

Canola Crop Improvement for the Southern Great Plains: Building Acres, Building Value



Cooperating Investigators

Name	Subject Matter	Institution
Brian Arnall	Precision Nutrition	
Jourdan Bell	Agronomy	
Josh Lofton	Agronomy	
John Damicone	Plant Pathology	
Paul DeLaune	Agronomy	
Kris Giles	Entomology	
Carol Jones	Post-Harvest Storage	
David Nowlin	Post-Harvest Storage	
Clark Neely	Agronomy	
Angela Post	Weed Management	
Tom Royer	Entomology	
Jason Warren	Soil Health	
Jackie Lee	Pollinator Health	

A Systems Approach

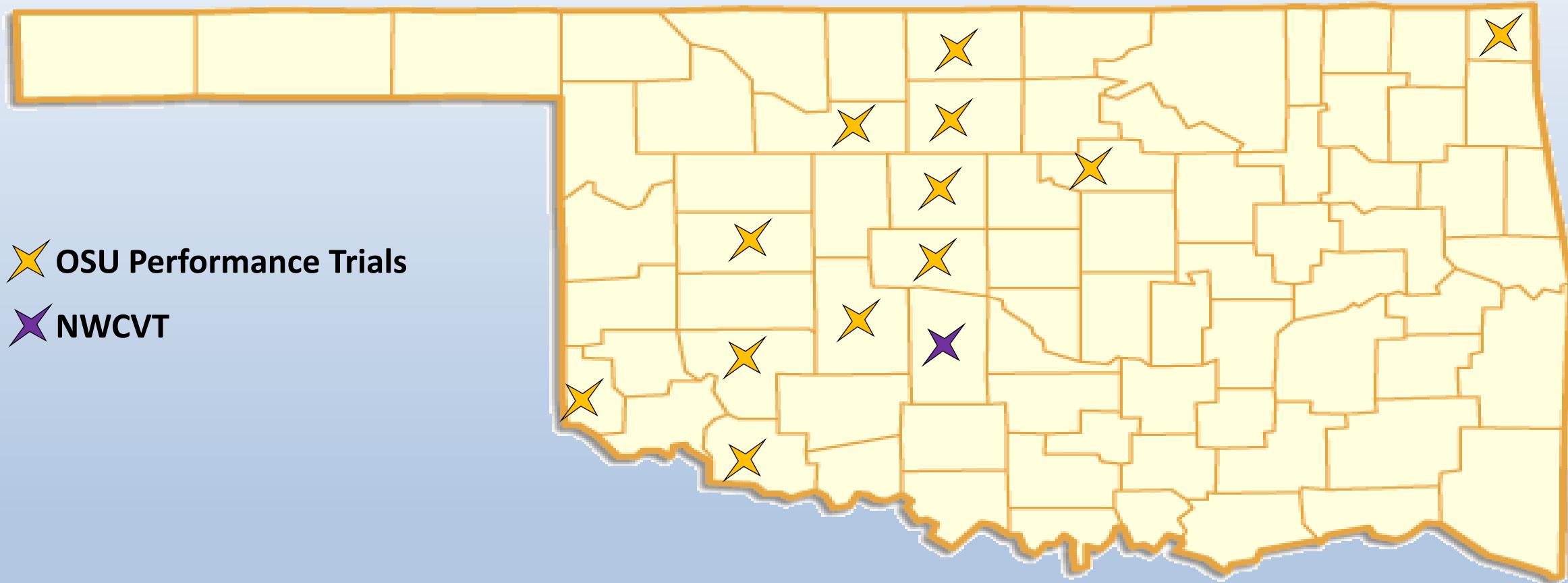
- Variety evaluations
- Investigations in best management practices:
 - Row spacing
 - Equipment demonstrations
 - No-till
 - Precision nutrition
 - Plant growth regulators
- Integrated pest management
 - Insects
 - Diseases
 - Weeds
- Pollinator Health
- Canola harvest, drying and storage
- Extension Program

Winter Canola Variety Trials

- OSU Performance Trials-12 locations (OK)
 - Paid entry from seed companies
 - Separate conventional and RR trials at each location
- Demonstration Variety Trials-10 locations (OK)
 - Several locations in TX as well
- National Winter Canola Variety Trials (OK & TX)
 - In cooperation with Kansas State University
 - Locations in Oklahoma and Texas



