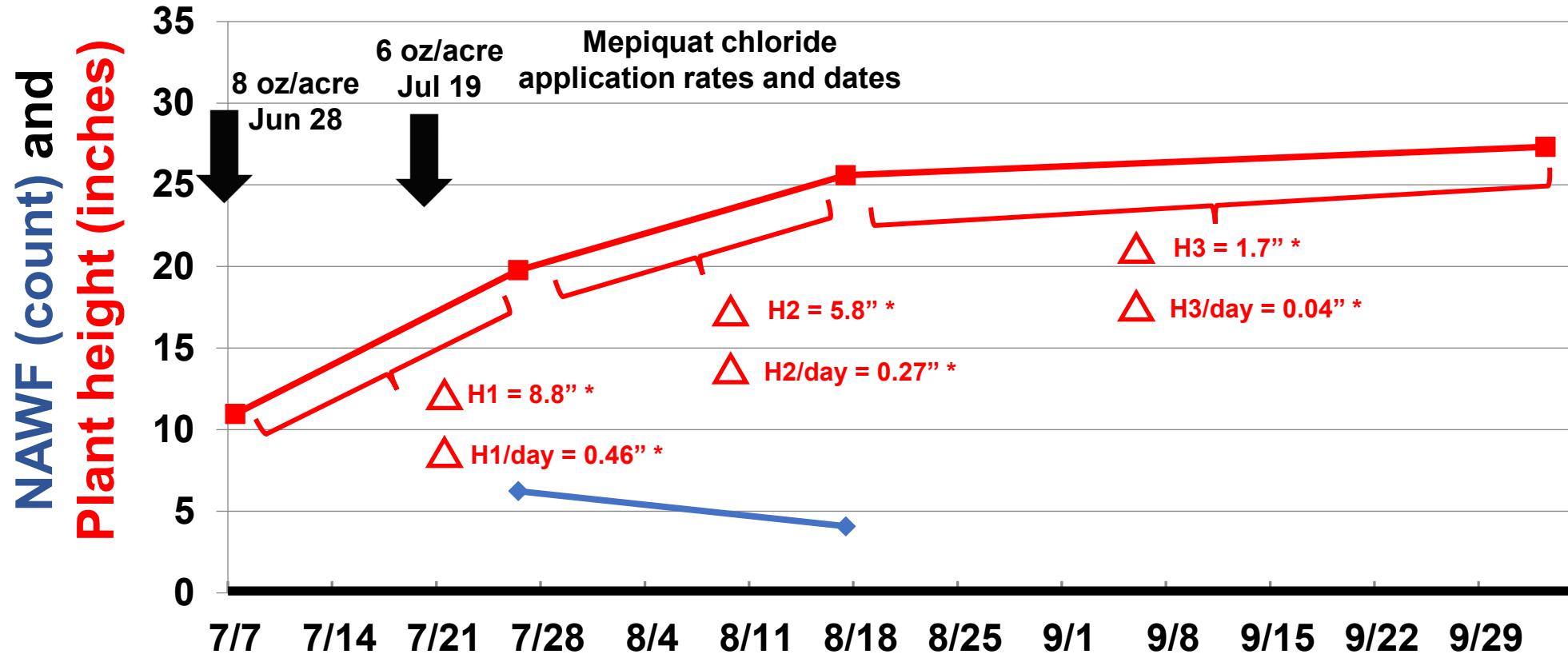
Appendix

Williams 2022 PhytoGen Enlist Variety Trial – Plant height and NAWF graphs, Amarillo 2022 cotton heat units and weather data.





Williams PhytoGen Variety Trial (Across All Entries) Panhandle – 2022

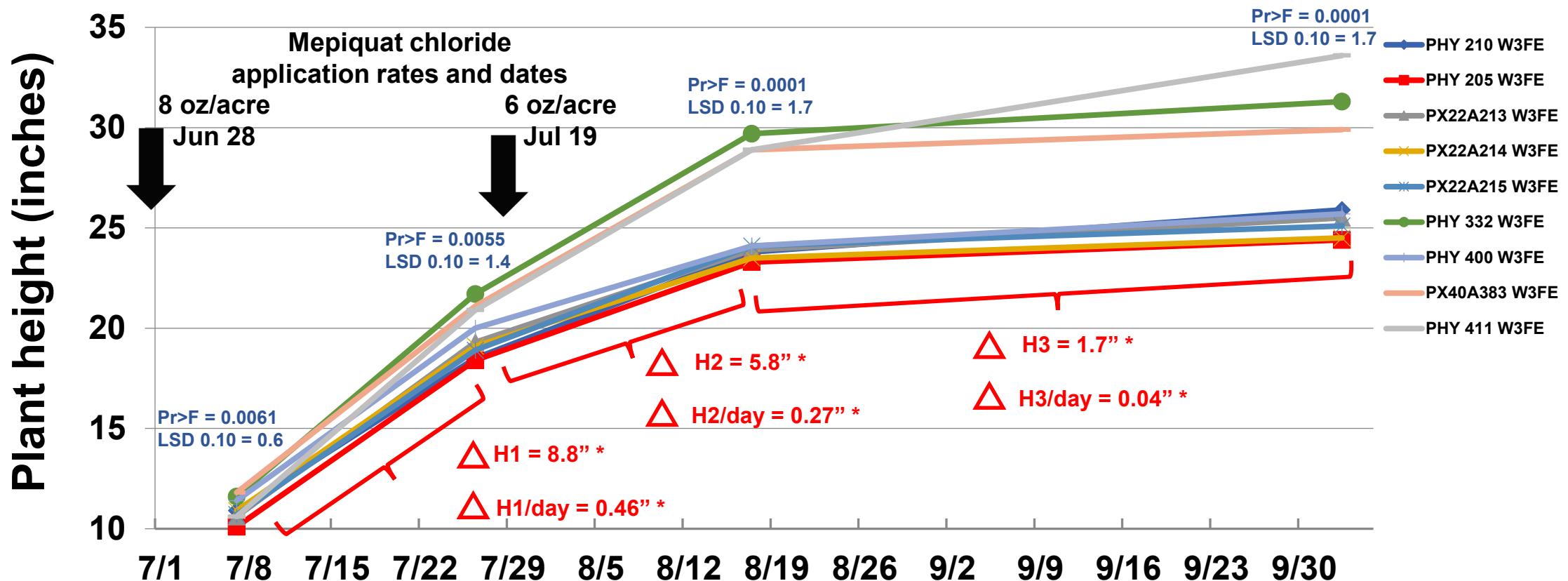


Rainfall (inches): Mar 1.6, Apr 0.0, May 1.6, Jun 3.1, Jul 4.5, Aug 0.2, Sep 1.2, Oct 1.4 = 13.6
Irrigation (inches): Mar 2.0, Apr 0.0, May 1.0, Jun 1.0, Jul 4.0, Aug 4.0, Sep 0.0 = 12.0

