Technical Report | October 30, 2025 | Public Release

Water Resiliency Corn Hybrid Performance Trials

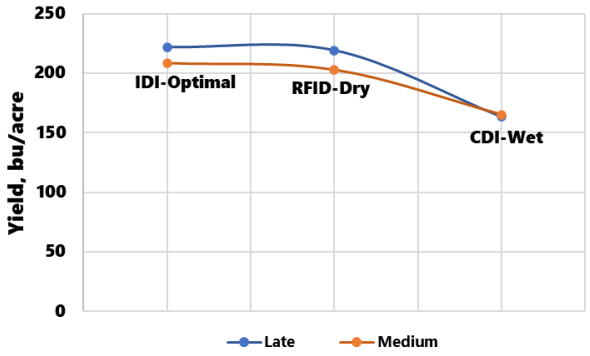
Summary

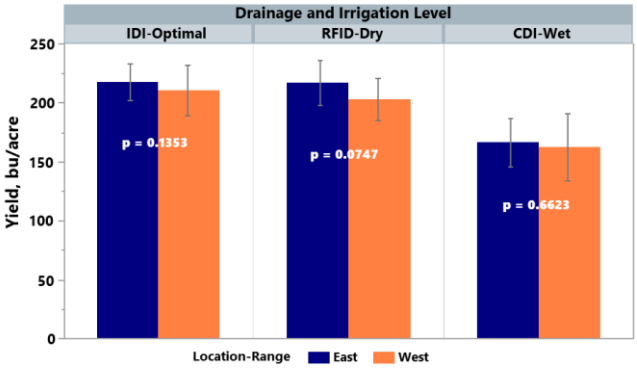
- Differences in late (≥116 day) and medium (112-115 day) season relative maturity group hybrid performance were detected under Optimal, Dry, and Wet treatment levels. In-season Wet stress reduced yield significantly compared to the Optimal and Rainfed treatments.
- Overall, the 2025 growing season was characterized by adequate precipitation. Monitoring root-zone soil water status, coupled with timely irrigation and drainage, did not significantly improve grain yield compared to rainfed conditions.
- Major dry stresses primarily occurred at the end of the growing season R4 + (Dough stage) for the Rainfed treatment, which minimized yield losses.
- Short periods of wet stress during early reproduction (VT-R2) had a significant impact on final yield for the Wet treatment compared to Optimal and Dry.

2025 Corn Resilience Trial Summary
Relative Maturity Group Mean Aggregate Performance

DAI Level	Relative Maturity Group (Days)	n	Yield*, bu/acre	CV
IDI-Optimal	Late (≥116)	36	221.8	7.4
	Medium (112-115)	48	208.7	9.1
	Mean		215.2	
RFID-Dry	Late (≥116)	36	219.2	7.2
	Medium (112-115)	48	203.1	9.6
	Mean		211.2	
CDI-Wet	Medium (112-115)	48	165.1	14.8
	Late (≥116)	36	163.5	15.5
	Mean		164.3	

*Means with the same color band are not different at the LSD α=0.05 test level.





Above: Mean yield response to water stress for Late (≥116 day), and Medium (112-115 day) season corn hybrids in 2025. **Right**: Mean yield response ± standard deviation by plot location within Drainage and Irrigation treatment block (see Pg. 6 field map for spatial extent). We observed no significant difference in grain yield by location range across treatment blocks; however, the West range plots marginally outperformed the East range plots, particularly the RFID-Dry block, indicating that yield differences among hybrids were driven mainly by an unequal number of stress days observed in the East and West location ranges, not genetics.

Introduction

The goals of the water resiliency performance trials are:

- Evaluate elite, commercially available corn hybrids under water stress conditions at different growth stages.
- Generate objective data for extension agents, producers, and advisors in selecting hybrids appropriate for their field situations.

The trials, conducted at the Total Ag Water Management (TAWM) Site located at the Tidewater Research Station in Plymouth, NC, artificially imposed water stress during the growing season under a uniform soil type and observed natural precipitation. Twenty-six hybrid entries from five agribusiness suppliers were trialed in 2025. The hybrids were randomized and replicated four times in a two-level experimental design on a Portsmouth fine sandy loam soil. The target planting density was 34,000 plants/acre on 30-inch row spacing. The trial plots were planted on May 2 and harvested on the 22nd and 23rd of September using a plot combine equipped with a sensor-based electronic yield monitoring and display system. Yield data were analyzed using a mixed-effects model with drainage and irrigation (DAI) level and hybrid as fixed effects, and replication as a random effect in SAS 9.4 Proc Glimmix. Mean separation was performed via least significant difference (LSD, $\alpha = 0.05$); the two top-yielding ranges are displayed.