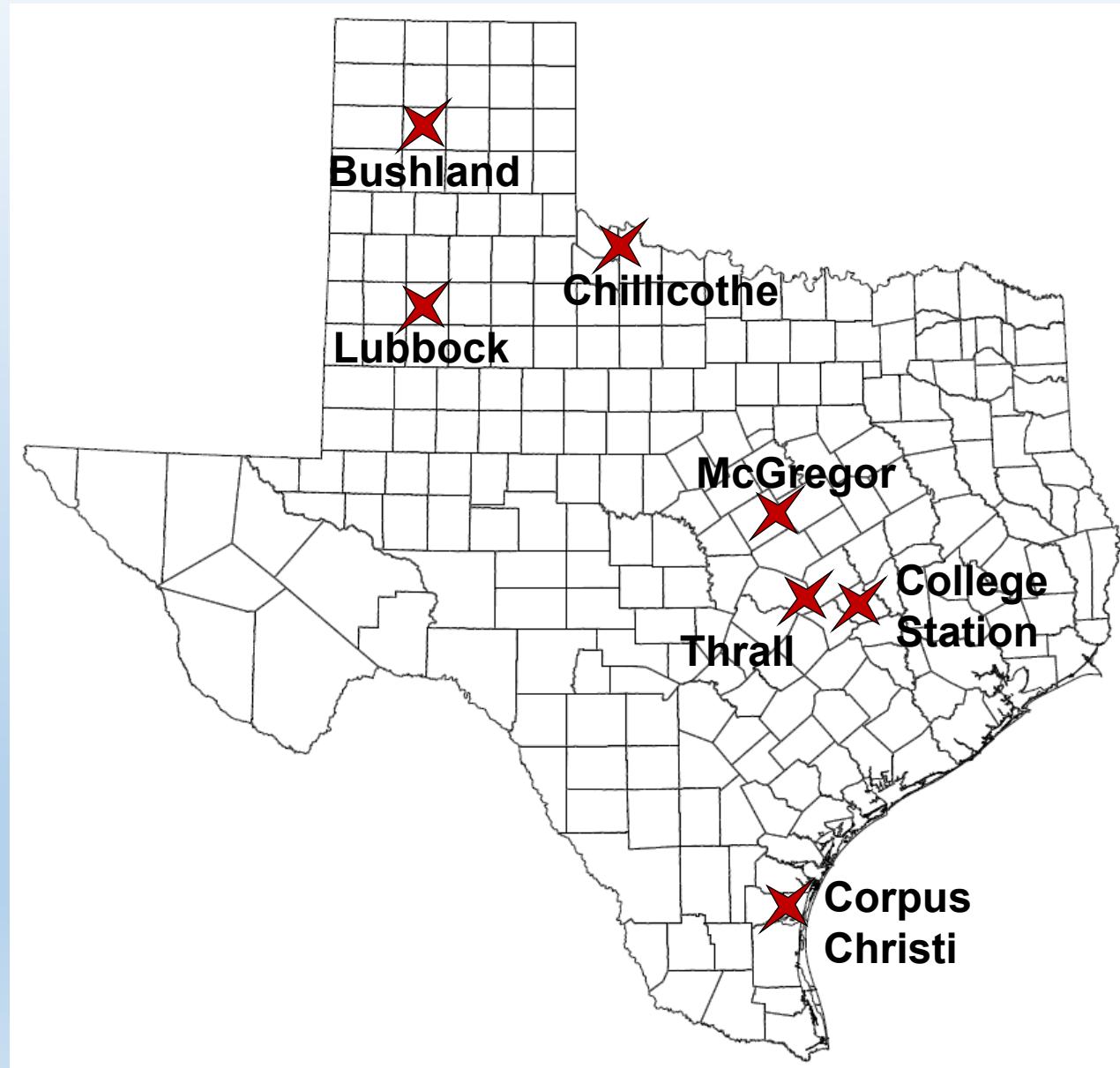
Winter Canola Variety Trials in OK



Oklahoma Canola Variety Trials

- Planted Variety Trial (XX varieties)
Planted with no-till drill on 7.5"
spacing
- Planted in no-till following wheat
- Moisture conditions and stand
establishment were good.
- Stand establishment and fall vigor
was recorded.

Winter Canola Variety Trials in TX



Texas Rolling Plains Canola Variety Trial

- Seven locations
- No-till drill on 7.5" spacing
- Planted in no-till following wheat
- Moisture conditions and stand establishment were good.
- Stand establishment and fall vigor was recorded.



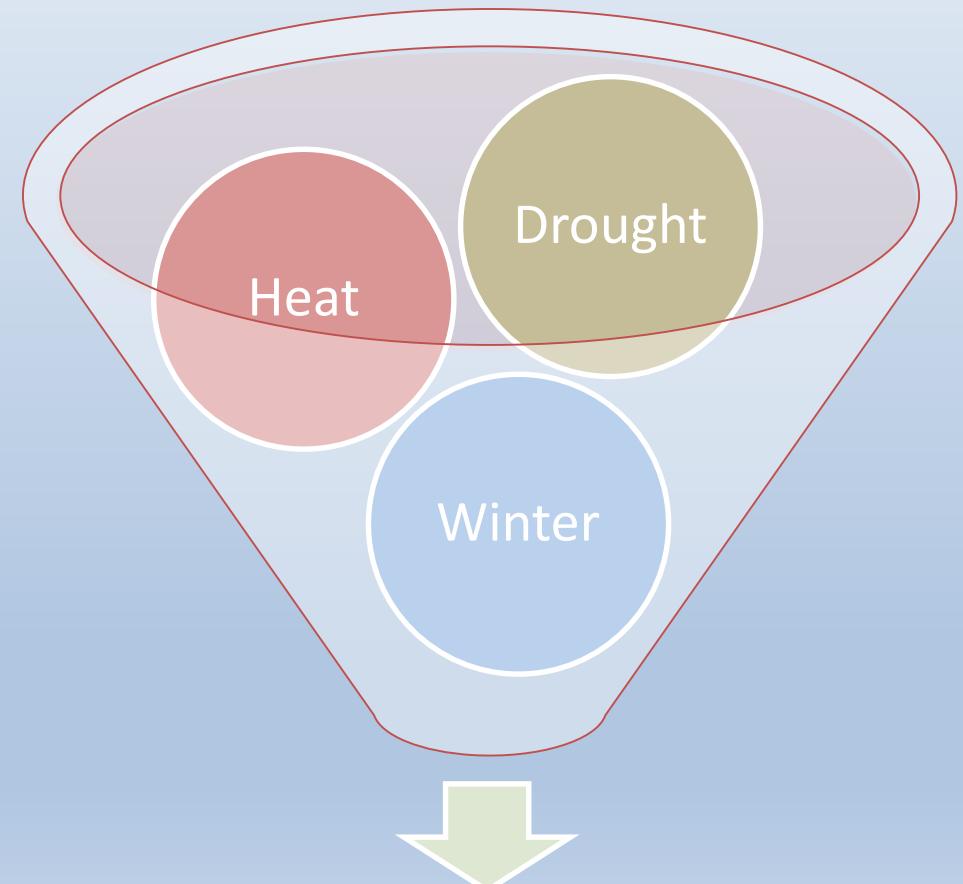
Winter Canola Variety Trial at College Station, TX



Photo taken February 26, 2016.