Planted: May 5
Seeding rate: 55K
Days to bloom: 72
First bloom date: Jul 16



Williams PhytoGen Variety Trial Panhandle – 2022



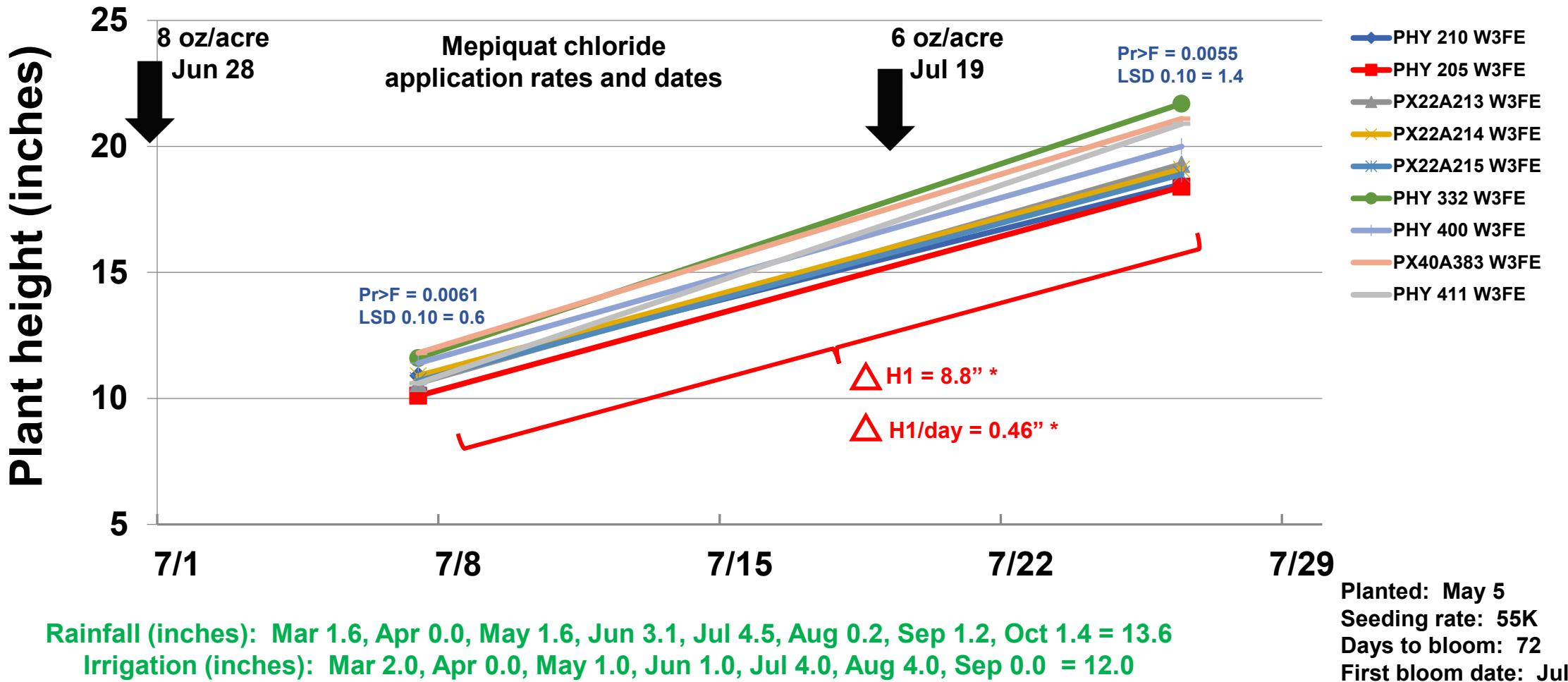
Rainfall (inches): Mar 1.6, Apr 0.0, May 1.6, Jun 3.1, Jul 4.5, Aug 0.2, Sep 1.2, Oct 1.4 = 13.6

Irrigation (inches): Mar 2.0, Apr 0.0, May 1.0, Jun 1.0, Jul 4.0, Aug 4.0, Sep 0.0 = 12.0