The drainage and irrigation (DAI) treatments implemented by the project are designed to achieve different levels of exposure to water stress during the growing season, as described below.

- Rainfed + Intensive Drainage (RFID-Dry): Intended to create drier than normal conditions typical of well-drained sites in NC. Drain tile spacing is 37.5', which is highly intensive for a Portsmouth fine sandy loam soil and intended to provide a much higher drainage intensity than needed for efficient crop production on this soil type. Soil moisture content is entirely governed by natural rainfall and by tile drains discharging at full capacity throughout the growing season.
- Intensive Drainage + Irrigation (IDI-Optimal): Intended to create ideal conditions representative of efficient water management systems. Soil water matric potential is continuously monitored at 8" and 20" depths in the root zone, with subsurface drip irrigation applied during drier-than-normal periods.
- Controlled Drainage + Irrigation (CDI-Wet): Intended to create a water-saturated root zone typical of river bottoms and tidal controlled drainage areas during most growing seasons. Tile drainage spacing is 37.5' and is controlled to reduce drainage capacity and impose wet stress artificially. This is coupled with subsurface drip irrigation to further impose wet stress at targeted growth stages.

Water Resiliency Corn Hybrid Performance Trials

Key Performance Statistics for RM ≥ 116 Day Hybrids, Tidewater Research Station 2025

2025 Late Maturity Corn Hybrid Resilience Trial Information

DAI Level	Source	Entry	RM, Days	n	Yield*, bu/acre	CV
IDI-Optimal	Meherrin	RV1839VT2P	118	4	235.0	3.4
	Pioneer	P17677YHR	117	4	232.0	3.0
	DeKalb	DKC68-35VT2P	118	4	227.9	5.7
	DeKalb	DKC68-94	118	4	225.1	4.2
	DeKalb	DKC70-45VT2P	120	4	223.9	4.1
	DeKalb	DKC68-39	118	4	222.6	4.9
	Pioneer	P1608YHR	116	4	219.4	5.3
	DeKalb	DKC66-03	116	4	213.0	13.8
	DeKalb	DKC68-67	118	4	197.3	7.4
		Mean		36	221.8	7.4
		LSD, 0.05			19.6	

*Means with the same color band are not different at the LSD α=0.05 test level. Entries highlighted in blue are non-Bt refuge comparisons.

2025 Late Maturity Corn Hybrid Resilience Trial Information

DAI Level	Source	Entry	RM, Days	n	Yield*, bu/acre	CV
RFID-Dry	DeKalb	DKC68-94	118	4	234.0	6.6
	Meherrin	RV1839VT2P	118	4	225.2	5.9
	DeKalb	DKC70-45VT2P	120	4	225.1	4.1
	DeKalb	DKC68-39	118	4	223.0	10.7
	DeKalb	DKC68-35VT2P	118	4	221.7	7.5
	Pioneer	P1608YHR	116	4	213.8	11.3
	Pioneer	P17677YHR	117	4	211.7	3.1
	DeKalb	DKC66-03	116	4	210.8	4.2
	DeKalb	DKC68-67	118	4	207.8	2.6
		Mean		36	219.2	7.2
		LSD, 0.05			18.2	

*Means with the same color band are not different at the LSD α=0.05 test level. Entries highlighted in blue are non-Bt refuge comparisons.

2025 Late Maturity Corn Hybrid Resilience Trial Information

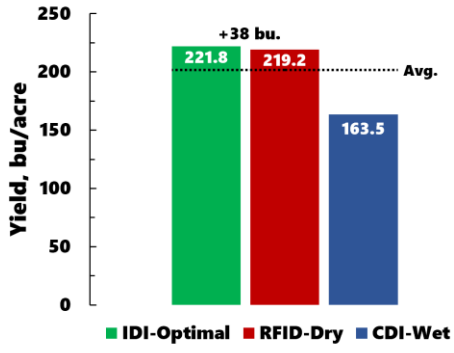
DAI Level	Source	Entry	RM, Days	n	Yield*, bu/acre	CV
CDI-Wet	DeKalb	DKC68-94	118	4	186.5	8.1
	DeKalb	DKC70-45VT2P	120	4	181.4	4.9
	DeKalb	DKC68-39	118	4	175.1	1.9
	Pioneer	P17677YHR	117	4	174.2	7.1
	Pioneer	P1608YHR	116	4	170.2	7.8
	DeKalb	DKC66-03	116	4	165.1	14.0
	DeKalb	DKC68-35VT2P	118	4	146.6	13.9
	DeKalb	DKC68-67	118	4	140.7	12.6
	Meherrin	RV1839VT2P	118	4	132.0	31.1
		Mean		36	163.5	15.5
		LSD, 0.05			28.9	

*Means with the same color band are not different at the LSD α=0.05 test level. Entries highlighted in blue are non-Bt refuge comparisons.

