Cotton Flowering Profile and Compensation after Cotton Fleahopper and Lygus Simulated Fruit Loss

Megha N. Parajulee, Ken E. Legé, Surendra Gautam, and Raju Sapkota

Texas A&M AgriLife Research and Extension Center, Lubbock, TX

Southwest Cotton Physiology Conference, 10-12 March 2025, Lubbock, Texas

Texas A&M AgriLife Research

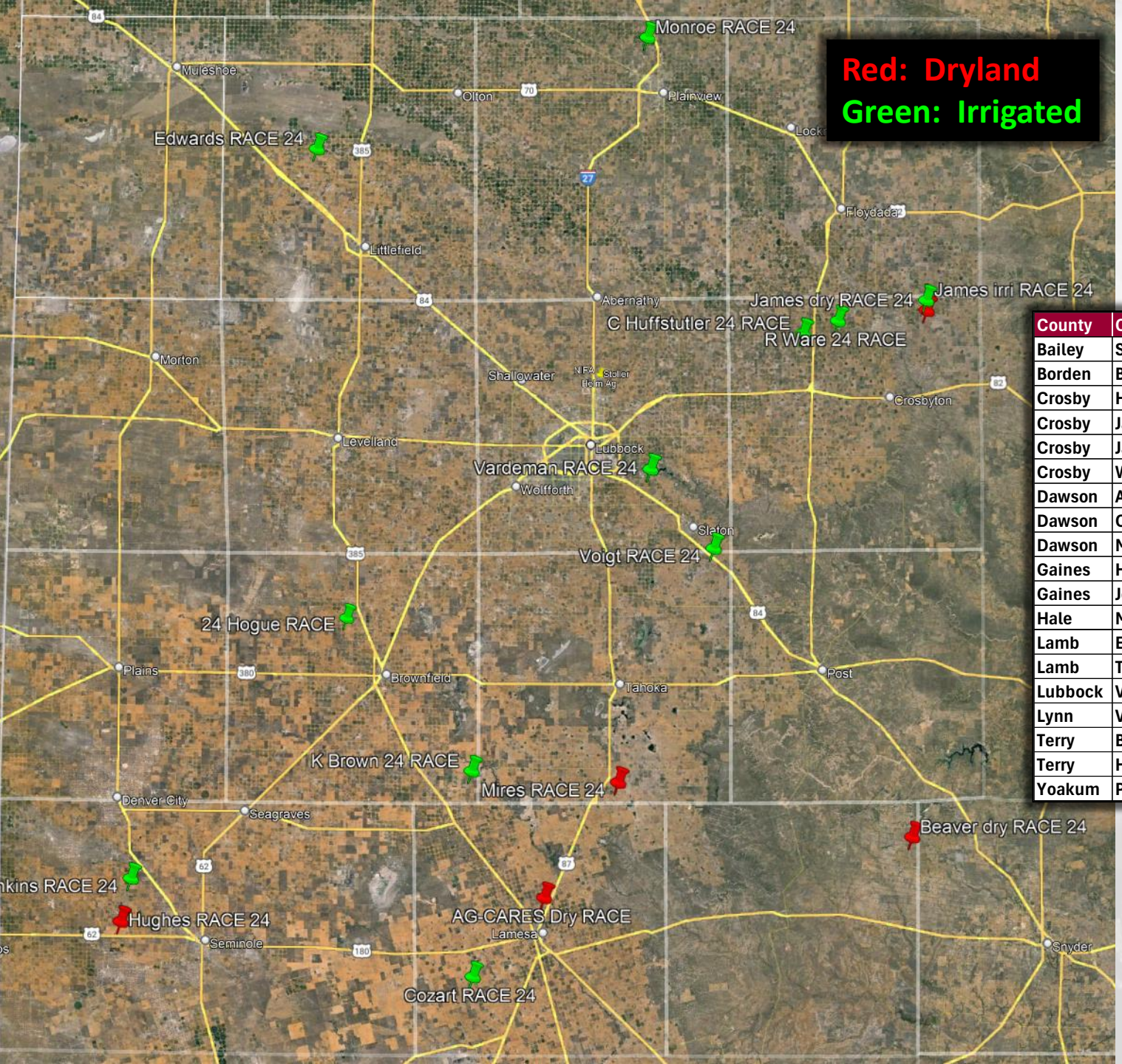
Plains Cotton Growers — Plains Cotton Improvement Program