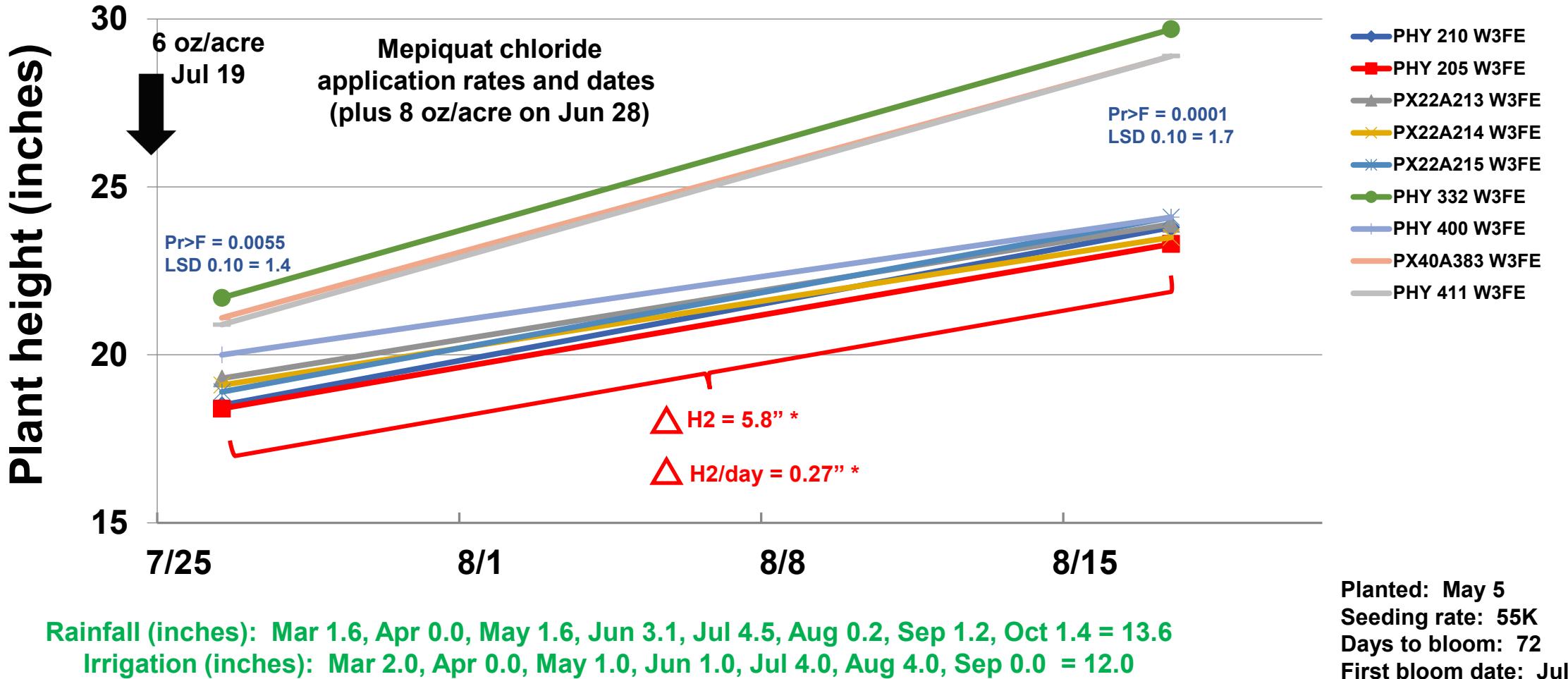
Williams PhytoGen Variety Trial

Panhandle – 2022



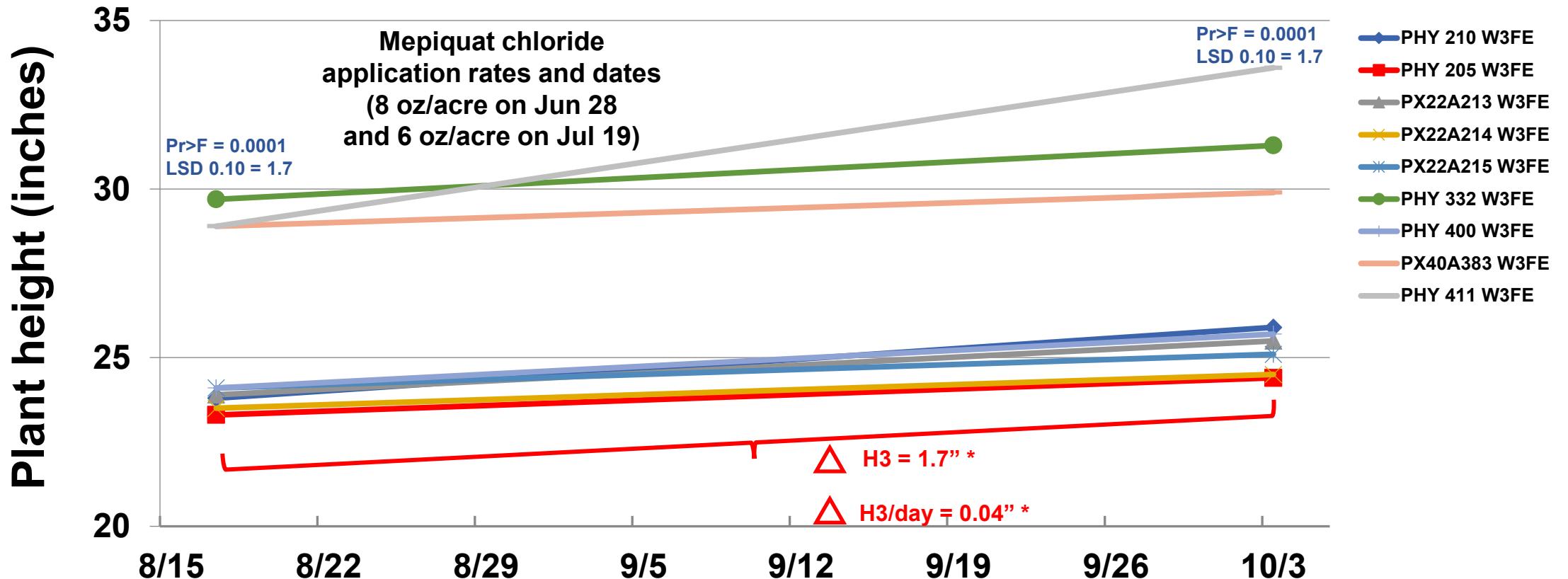


Williams PhytoGen Variety Trial Panhandle – 2022





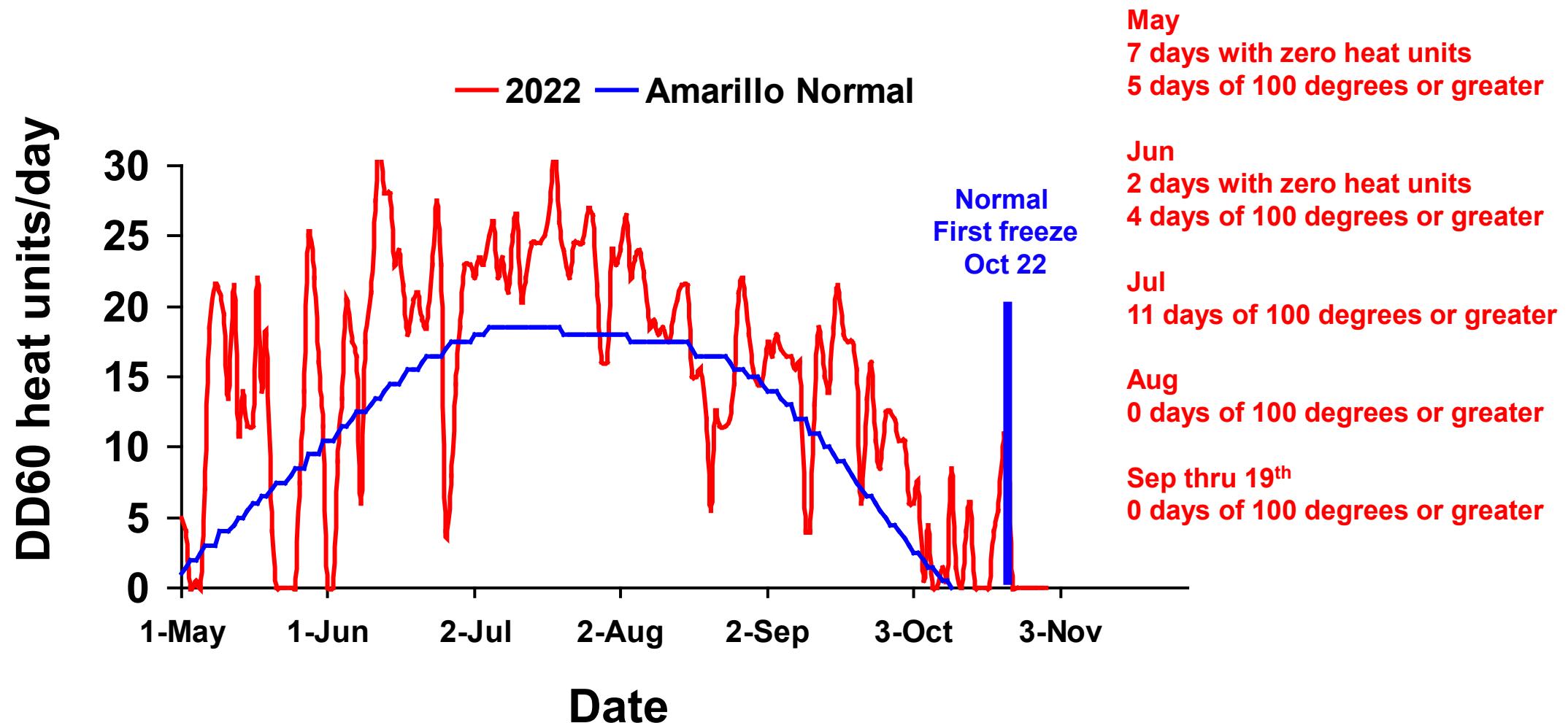
Williams PhytoGen Variety Trial Panhandle – 2022