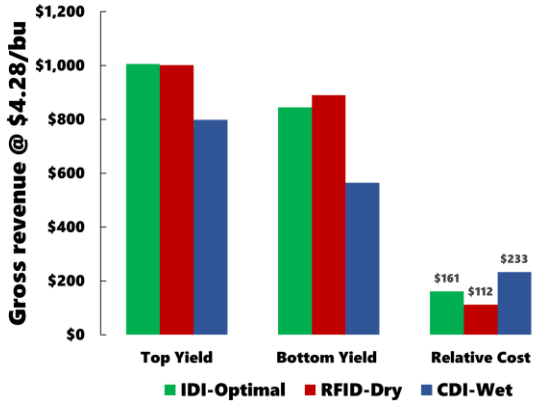
2025 Late Maturity Corn Hybrid Resilience Trial Information

DAI Level	Source	Entry	RM, Days	n	Yield*, bu/acre	CV
Overall	DeKalb	DKC68-94	118	12	215.2	11.5
	DeKalb	DKC70-45VT2P	120	12	210.1	10.8
	DeKalb	DKC68-39	118	12	206.9	13.2
	Pioneer	P17677YHR	117	12	206.0	12.8
	Pioneer	P1608YHR	116	12	201.1	13.8
	DeKalb	DKC68-35VT2P	118	12	198.7	20.9
	Meherrin	RV1839VT2P	118	12	197.4	27.2
	DeKalb	DKC66-03	116	12	196.3	15.6
	DeKalb	DKC68-67	118	12	181.9	18.2
		Mean		108	201.5	16.5
		LSD, 0.05			12.7	

*Means with the same color band are not different at the LSD α=0.05 test level. Entries highlighted in blue are non-Bt refuge comparisons.



Optimal root-zone moisture achieved through real-time matric potential monitoring did not significantly improve late-maturity hybrid grain yield compared to dryland in 2025 at the Water Resiliency site. The Optimal and Dry treatments returned 38 bu/acre (+23.2%) more grain than the Wet treatment.



Gross revenue and relative cost comparison of late maturity (≥116 day) hybrid selection under three soil water treatment levels, based on 2025 Tidewater trial data. Top Yield is the gross revenue generated by the highest average yielding hybrid in each management category; Bottom Yield is the gross revenue generated by the lowest average yielding hybrid. Relative cost is Top Avg. – Bottom Avg. for each category, representing the ***cost of hybrid selection in different environments***.

Key Performance Statistics for RM 112-115 Day Hybrids, Tidewater Research Station 2025

2025 Medium Maturity Corn Hybrid Resilience Trial Information

DAI Level	Source	Entry	RM, Days	n	Yield*, bu/acre	CV
IDI-Optimal	Scout	GT5914TRE	114	4	224.2	6.7
	Pioneer	P13841PWUE	113	4	220.1	5.0
	DeKalb	DKC63-56	113	4	219.9	5.4
	Pioneer	P1377PWUE	113	4	217.8	9.5
	Meherrin	RV1577 VT2P	115	4	216.5	3.9
	Scout	GT4914TRE	114	4	216.3	1.5
	AgVenture	AV7612PCE	112	4	215.5	4.7
	Scout	GT1214RR2	114	4	211.2	5.4
	DeKalb	DKC64-20	114	4	200.8	5.7
	Pioneer	P1587LRE	115	4	197.8	9.5
	DeKalb	DKC65-93	115	4	183.8	4.7
	DeKalb	DKC62-05	112	4	180.4	15.6
		Mean		48	208.7	9.1
		LSD, 0.05			19.8	

*Means with the same color band are not different at the LSD α=0.05 test level. Entries highlighted in blue are non-Bt refuge comparisons.

2025 Medium Maturity Corn Hybrid Resilience Trial Information

DAI Level	Source	Entry	RM, Days	n	Yield*, bu/acre	CV
RFID-Dry	Scout	GT4914TRE	114	4	223.6	6.3
	Scout	GT5914TRE	114	4	218.1	4.9
	Pioneer	P1377PWUE	113	4	214.9	4.5
	DeKalb	DKC63-56	113	4	212.4	7.8
	Pioneer	P13841PWUE	113	4	209.2	6.4
	Scout	GT1214RR2	114	4	206.4	7.6
	Meherrin	RV1577 VT2P	115	4	203.8	7.2
	Pioneer	P1587LRE	115	4	201.8	7.3
	AgVenture	AV7612PCE	112	4	199.9	10.3
	DeKalb	DKC64-20	114	4	190.9	4.9
	DeKalb	DKC62-05	112	4	178.7	16.0
	DeKalb	DKC65-93	115	4	178.1	3.3
		Mean		48	203.1	9.6
		LSD, 0.05			19.7	

*Means with the same color band are not different at the LSD α=0.05 test level. Entries highlighted in blue are non-Bt refuge comparisons.