Impacts of Variety Testing

- A wide range of harsh growing conditions are possible in the region
- Satisfies the need for a wide range of varieties with climactic adaptability
- Ensures producers in the region have consistent positive results



Identify Adapted Varieties

Expanding the Capacity of Varieties Through BMP

- Planting Date
- Row Spacing
- Fertility
- Tillage
- Variety x Planting Date
- PGR x Planting Date

November 4, 2015

September 17 Planting



October 2 Planting



December 22, 2015

September 17 Planting



October 2 Planting



February 1, 2016

September 17 Planting



October 2 Planting





NWCVT Manhattan, KS
Photo credit: Mike Stamm

Lockett, TX PGR Trial

- Planting Dates: Sept. 11, 18, and 25, 2015
- Varieties: HyClass 125W & Pioneer 46W94
- PGRs: tebuconazole, mepiquat pentaborate, mepiquat chloride (2 rates), fluxapyroxad/pyraclostrobin, and metconazole.
- Applied at 6 leaf stage.
- Crown height and diameter measured in December. Stand counts measured in December and again in March.

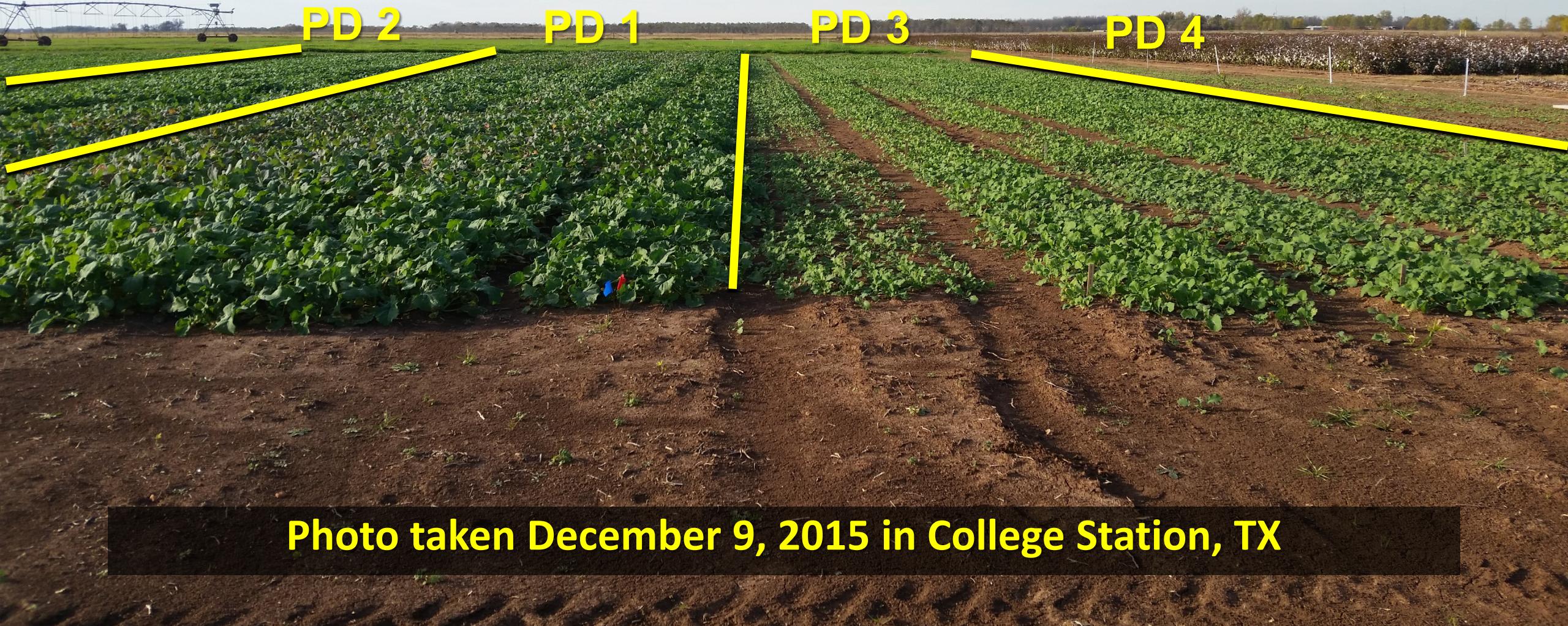


College Station, TX PGR Trial

- Canola was planted on October 1, 15, 29, and November 13.
- Two varieties evaluated include Pioneer 46W94 and Mercedes.
- PGRs include tebuconazole, mepiquat pentaborate, mepiquat chloride (2 rates), fluxapyroxad/pyraclostrobin, and metconazole.
- PGRs applied at 6 leaf stage.
- Crown height and diameter measured in December.