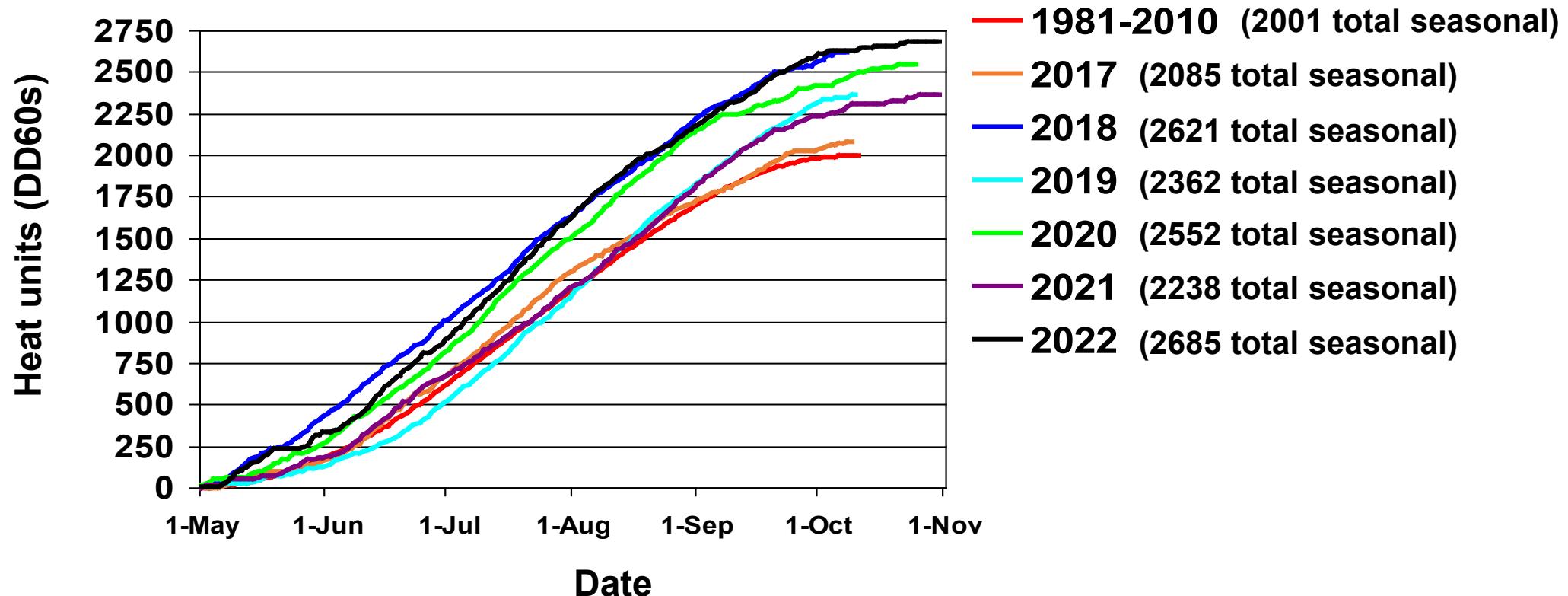
△ H₃ = 1.7" *
△ H_{3/day} = 0.04" *

Amarillo

30-Year Normal (1981-2010) and 2022 Daily Heat Units

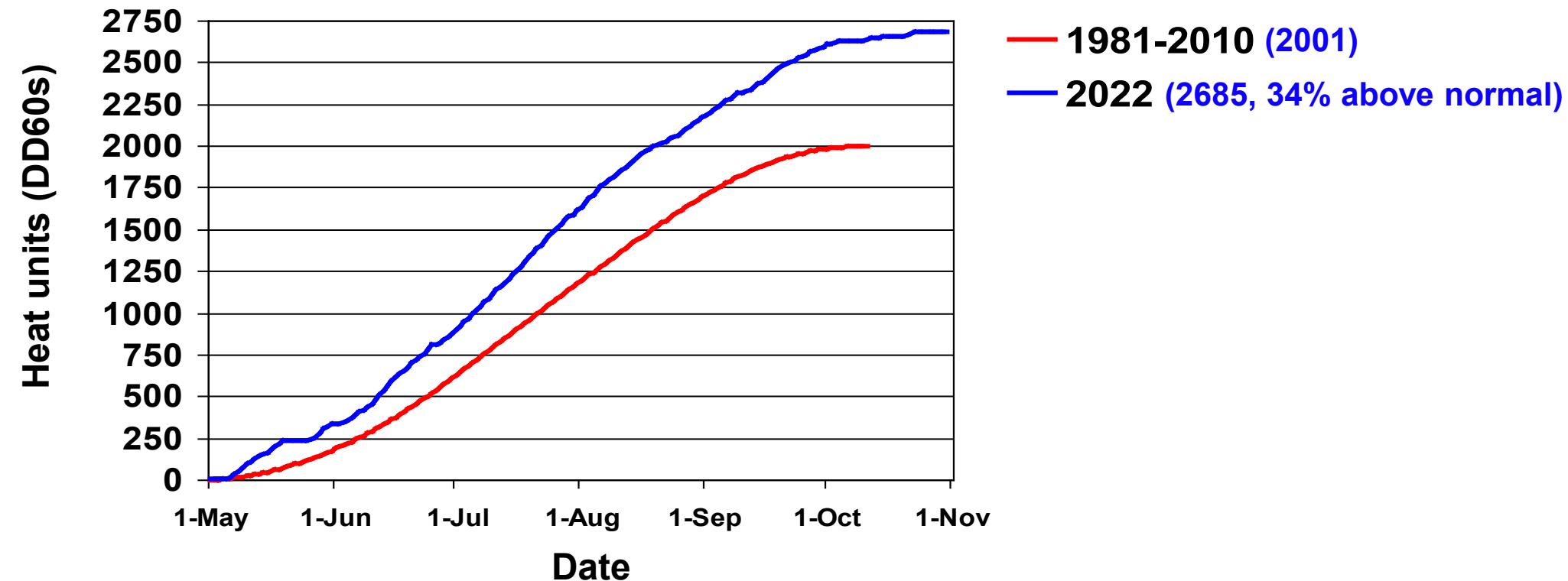


**Amarillo 30-Yr Normal (1981-2010)
vs. 2017, 2018, 2019, 2020, 2021, and 2022
Cotton Heat Unit Accumulation
From May 1 Through First Hard Freeze**