2025 Medium Maturity Corn Hybrid Resilience Trial Information

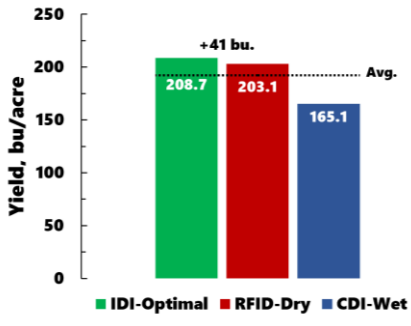
DAI Level	Source	Entry	RM, Days	n	Yield*, bu/acre	CV
CDI-Wet	Scout	GT5914TRE	114	4	189.0	4.4
	Scout	GT4914TRE	114	4	185.6	4.1
	Meherrin	RV1577 VT2P	115	4	174.8	4.4
	DeKalb	DKC64-20	114	4	172.5	8.3
	Pioneer	P1587LRE	115	4	168.0	21.2
	DeKalb	DKC63-56	113	4	167.4	7.4
	Scout	GT1214RR2	114	4	167.3	21.2
	Pioneer	P13841PWUE	113	4	165.7	2.2
	AgVenture	AV7612PCE	112	4	165.2	10.1
	Pioneer	P1377PWUE	113	4	156.3	7.7
	DeKalb	DKC62-05	112	4	137.2	22.4
	DeKalb	DKC65-93	115	4	132.1	20.8
		Mean		48	165.1	14.8
		LSD, 0.05			28.1	

*Means with the same color band are not different at the LSD α=0.05 test level. Entries highlighted in blue are non-Bt refuge comparisons.

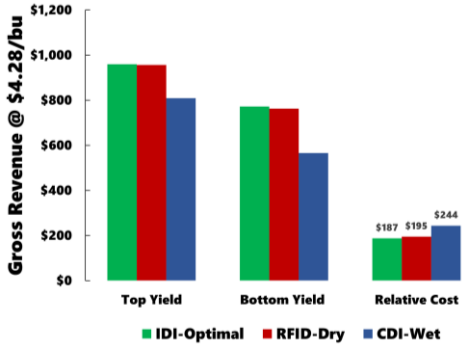
2025 Medium Maturity Corn Hybrid Resilience Trial Information

DAI Level	Source	Entry	RM, Days	n	Yield*, bu/acre	CV
Overall	Scout	GT5914TRE	114	12	210.4	9.1
	Scout	GT4914TRE	114	12	208.5	9.2
	DeKalb	DKC63-56	113	12	199.9	13.6
	Meherrin	RV1577 VT2P	115	12	198.4	10.4
	Pioneer	P13841PWUE	113	12	198.3	13.2
	Pioneer	P1377PWUE	113	12	196.3	16.6
	Scout	GT1214RR2	114	12	195.0	15.1
	AgVenture	AV7612PCE	112	12	193.5	13.7
	Pioneer	P1587LRE	115	12	189.2	14.5
	DeKalb	DKC64-20	114	12	188.1	8.7
	DeKalb	DKC62-05	112	12	165.4	20.3
	DeKalb	DKC65-93	115	12	164.7	17.4
		Mean		144	192.3	14.9
		LSD, 0.05			12.9	

*Means with the same color band are not different at the LSD α=0.05 test level. Entries highlighted in blue are non-Bt refuge comparisons.



Optimal root-zone moisture achieved through real-time matric potential monitoring did not significantly improve medium-maturity hybrid grain yield compared to dryland in 2025 at the Water Resiliency site. The Optimal and Dry treatments returned 41 bu/acre (+24.8%) more grain than the Wet treatment.



Gross revenue and relative cost comparison of medium maturity (112-115 day) hybrid selection under three soil water treatment exposures, based on 2025 Tidewater trial data. Top Yield is the gross revenue generated by the highest average yielding hybrid in each management category; Bottom Yield is the gross revenue generated by the lowest average yielding hybrid. Relative cost is Top Yield – Bottom Yield for each category, representing the ***cost of hybrid selection in different environments***.