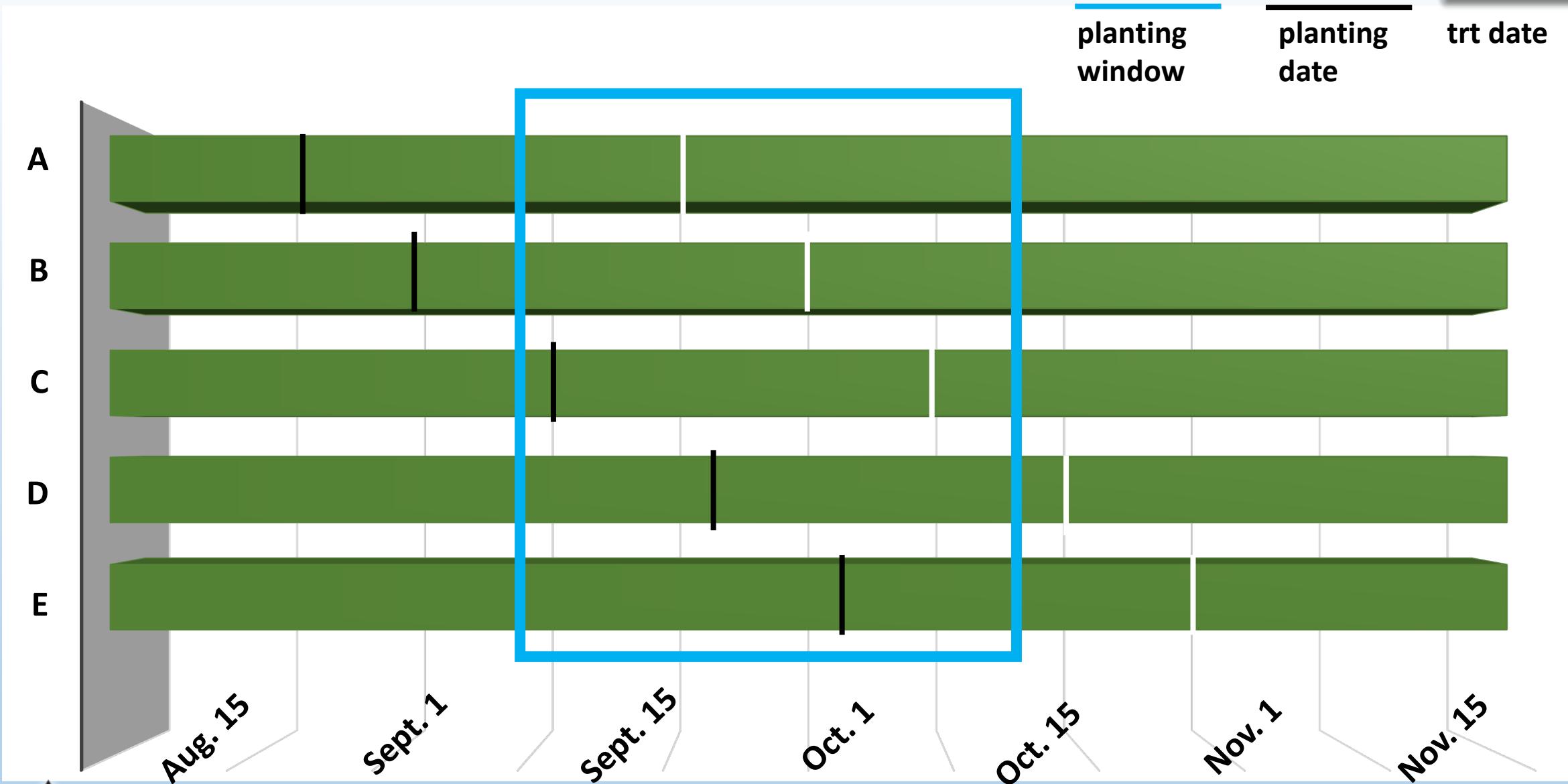
Planting Date x Plant Growth Regulator Study





	Planting Dates	Treatments	g ai ha ⁻¹
A	August 25	Non-treated	0
B	September 1	Tebuconazole*	61.5
C	September 8	Tebuconazole*	123.09
D	September 22	mepiquat chloride	11.97
		mepiquat chloride	23.94
		mepiquat pentaborate	58.13
		prohexadione-calcium	136.34
E	September 28	Metconazole*	51.29
		kinetin + gibberellic acid + indole butyric acid	2.25 + 0.841 + 1.12