Texas A&M AgriLife Extension — R.A.C.E. Replicated Agronomic Cotton Evaluation

Cotton Incorporated

2024 Southern High Plains RACE Variety Locations

Ken E. Legé

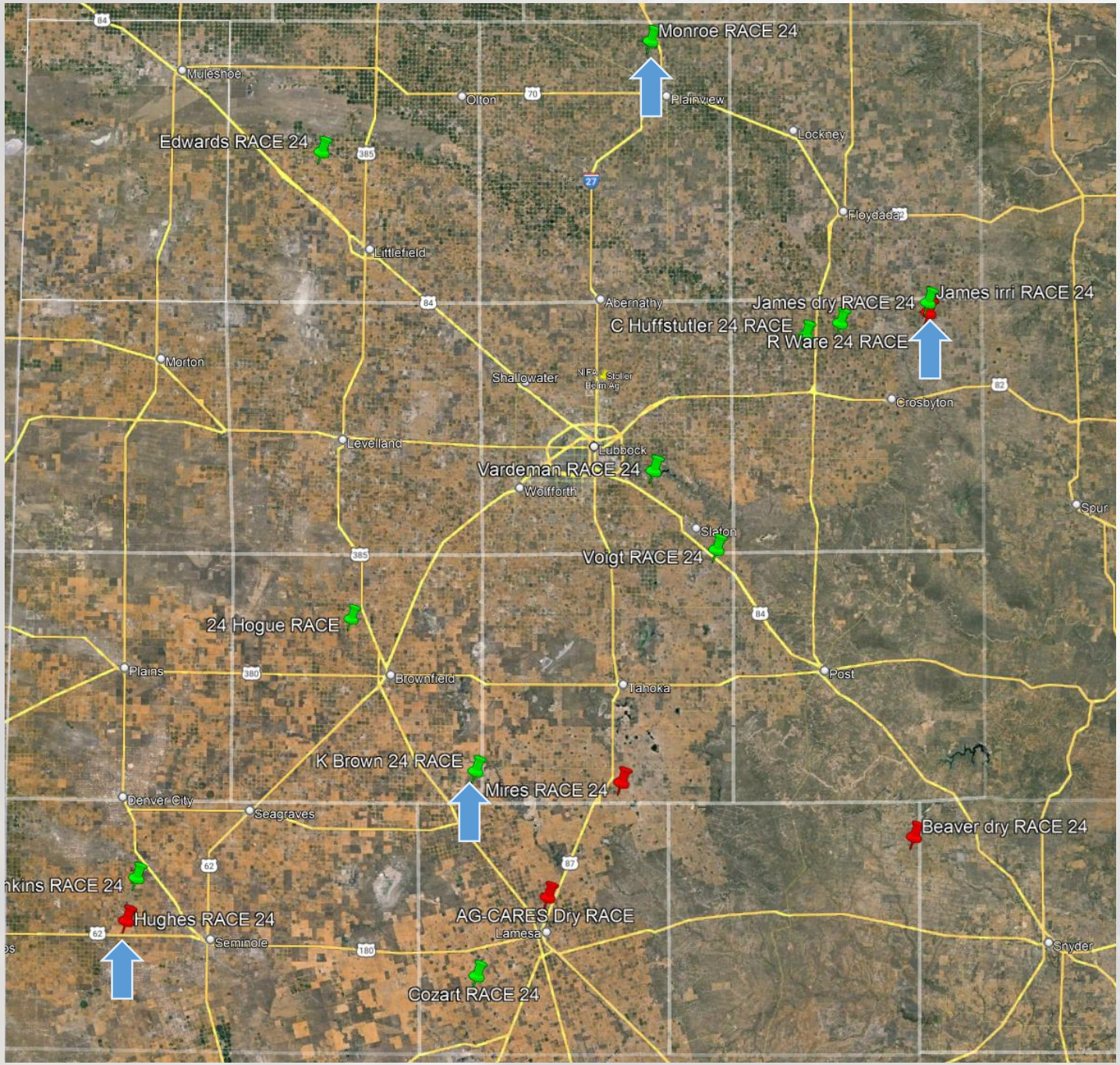


County	Cooperator	Tech	Irri?	# Varieties	Planted?	Harvested?	Comments
Bailey	Saylor	XF	N	5	N	N	Prevented planting due to heavy rain
Borden	Beaver	XF	N	5	Y	N	Abandoned in Sept due to drought
Crosby	Huffstutler	XF	Y	9	Y	Y*	
Crosby	James	XF	N	5	Y	Y	
Crosby	James	Mixed	Y	6	Y	Y	
Crosby	Ware	Mixed	Y	8	Y	Y*	
Dawson	AG-CARES	Mixed	N	8	Y	N	Abandoned in Sept due to drought
Dawson	Cozart	XF	Y	9	Y	Y*	
Dawson	Mires	XF	N	5	Y	Y	
Gaines	Hughes	Enlist	N	6	Y	Y*	
Gaines	Jenkins	Enlist	Y	6	Y	Y	
Hale	Monroe	XF	Y	8	Y	Y	
Lamb	Edwards	XF	Y	10	Y	Y	
Lamb	Tiller	XF	N	5	Y	N	Lost early due to heavy rain
Lubbock	Vardeman	Mixed	Y	8	Y	Y	
Lynn	Voigt	Mixed	Y	4	Y	Y	
Terry	Brown	XF	Y	7	Y	Y	
Terry	Hogue	Mixed	Y	6	Y	Y	
Yoakum	Patton	Conv	Y	3	Y	N	Lost early due to heavy rain

Texas A&M AgriLife Extension

R.A.C.E. Replicated Agronomic Cotton Evaluation

Active sites, as of 7/12/24



Hale Co.

DP2335B3XF
FM765AX
FM823AXTP

Drip 3.2 gpma — 1400 lb/A

Crosby Co.

DP2335B3XF
FM765AX
FM868AXTP
PHY332W3FE

Drip 3.7 gpma — 1100 lb/A

Terry Co.

DP2335B3XF
FM765AX
FM823AXTP

Pivot 4.2 gpma — 650 lb/A

Gaines Co.