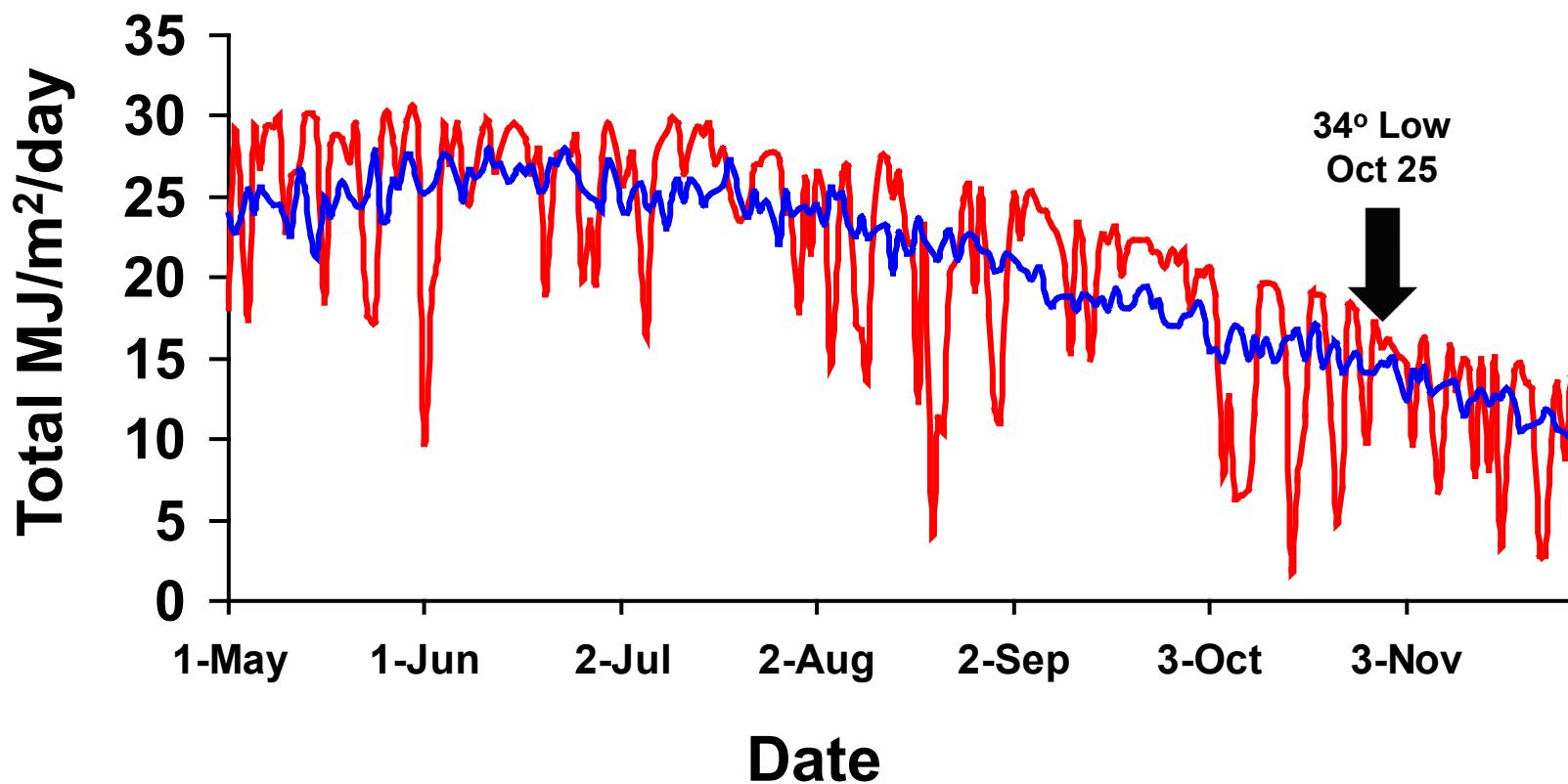
Amarillo 30-Yr Normal (1981-2010) vs. 2022 Cotton Heat Unit Accumulation From May 1

% normal Sep 1-30	HU from May 1 thru Sep 30	% LTA from May 1 thru Sep 30	HU from May 15 thru Sep 30	% LTA from May 15 thru Sep 30	HU from May 20 thru Sep 30	% LTA from May 20 thru Sep 30
plus 49	2599	plus 31	2442	plus 26	2365	plus 24



Muleshoe 18-Year Mean (2004-2021) and 2022 Daily Total Solar Radiation (MJ/meter²)