Key Performance Statistics for Non-Bt Hybrids, Tidewater Research Station 2025

2025 Non-Bt Protected Hybrid Resilience Trial Information

DAI Level	Source	Entry	RM, Days	n	Yield*, bu/acre	CV
IDI-Optimal	DeKalb	DKC68-94	118	4	225.1	4.2
	DeKalb	DKC68-39	118	4	222.6	4.9
	DeKalb	DKC63-56	113	4	219.9	5.4
	DeKalb	DKC66-03	116	4	213.0	13.8
	Scout	GT1214RR2	114	4	211.2	5.4
	DeKalb	DKC64-20	114	4	200.8	5.7
	Pioneer	P1587LRE	115	4	197.8	9.5
	DeKalb	DKC68-67	118	4	197.3	7.4
	DeKalb	DKC65-93	115	4	183.8	4.7
	DeKalb	DKC62-05	112	4	180.4	15.6
		Mean		40	205.2	10.4
		LSD, 0.05			22.4	

*Means with the same color band are not different at the LSD α=0.05 test level.

2025 Non-Bt Protected Hybrid Resilience Trial Information

DAI Level	Source	Entry	RM, Days	n	Yield*, bu/acre	CV
RFID-Dry	DeKalb	DKC68-94	118	4	234.0	6.6
	DeKalb	DKC68-39	118	4	223.0	10.7
	DeKalb	DKC63-56	113	4	212.4	7.8
	DeKalb	DKC66-03	116	4	210.8	4.2
	DeKalb	DKC68-67	118	4	207.8	2.6
	Scout	GT1214RR2	114	4	206.4	7.6
	Pioneer	P1587LRE	115	4	201.8	7.3
	DeKalb	DKC64-20	114	4	190.9	4.9
	DeKalb	DKC62-05	112	4	178.7	16.0
	DeKalb	DKC65-93	115	4	178.1	3.3
		Mean		40	204.4	10.9
		LSD, 0.05			21.5	

*Means with the same color band are not different at the LSD α=0.05 test level.

2025 Non-Bt Hybrid Resilience Trial Information

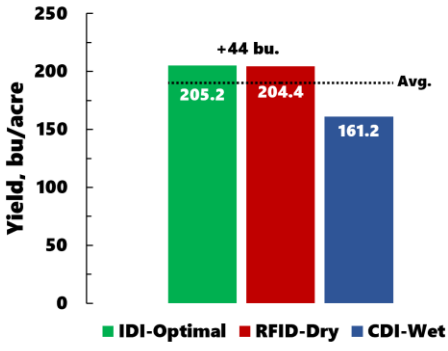
DAI Level	Source	Entry	RM, Days	n	Yield*, bu/acre	CV
CDI-Wet	DeKalb	DKC68-94	118	4	186.5	8.1
	DeKalb	DKC68-39	118	4	175.1	1.9
	DeKalb	DKC64-20	114	4	172.5	8.3
	Pioneer	P1587LRE	115	4	168.0	21.2
	DeKalb	DKC63-56	113	4	167.4	7.4
	Scout	GT1214RR2	114	4	167.3	21.2
	DeKalb	DKC66-03	116	4	165.1	14.0
	DeKalb	DKC68-67	118	4	140.7	12.6
	DeKalb	DKC62-05	112	4	137.2	22.4
	DeKalb	DKC65-93	115	4	132.1	20.8
		Mean			161.2	16.9
		LSD, 0.05			33.8	

*Means with the same color band are not different at the LSD α=0.05 test level.

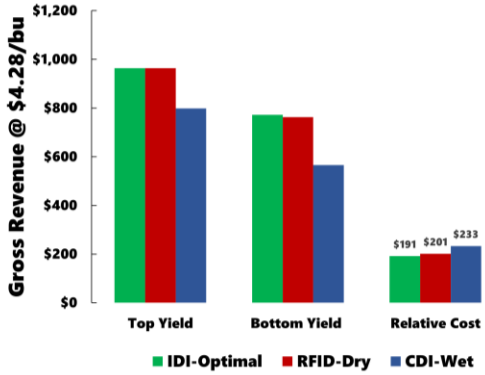
2025 Non-Bt Protected Hybrid Resilience Trial Information

DAI Level	Source	Entry	RM, Days	n	Yield*, bu/acre	CV
Overall	DeKalb	DKC68-94	118	12	215.2	11.5
	DeKalb	DKC68-39	118	12	206.9	13.2
	DeKalb	DKC63-56	113	12	199.9	13.6
	DeKalb	DKC66-03	116	12	196.3	15.6
	Scout	GT1214RR2	114	12	195.0	15.1
	Pioneer	P1587LRE	115	12	189.2	14.5
	DeKalb	DKC64-20	114	12	188.1	8.7
	DeKalb	DKC68-67	118	12	181.9	18.2
	DeKalb	DKC62-05	112	12	165.4	20.3
	DeKalb	DKC65-93	115	12	164.7	17.4
		Mean		120	190.2	16.4
		LSD, 0.05			14.8	

*Means with the same color band are not different at the LSD α=0.05 test level.