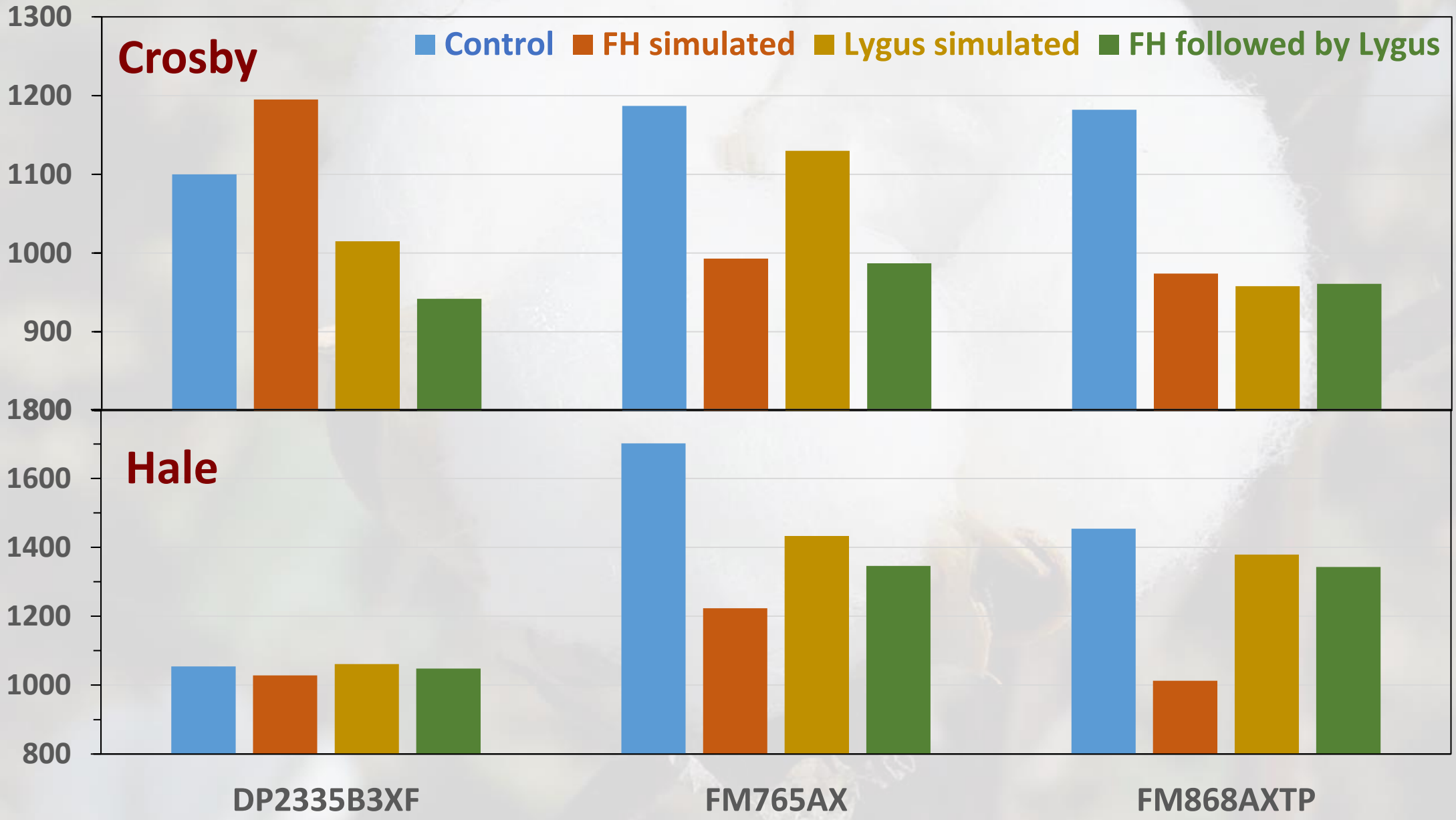
PHY332W3FE
PHY475W3FE
PHY443W3FE

LEPA 1-2 gpma — 600 lb/A

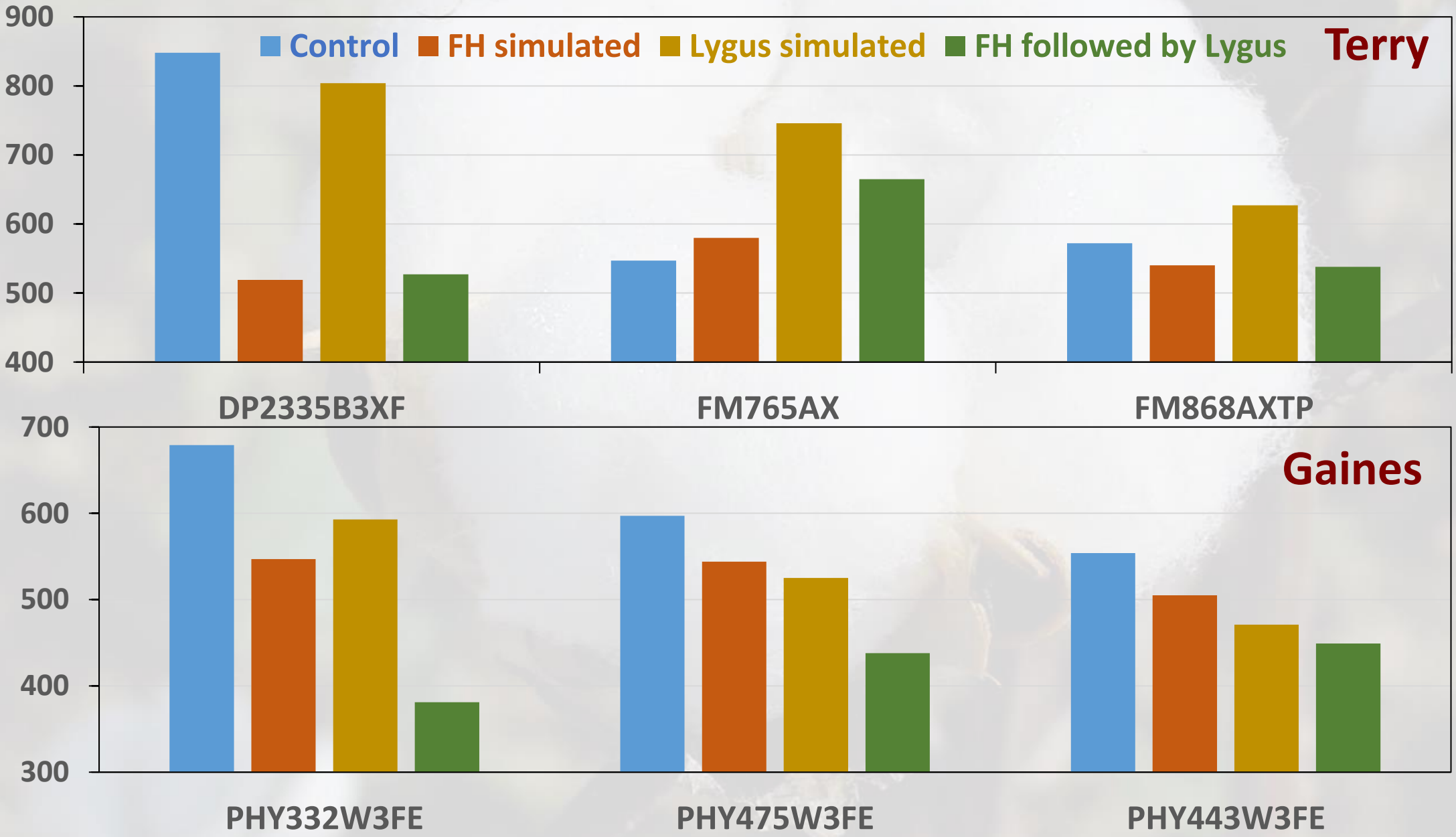
Insect Feeding Simulation Studies

- Fruit removal studies
  - Pre-flower square removal to mimic cotton fleahopper damage
  - Small boll removal to mimic late-season Lygus damage
- 4 geographically representative sites
  - Crosby, Hale, Terry, and Gaines Co. locations
  - Span the yield potential range
- Small subsample areas on targeted varieties
- Hand-harvested yield