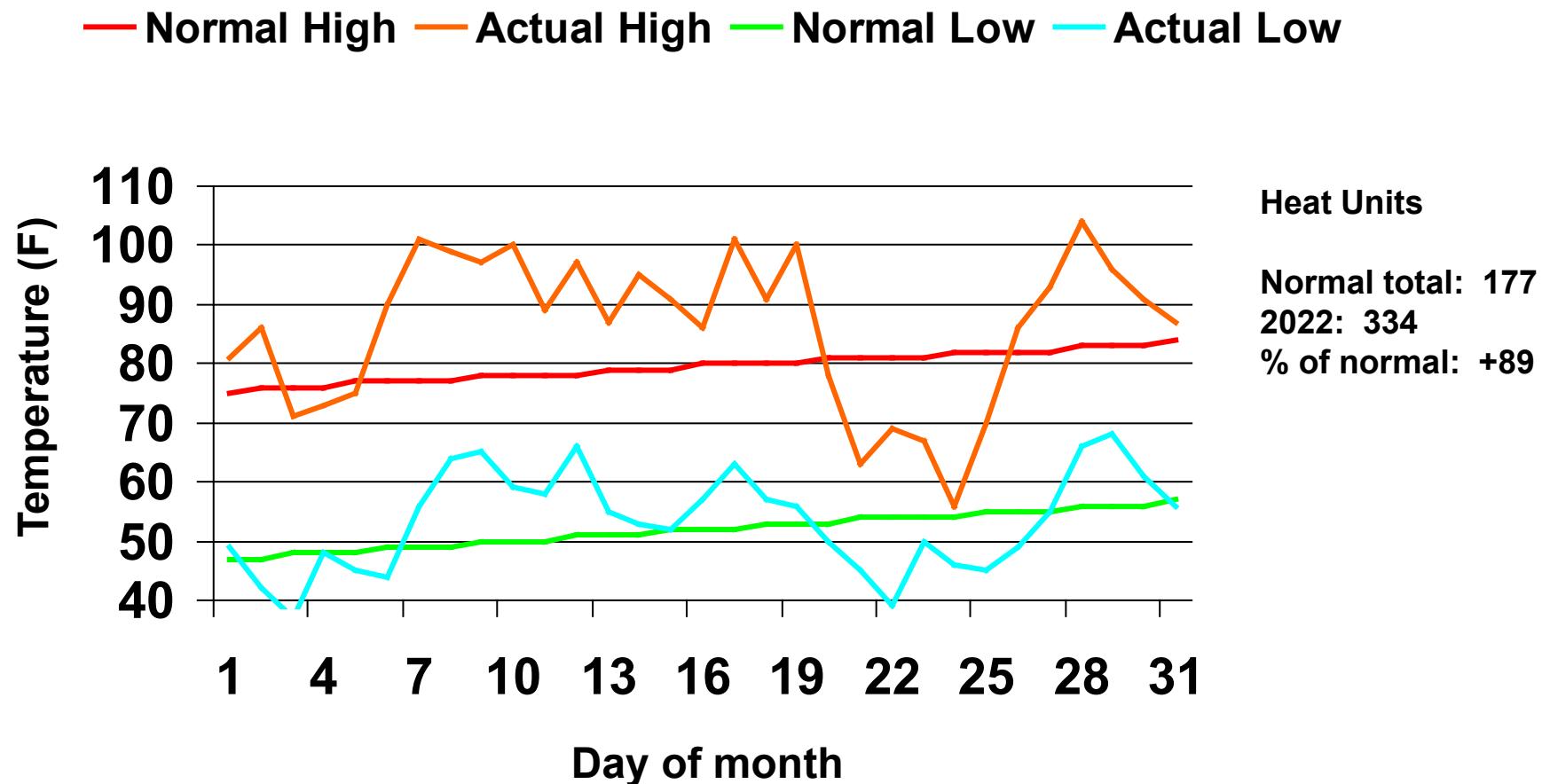
— 2022 — Muleshoe 18-Yr Mean



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

Amarillo

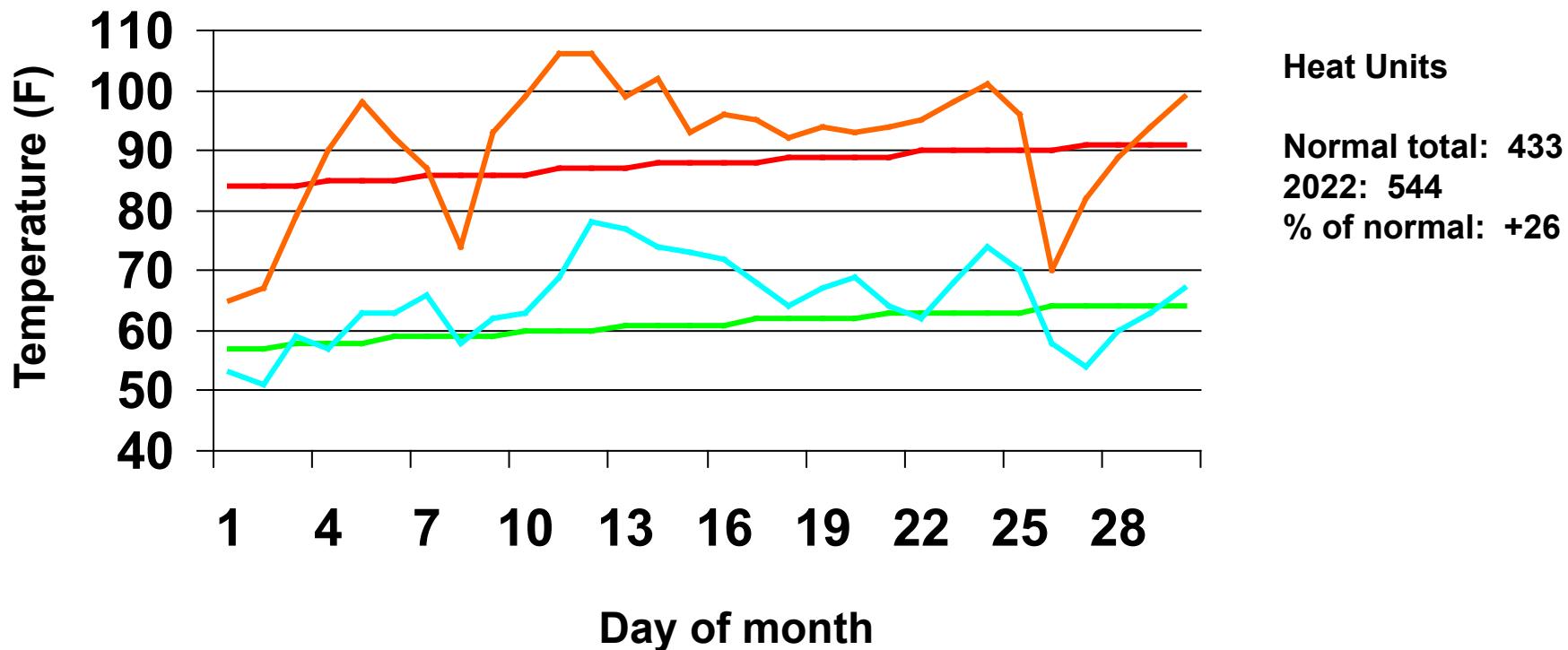
30-Yr Normal (1981-2010) and May 2022 Air Temperatures