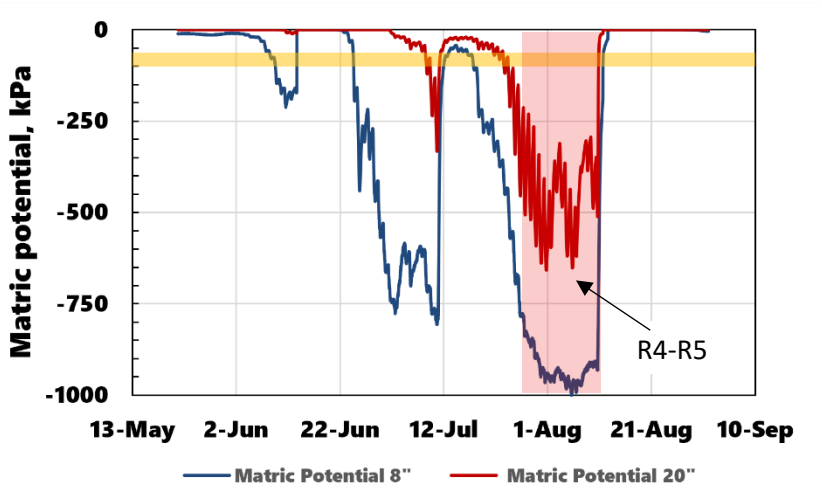


Optimal root-zone moisture achieved through real-time matric potential monitoring did not significantly improve Non-BT hybrid grain yield compared to dryland in 2025 at the Water Resiliency site. The Optimal and Dry treatments returned 44 bu/acre (+27.3%) more grain than the Wet treatment.

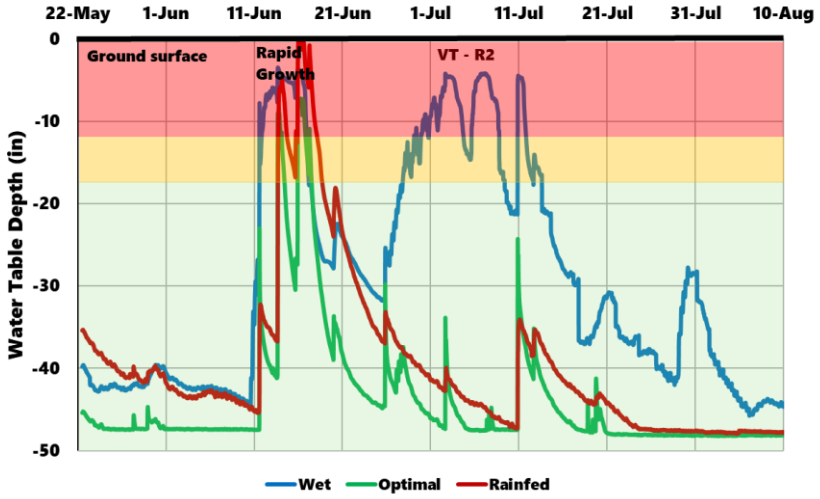


Gross revenue and relative cost comparison of non-insect-protected hybrid selection under three soil water treatment levels, based on 2025 Tidewater trial data. Top Yield is the gross revenue generated by the highest average yielding hybrid in each management category; Bottom Yield is the gross revenue generated by the lowest average yielding hybrid. Relative cost is Top Yield – Bottom Yield for each category, representing the ***cost of hybrid selection in different environments***.

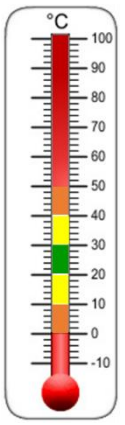
Interpretive Guide and Indicators



Dry stress levels in corn were determined by monitoring in-season matric potential in real time 8" and 20" deep in the root zone, depicted above for the RAINFED (RFID-dry) treatment. Matric potential is a measure of the energy needed by plants to extract water from a porous medium like soil. A lower matric potential (more negative) causes plants to work harder to provide the water needed for nutrient uptake, thermoregulation, and carbon assimilation. The yellow horizontal band in the above chart delineates the -55 kPa to -100 kPa range, where -55 kPa is the threshold for "minor" water stress at 8" deep. "Major" stress is defined by <-100 kPa at 8" deep and <-55 kPa 20" deep in the root zone in a Portsmouth fine sandy loam soil. Episodes of "minor" stress may occur during irrigation events, depending on the rate of water redistribution in the soil.