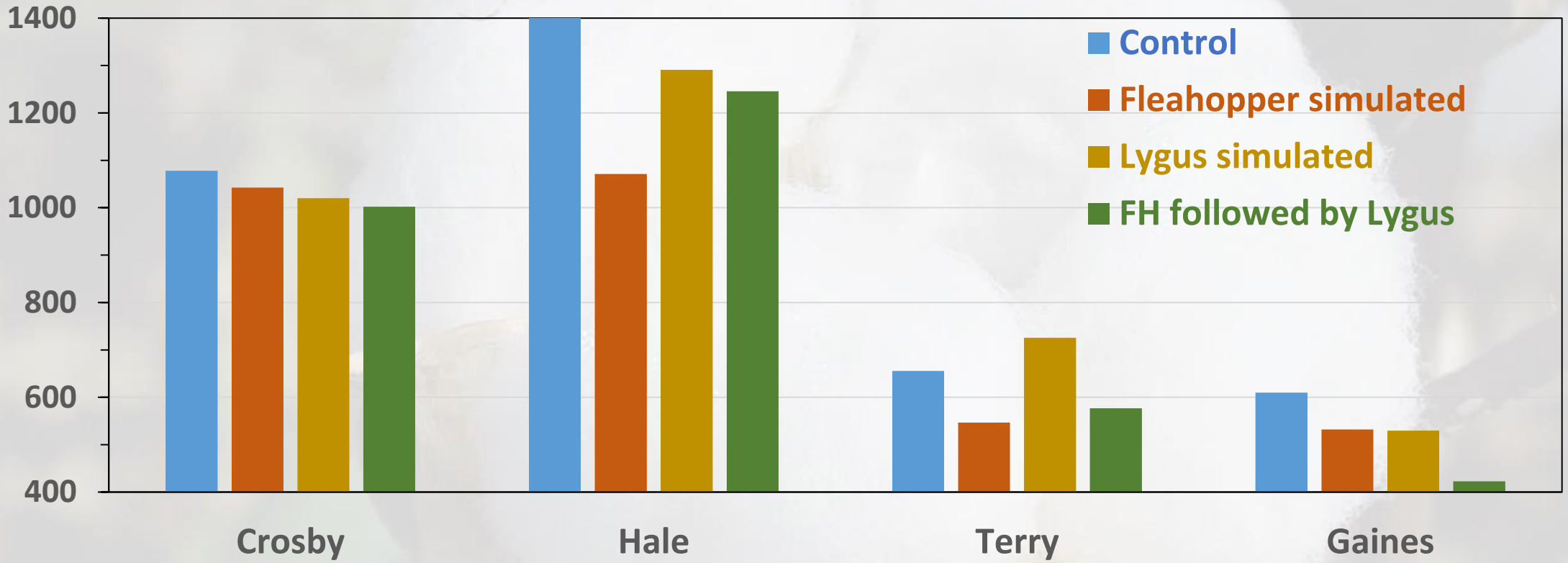
Cotton Response to Simulated Fleahopper and Lygus Damage



Cotton Response to Simulated Fleahopper and Lygus Damage



Cotton Response to Simulated Fleahopper and Lygus Damage



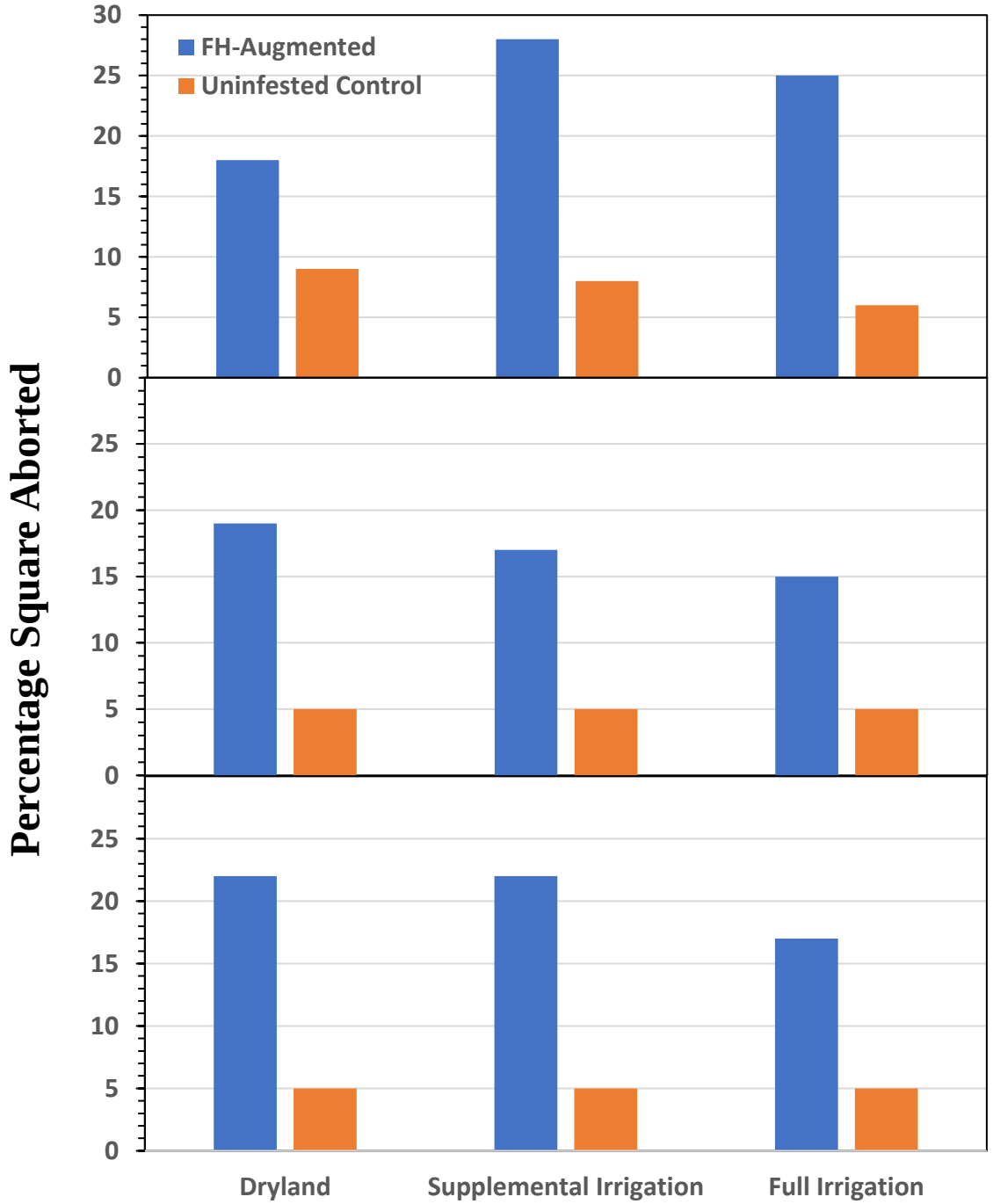
- Moderate yield (1100 lb/A)
- Cotton compensated FH and Lygus injury with insignificant reduction in lint yield
- FH followed by Lygus reduced about 100 lb/A