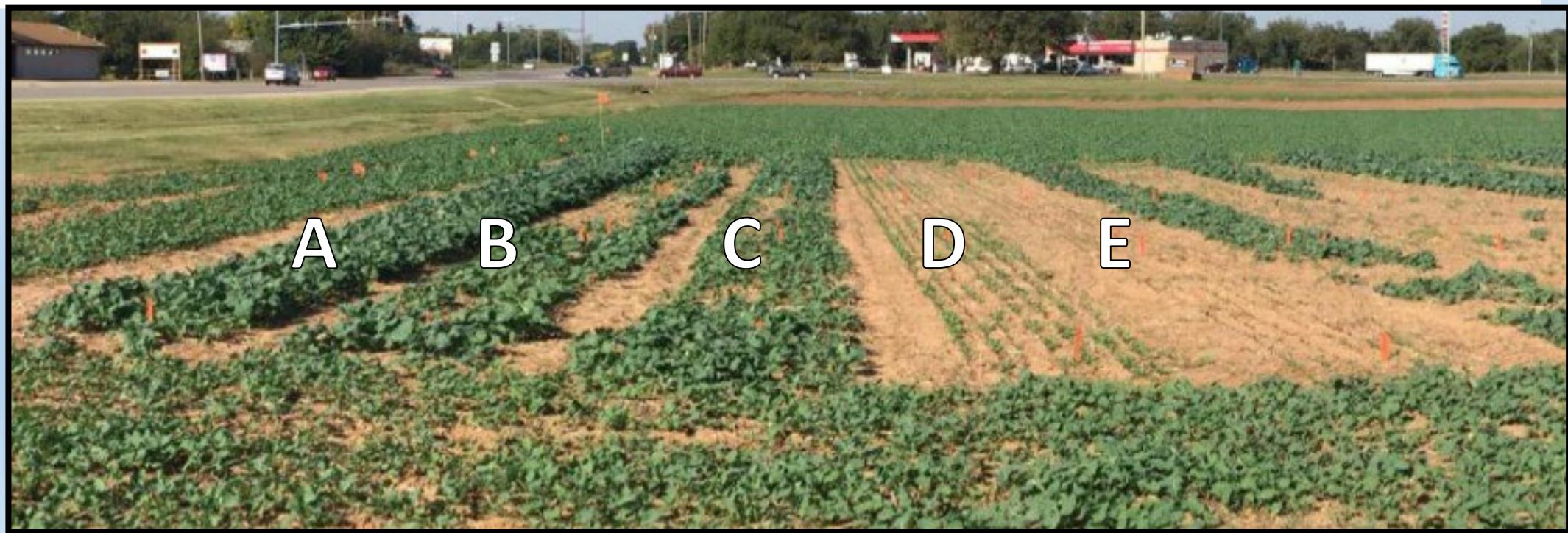
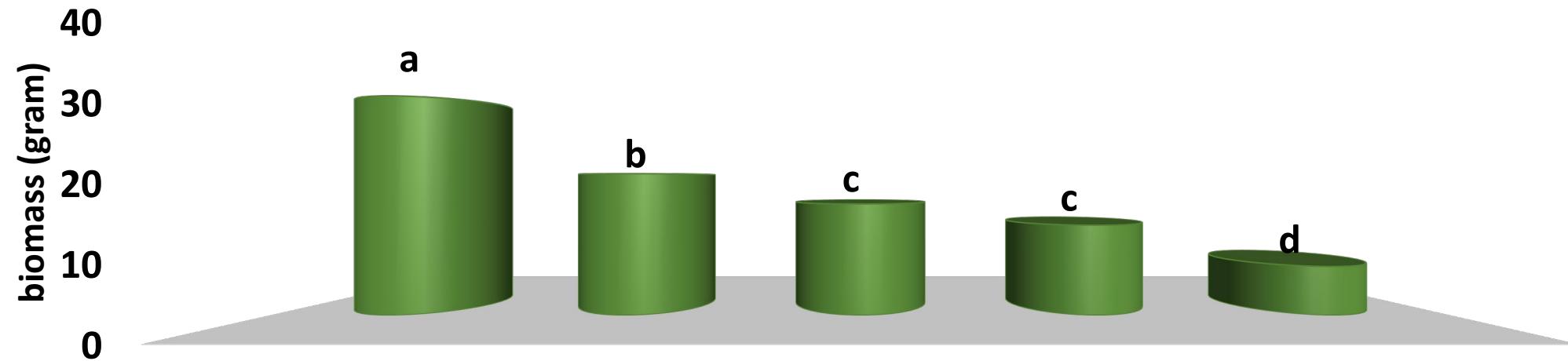
* Indicates a labeled fungicide