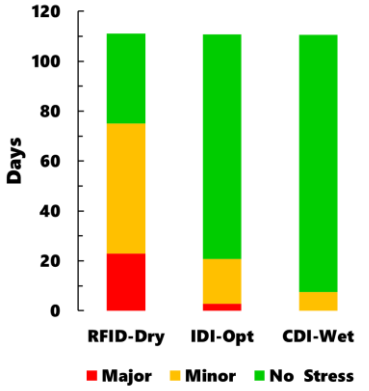


Wet Stress as measured by groundwater table depth traces for the water table beneath corn in RAINFED, OPTIMAL, and WET treatments in 2025. Zones are color-coded according to the depth and relative crop stress level: Red=highest crop stress, <12" deep; Yellow=medium crop stress, 12-18" deep; and Green=no crop stress, >18" deep. The red trace at ground level around June 13 represents ponded water.

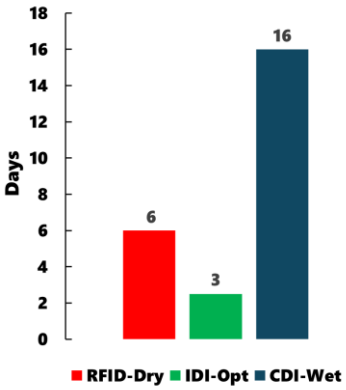


Above, thermometer measuring heat content with fill color indicating human comfort ranges. Right: dial gauge measuring soil water matric potential in kilopascals (kPa) with fill color indicating plant comfort ranges. Green=optimal Red= danger zone.

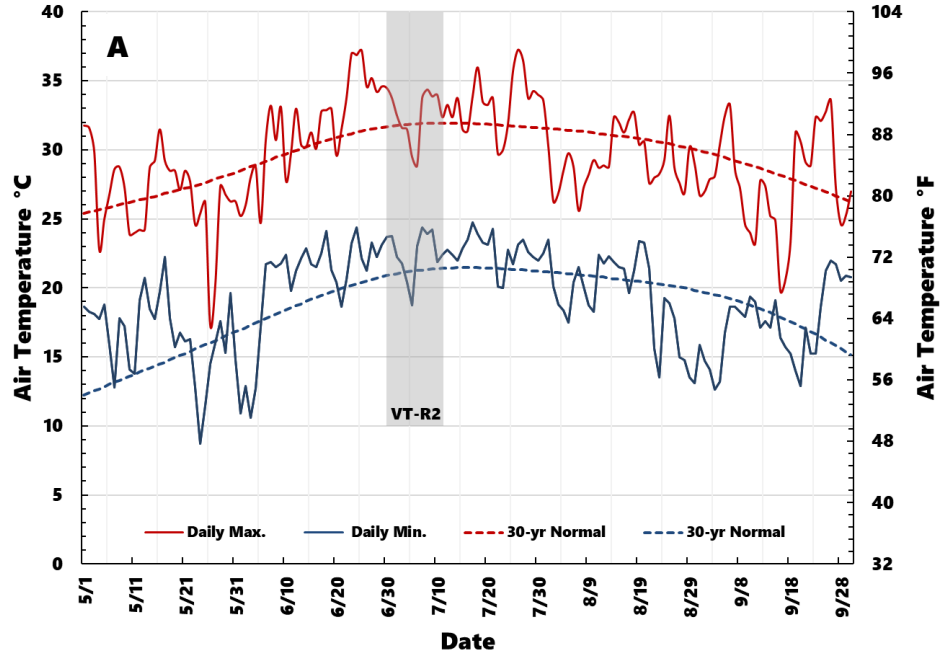
2025 Corn dry stress V6 through black layer, top 20" of root zone