- High yield (1400 lb/A)
- FH reduced yield significantly
- FH followed by Lygus reduced about 150 lb/A

- Low yield (650 lb/A)
- Late season Lygus pruning of small bolls was beneficial
- FH was a significant yield stressor for low yield condition

- Low yield (600 lb/A)
- FH and Lygus individually reduced some yield
- FH + Lygus significantly reduced lint yield (~200 lb/A)

2022

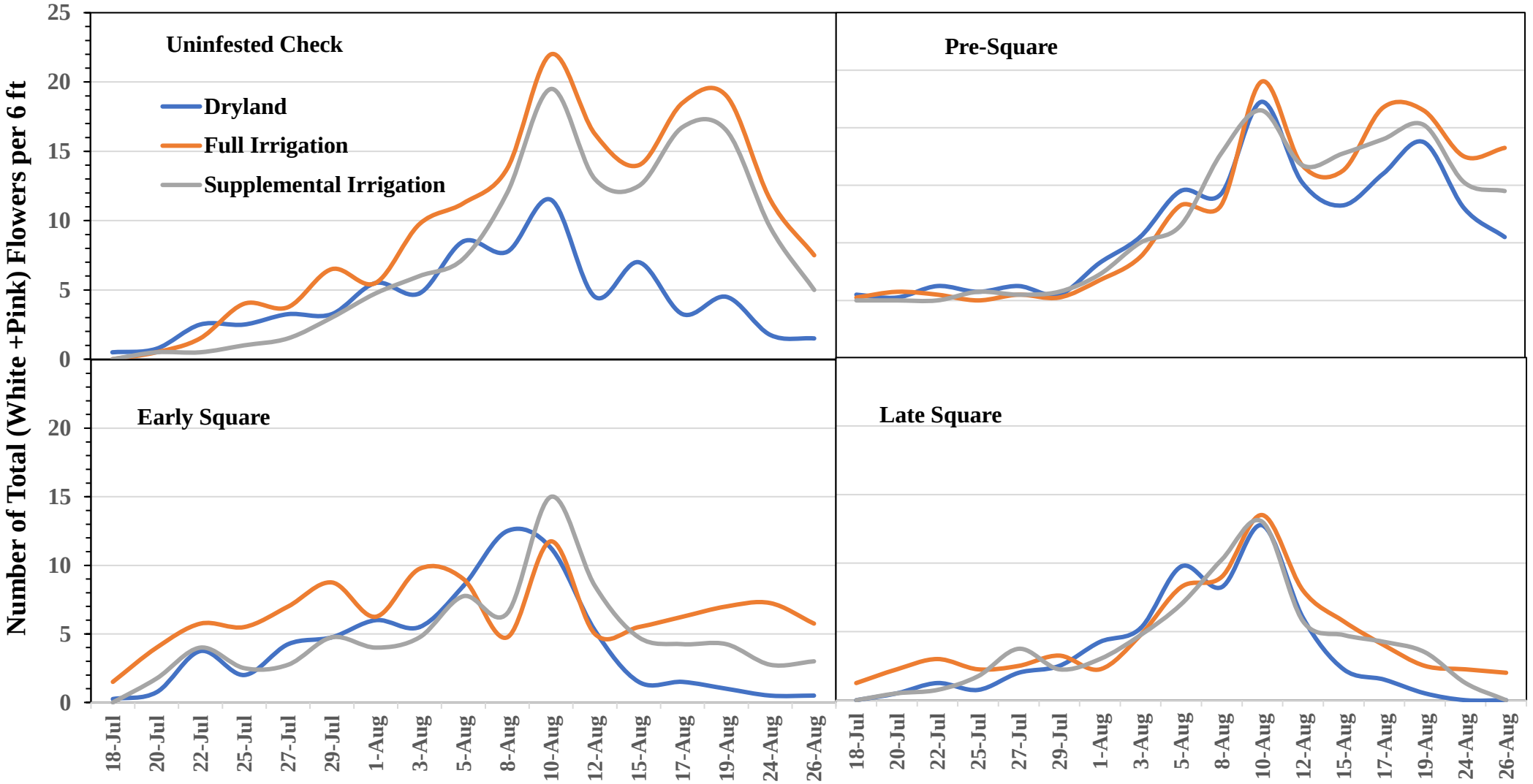


Pre-Square Cotton
(No visible squares in plants)