Mean Biomass Across Planting Dates 4 WAT

$\alpha = 0.05$
 $HSD = 0.9956$





Planting Date

GDD Accumulated

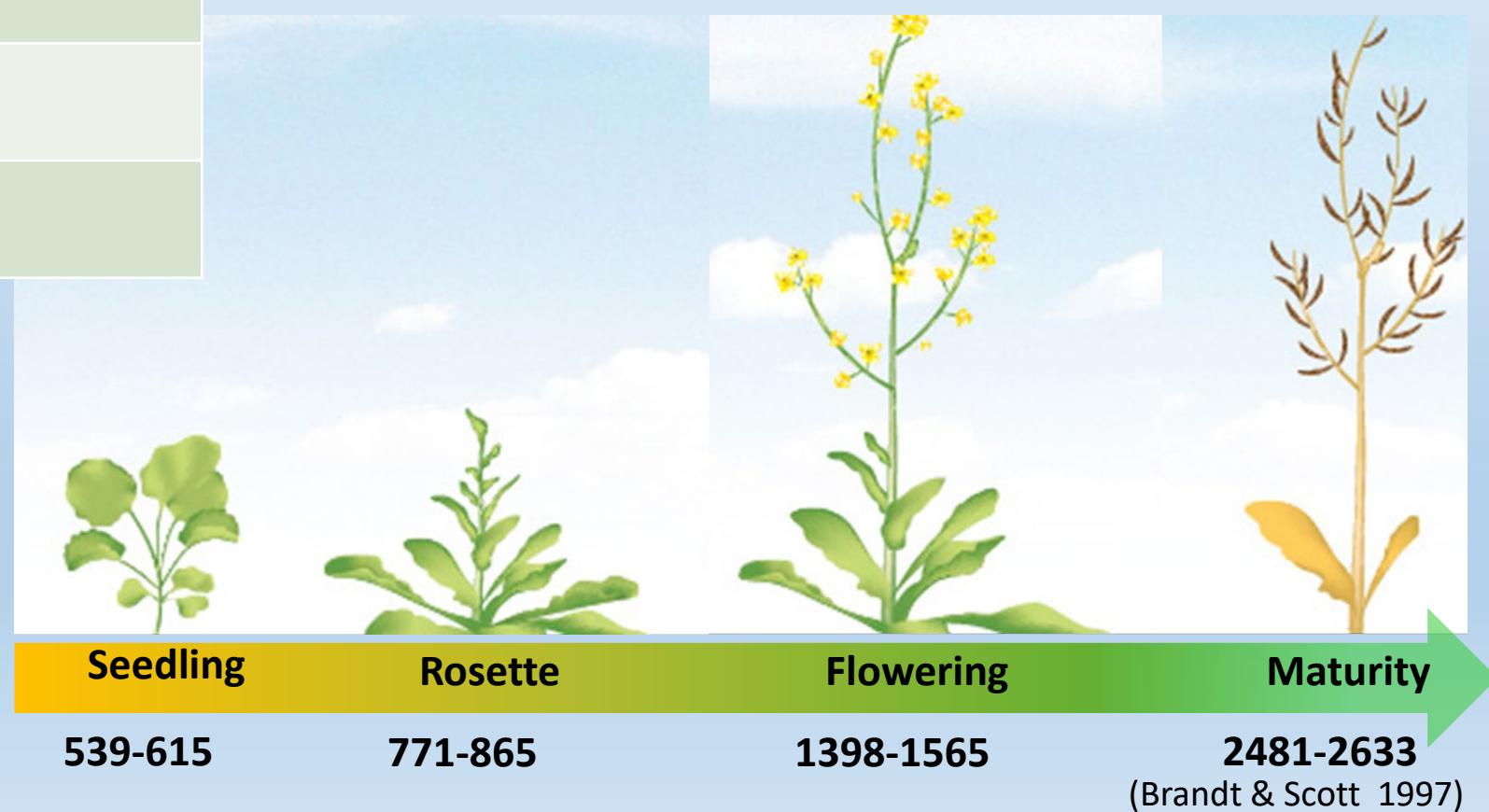
A 1493

B 1086

C 1018

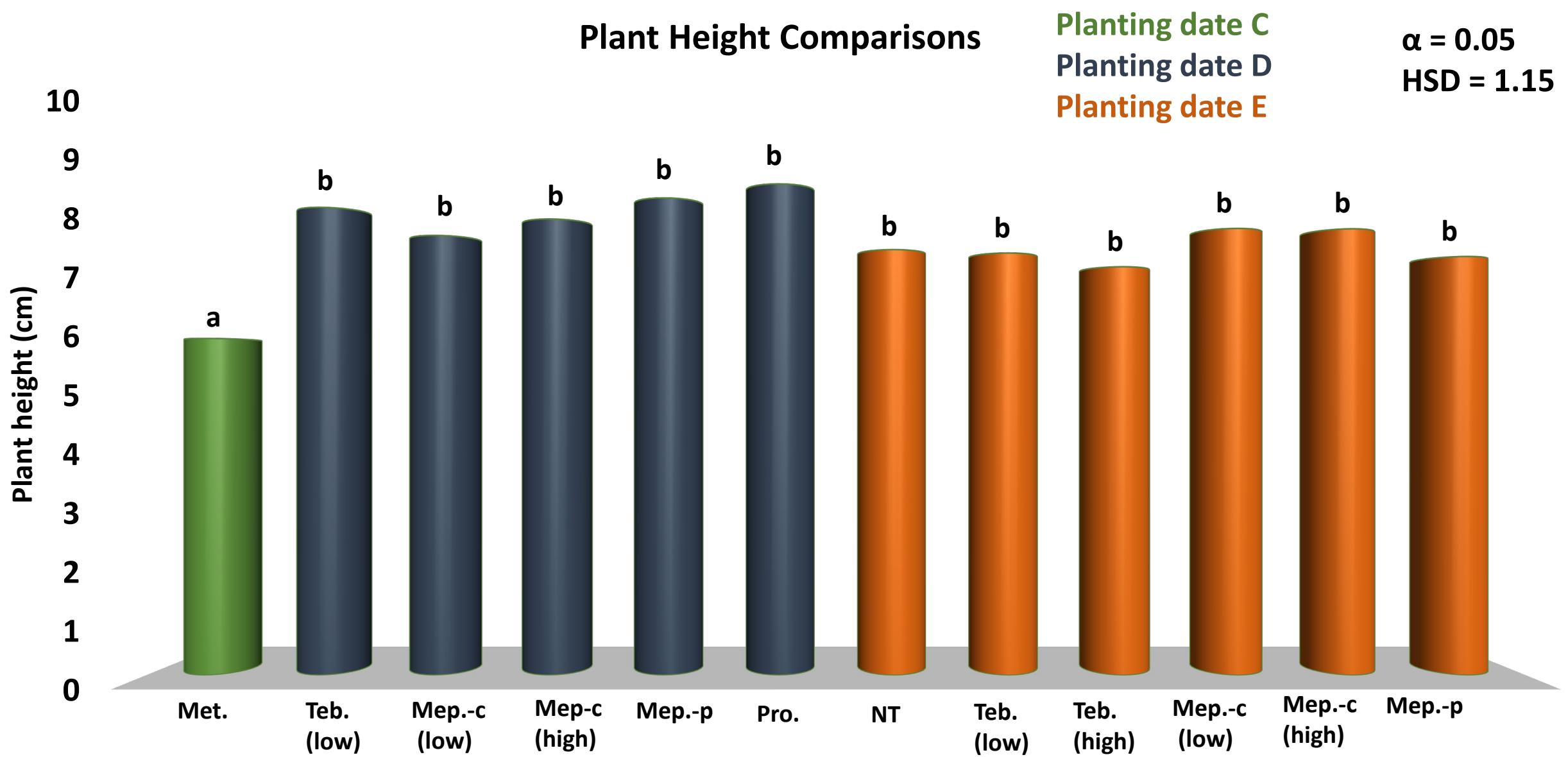
D 857

E 837





Plant Height Comparisons



4 WAT



Metconazole C



Prohexadione D



4 WAT



Metconazole C



Tebuconazole (low) E

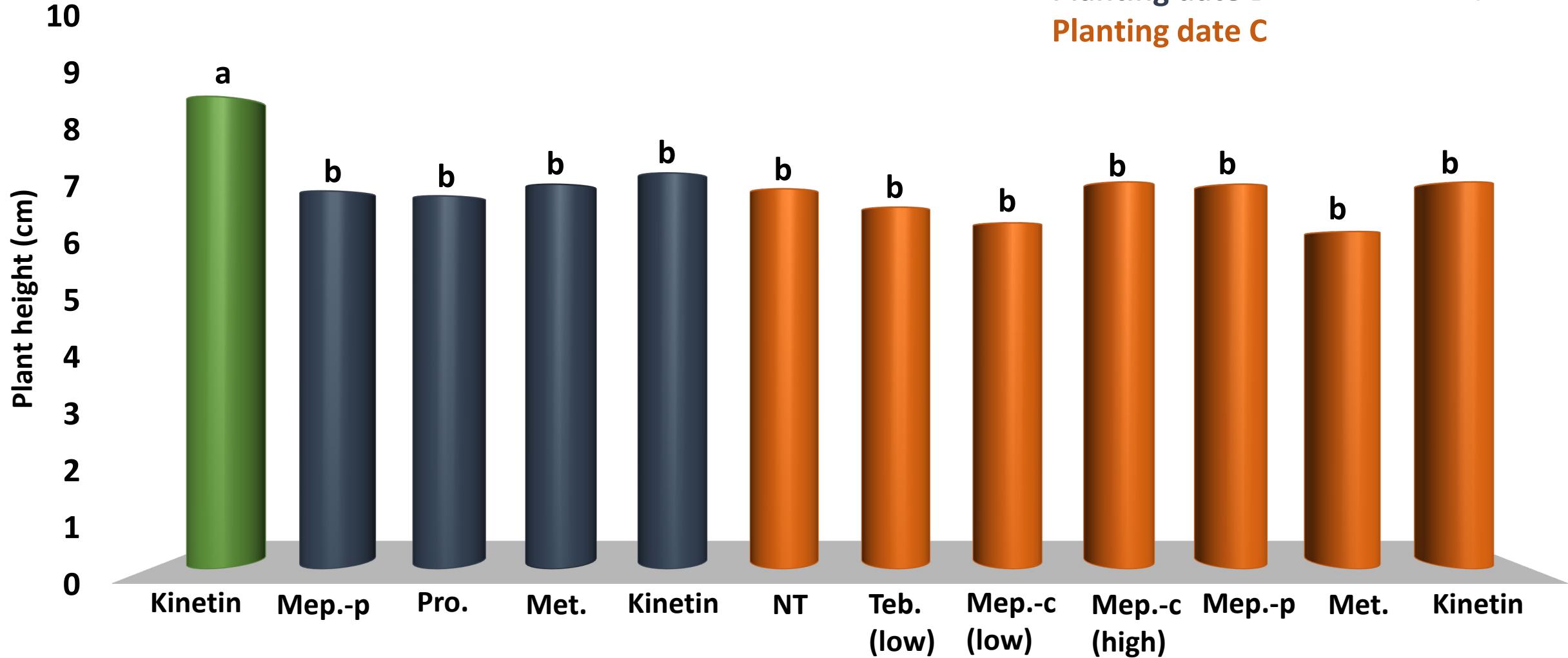




Plant Height Comparisons