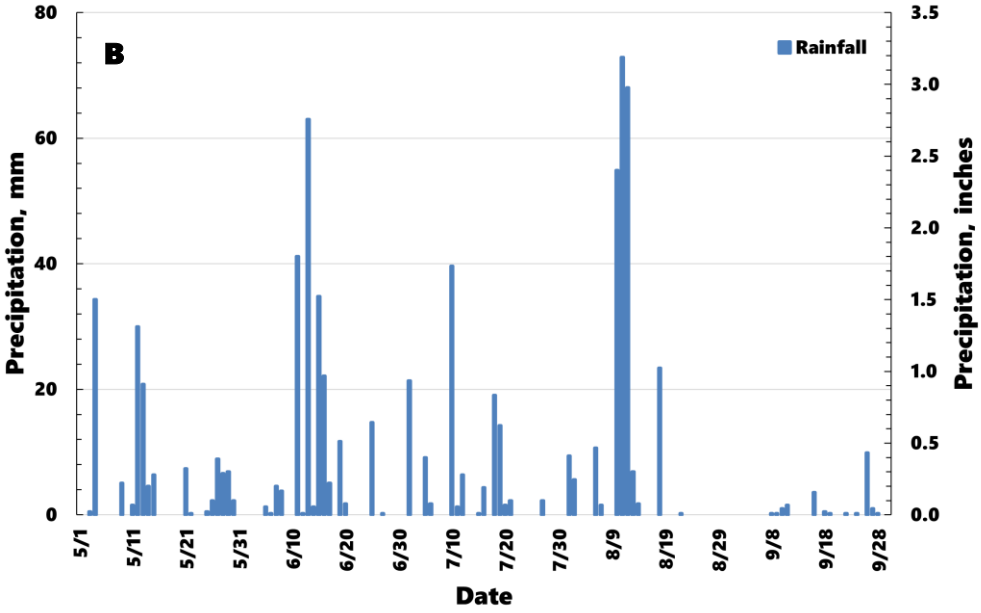


2025 Corn wet stress V6 through black layer, top 12" of root zone



Weather Information for the Tidewater Research Station May-September 2025





May 1 to September 30, 2025. Panel **A:** Daily maximum and minimum temperatures, and 30-yr Normals. Grey rectangle is the observed VT-R2 interval for drainage treatments and hybrids. Panel **B:** Daily precipitation.

Acknowledgements

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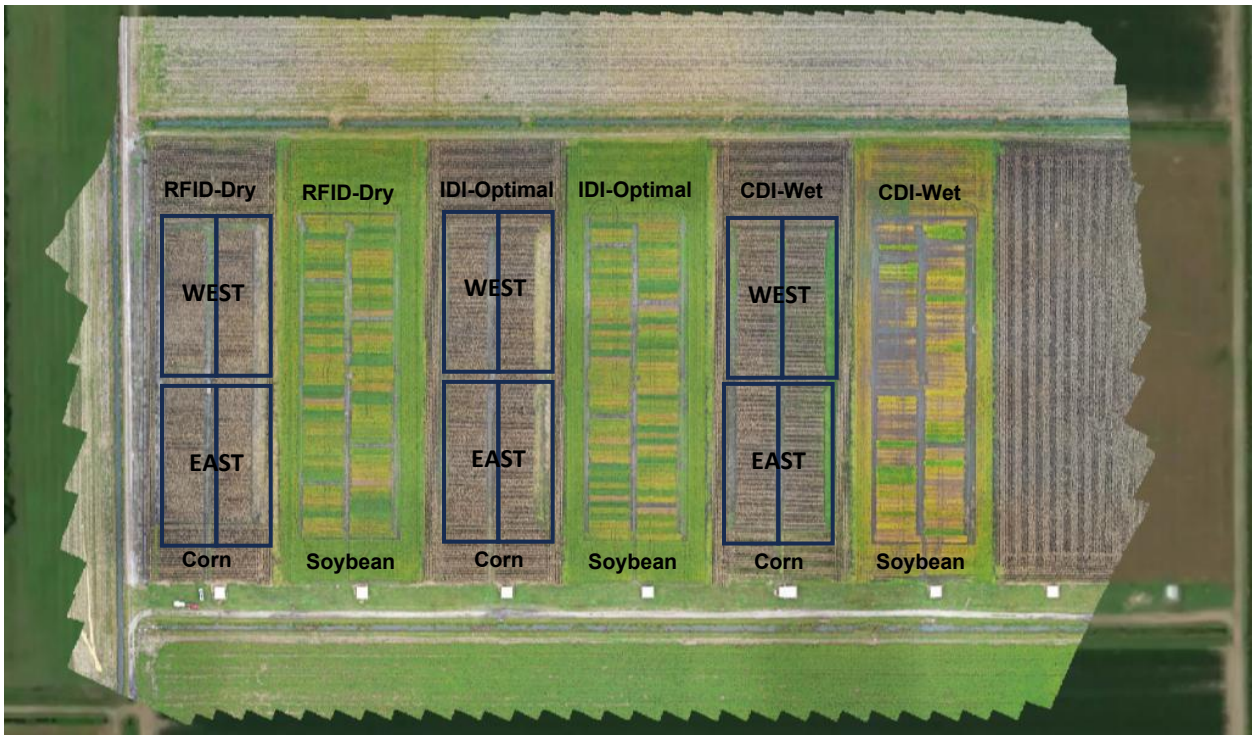

Aerial view of corn and soybean plots and spatial extent of West and East Ranges at the Total Agricultural Water Management site, Plymouth, NC. Treatment blocks are rotated annually following major producers in the region. *Image: J. Ward*