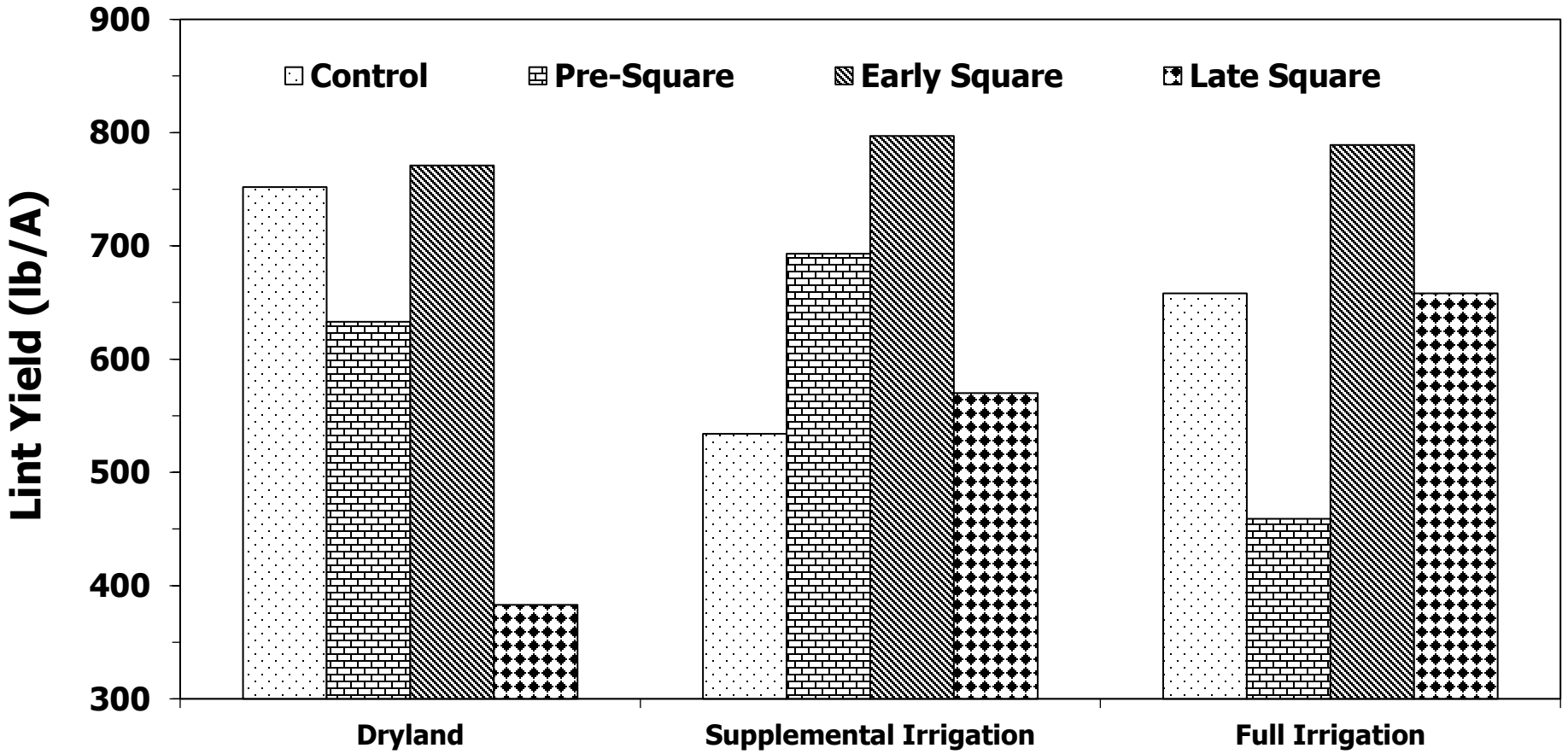
Early Square Stage
(2-3 squares)

Late Square Stage
(Prior to Flower Initiation)

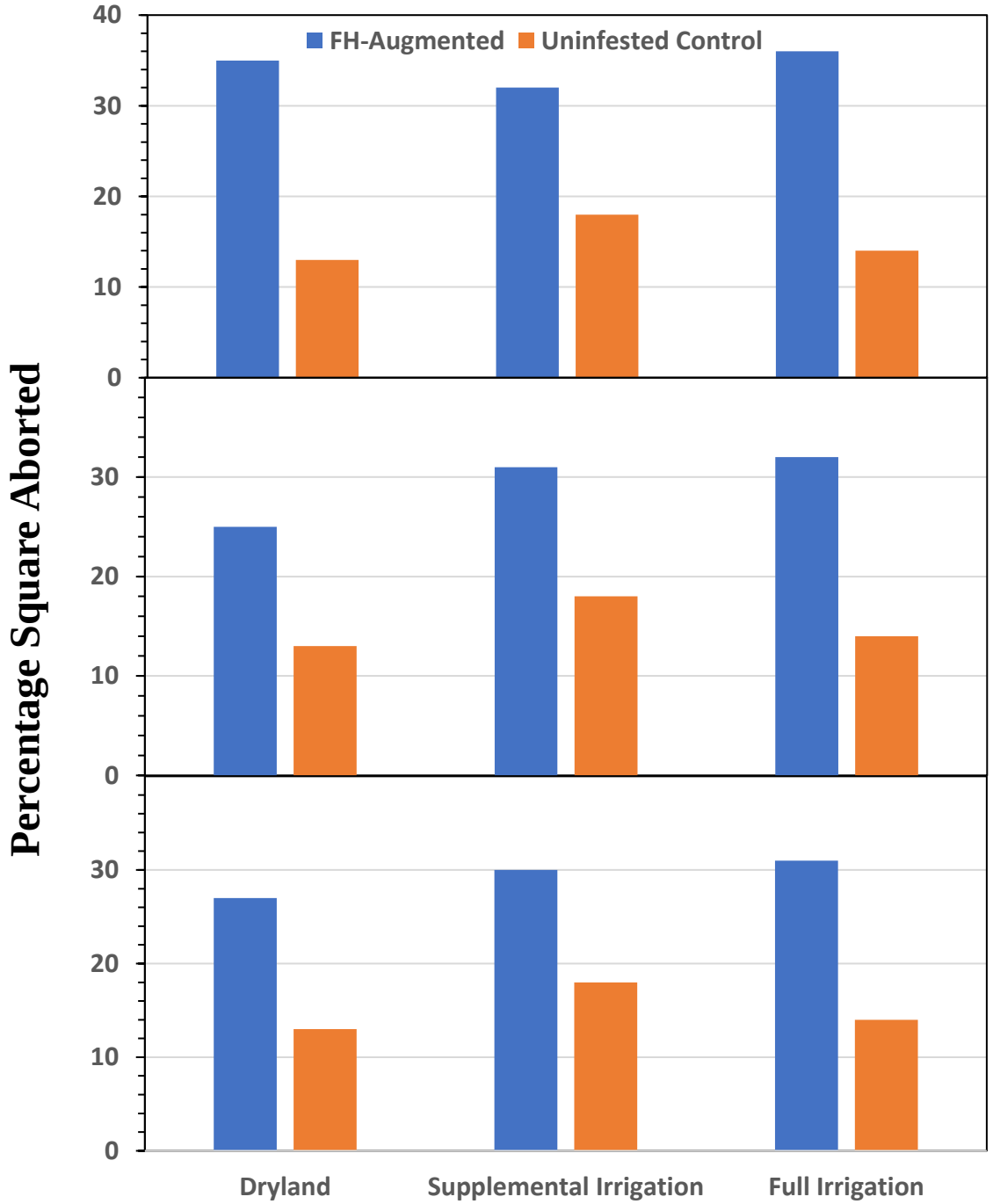
2022


Uninfested Check
Pre-Square
Early Square
Late Square
Dryland
Full Irrigation
Supplemental Irrigation
Number of Total (White +Pink) Flowers per 6 ft
0
5
10
15
20
25
18-Jul
20-Jul
22-Jul
25-Jul
27-Jul
29-Jul
1-Aug
3-Aug
5-Aug
8-Aug
10-Aug
12-Aug
15-Aug
17-Aug
19-Aug
24-Aug
26-Aug