Amarillo

30-Yr Normal (1981-2010) and June 2022 Air Temperatures

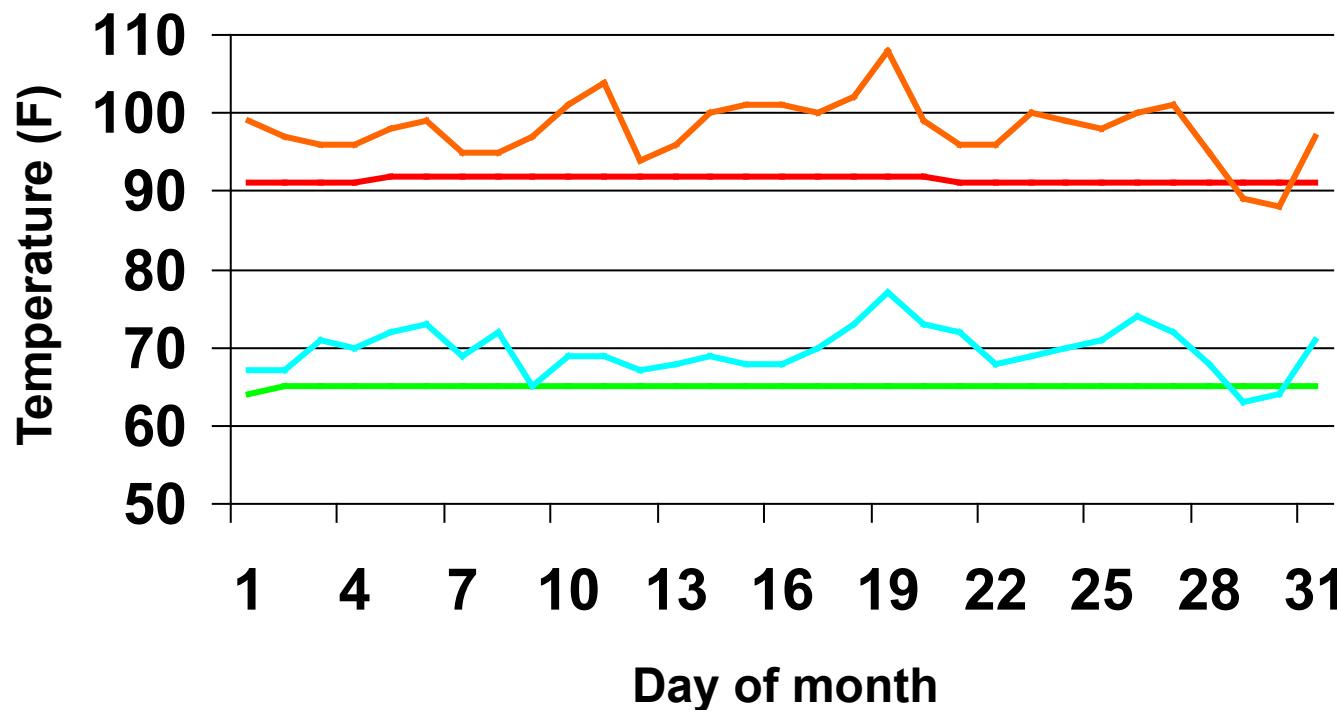
— Normal High — Actual High — Normal Low — Actual Low