Drought Stress X FH Infestations x Cotton Phenology on Lint Yield, Lubbock, 2022



2023

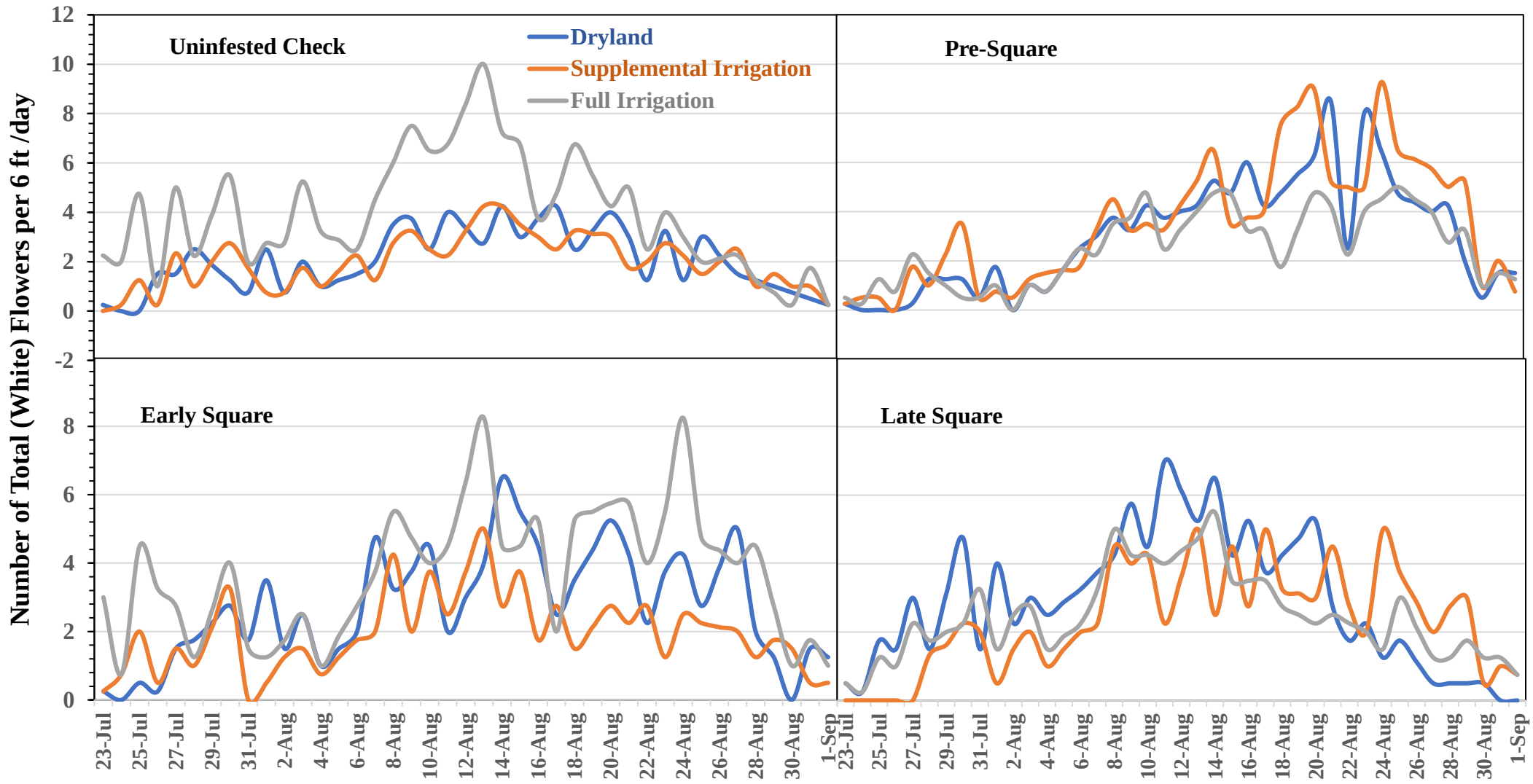


Pre-Square Cotton
(No visible squares in plants)

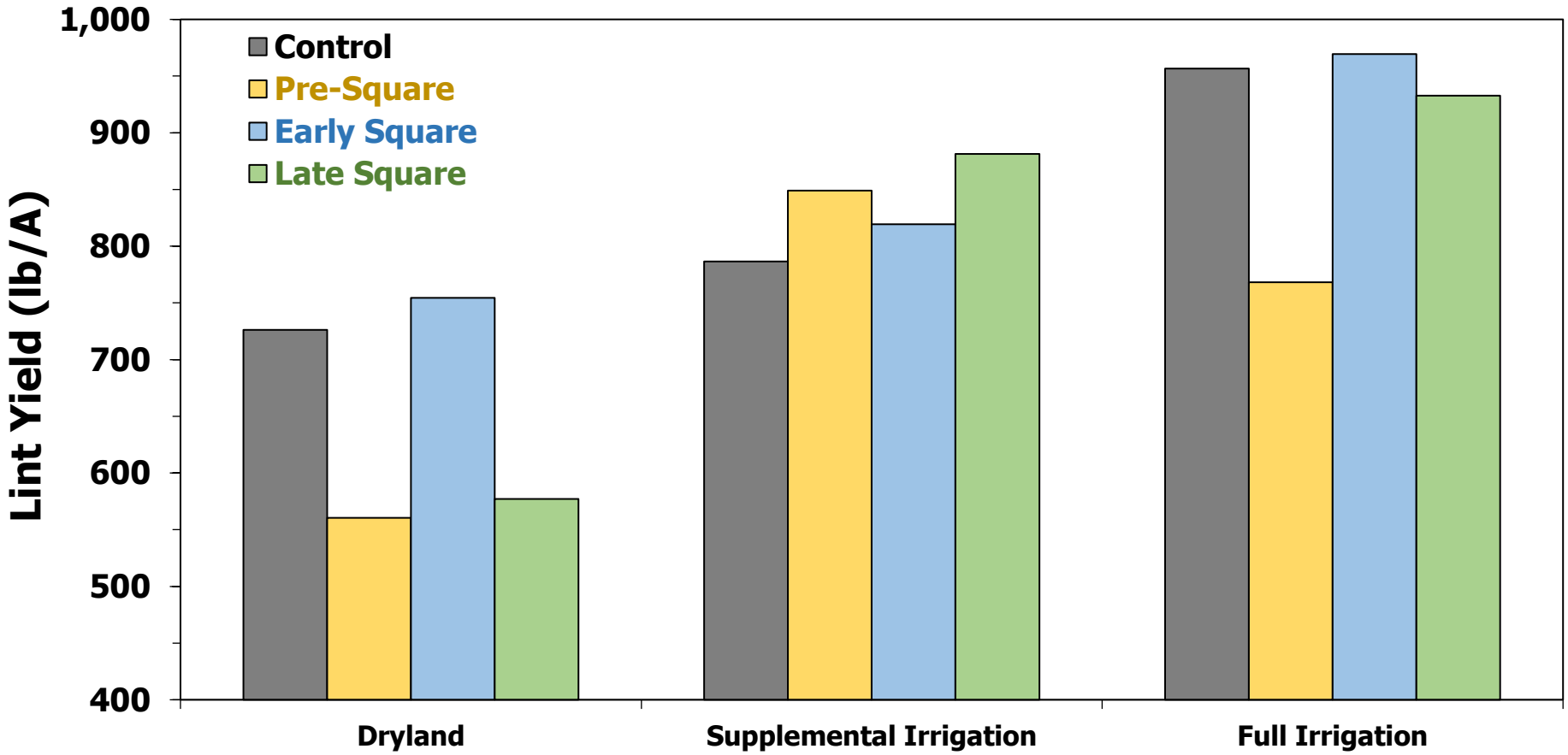
Early Square Stage
(2-3 squares)

Late Square Stage
(Prior to Flower Initiation)

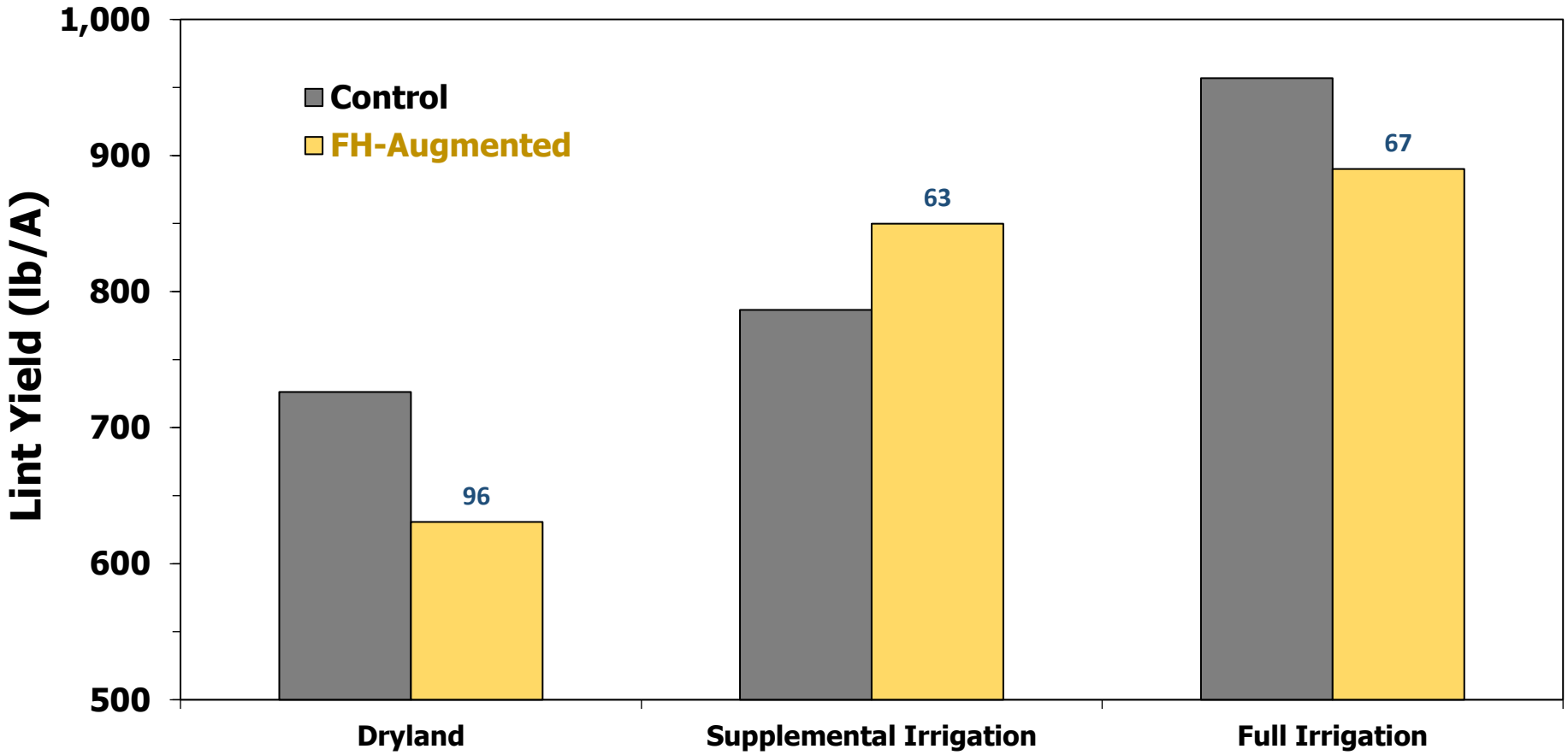
2023


Uninfested Check
Dryland
Supplemental Irrigation
Full Irrigation
Pre-Square
Early Square
Late Square
Number of Total (White) Flowers per 6 ft /day
12
10
8
6
4
2
0
-2
23-Jul
25-Jul
27-Jul
29-Jul
31-Jul
2-Aug
4-Aug
6-Aug
8-Aug
10-Aug
12-Aug
14-Aug
16-Aug
18-Aug
20-Aug
22-Aug
24-Aug
26-Aug
28-Aug
30-Aug
1-Sep

Drought Stress X FH Infestations x Cotton Phenology on Lint Yield, Lubbock, 2020-2023



Drought Stress X FH Infestations on Lint Yield, Lubbock, 2020-2023



Summary

- **Whether actual cotton fleahopper-infested or simulated CFH injury, cotton is vulnerable to 25-30% early square loss; <20% square loss is generally compensated.**
- **Sequential insect injury (thrips followed by CFH or CFH followed by Lygus) causes significant yield loss in most cases (irrigation or cultivar types).**
- **Both high-input, high yield as well as low-input, low-yield production systems are more sensitive to CFH injury than moderate yield conditions, but the sequential infestations that involves CFH injury appears to challenge the cotton physiological activities more significantly.**