Amarillo

30-Yr Normal (1981-2010) and July 2022 Air Temperatures

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

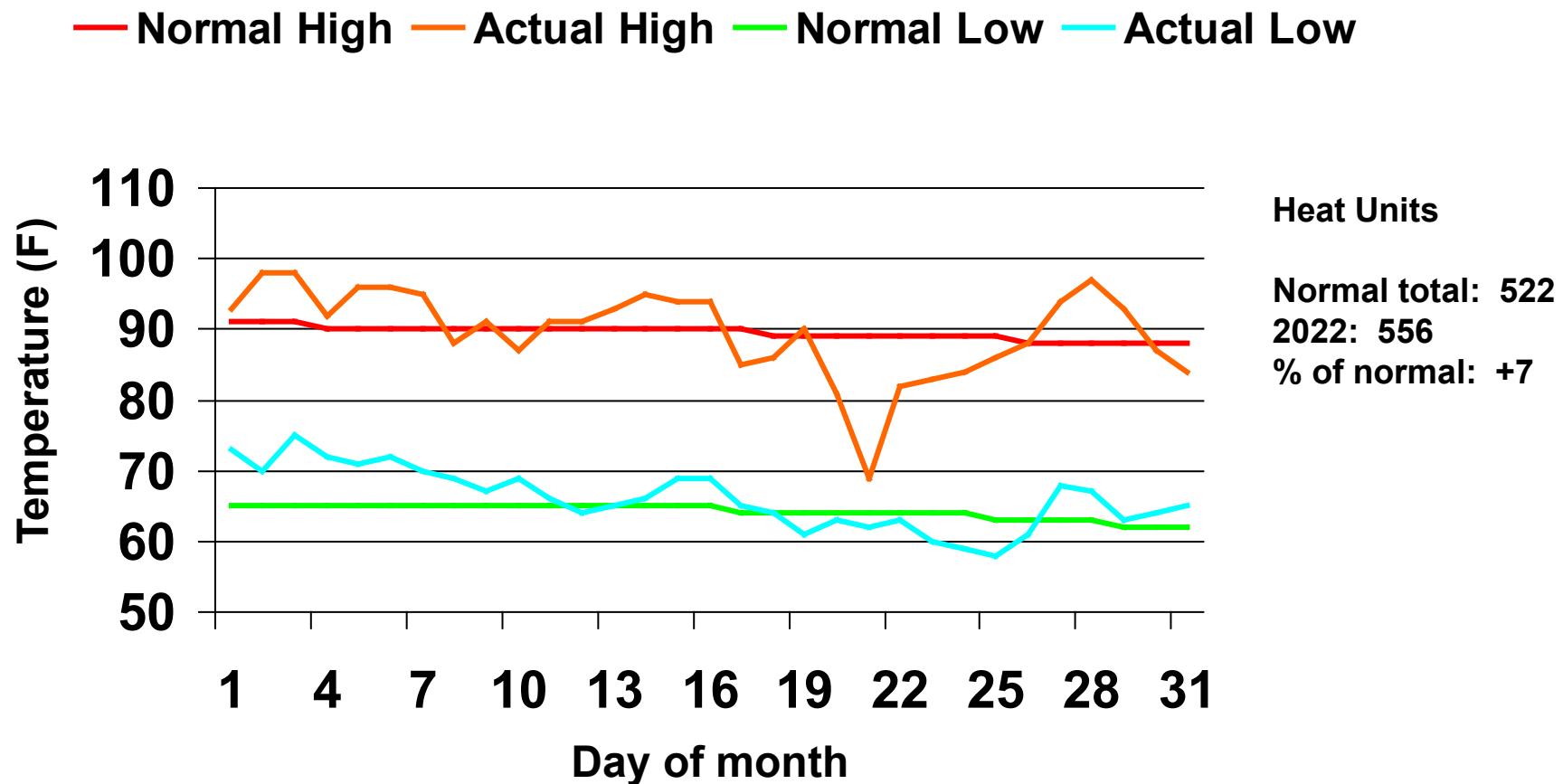


Heat Units

Normal total: 566
2022: 738
% of normal: +31

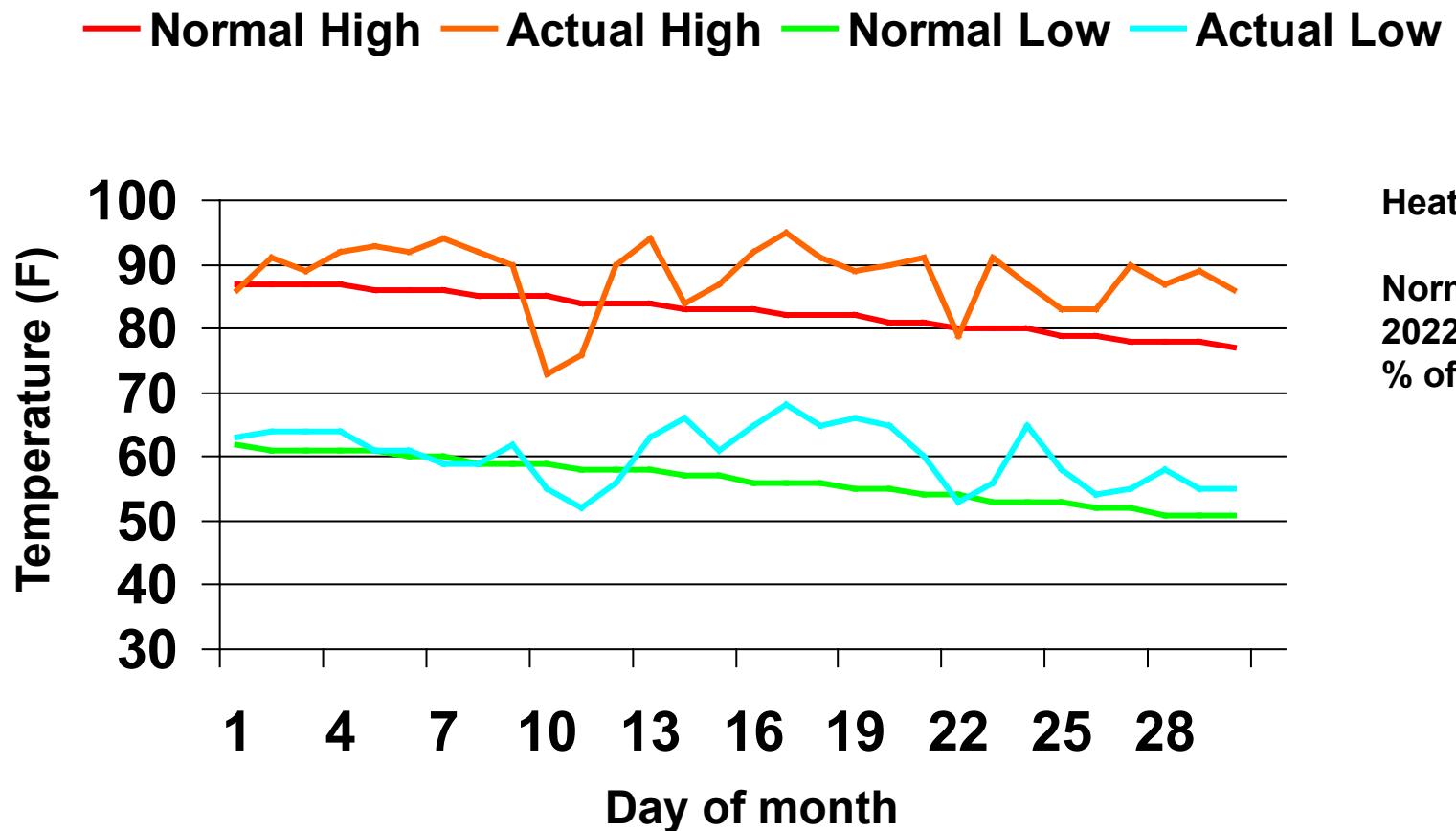
Amarillo

30-Yr Normal (1981-2010) and August 2022 Air Temperatures



Amarillo

30-Yr Normal (1981-2010) and September 2022 Air Temperatures



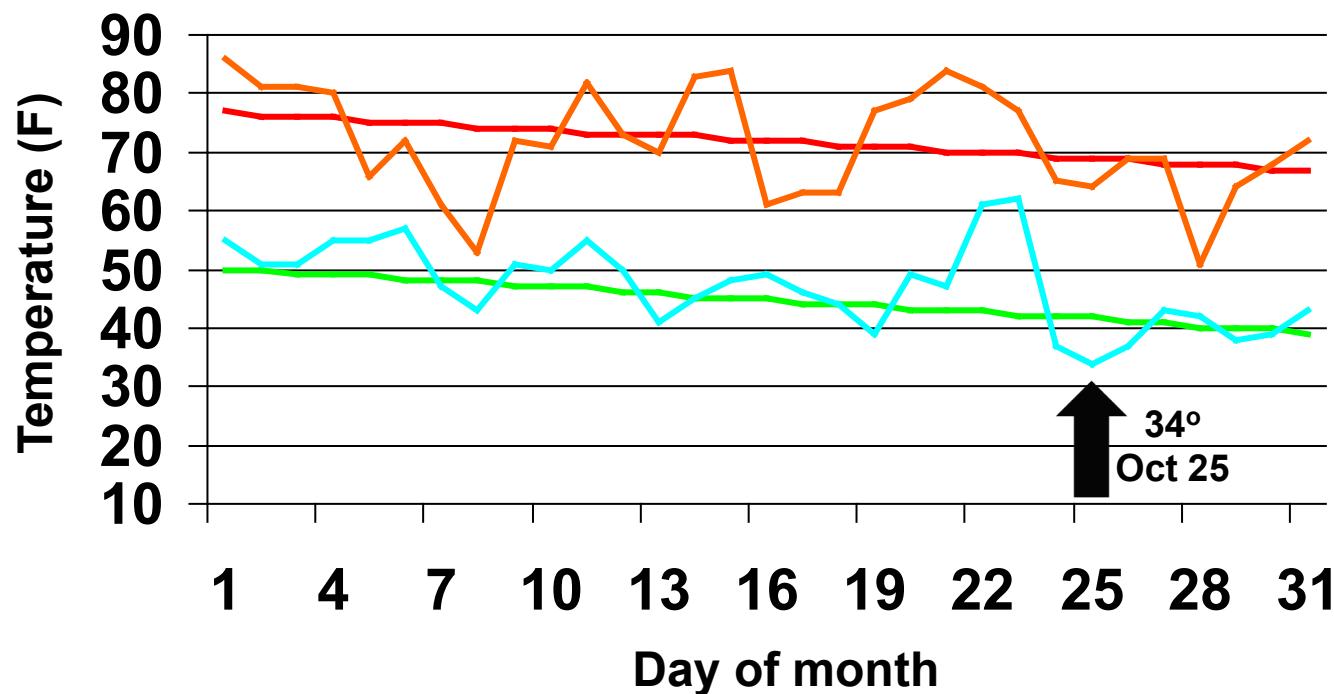
Heat Units

Normal total: 286
2022: 427
% of normal: +49

Amarillo

30-Yr Normal (1981-2010) and October 2022 Air Temperatures

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



Heat Units

Normal total: 19

2022: 87

% of normal: +358

First freeze on Nov 4 (29 degrees)
Hard freeze on Nov 11 (22 degrees)