Planting date E
Planting date B
Planting date C

$\alpha = 0.05$
 $HSD = 1.15$



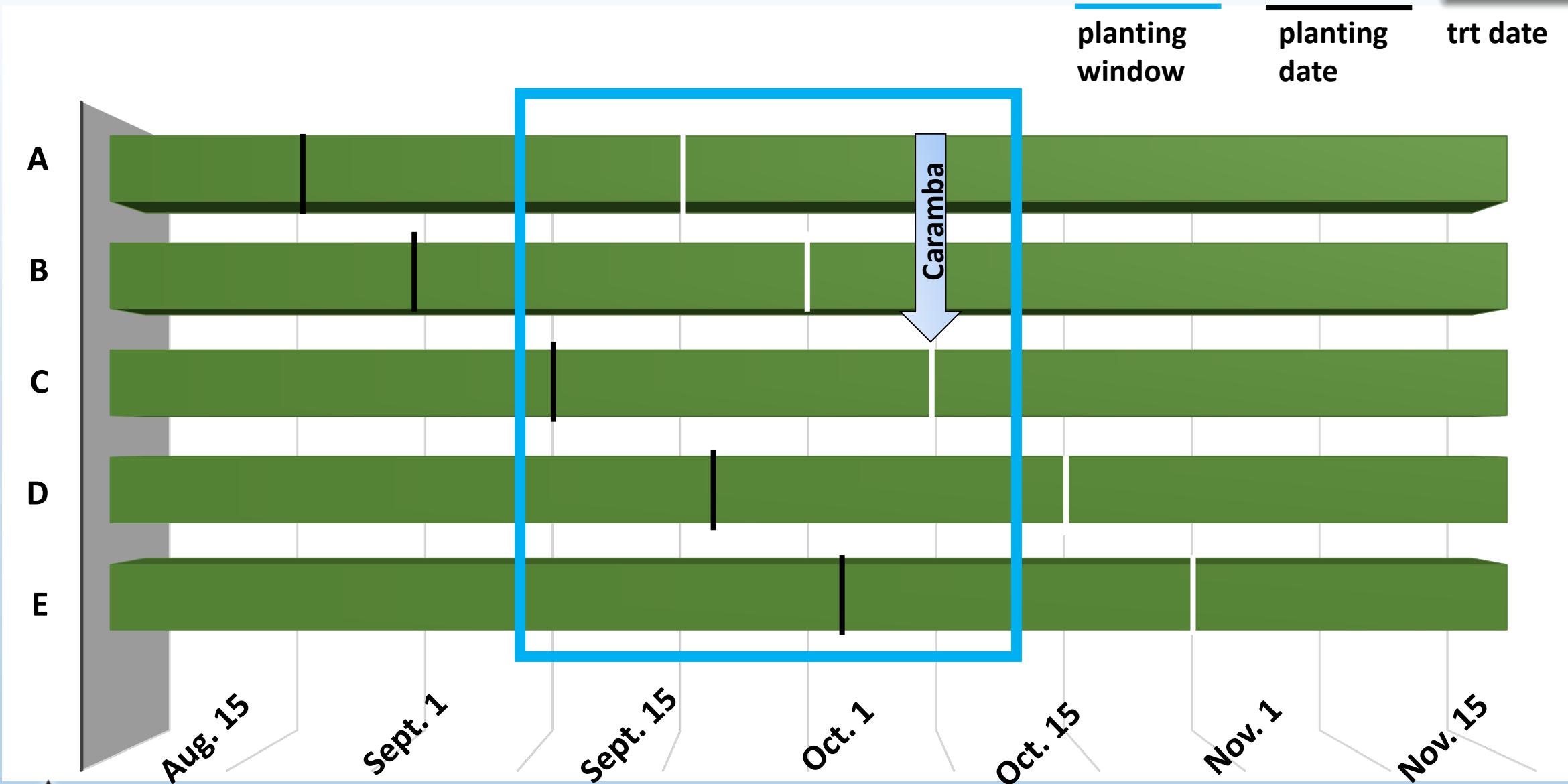
4 WAT

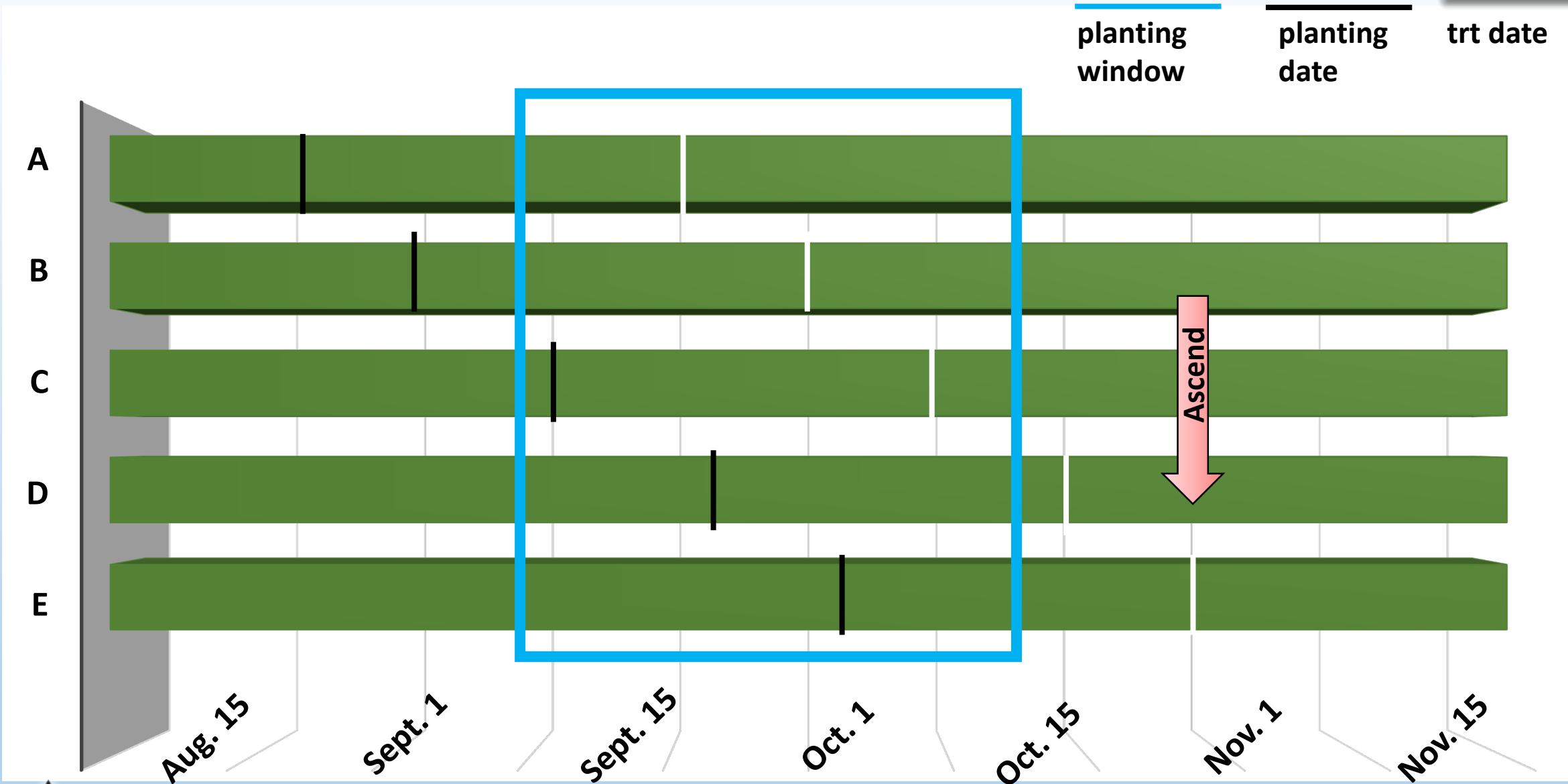


kinetin + GA + IBA PD - E



Metconazole PD - C





Impacts of PGR Testing

- Drought mitigation through fall top-growth management
- Earlier planting dates could improve winter survivability; but additional tools are needed to manage excess growth



Row Spacing and Seeding Rate

- Row spacing include 10", 20", 30" in no-till and 30" in strip-till.
- Evaluated varieties include Pioneer 46W94 (hybrid) and HyClass 125W (OP).
- Seeding rates for 10 and 20" spacing were 3 and 5 lbs/ac.
- Seeding Rates for 30" spacing were 1.5 and 2.0 lbs/ac.

20" Spacing



30" Spacing



Twin



15"



30"



14" Wheat Stubble





Large Scale VT with Hoe Drill in No-till



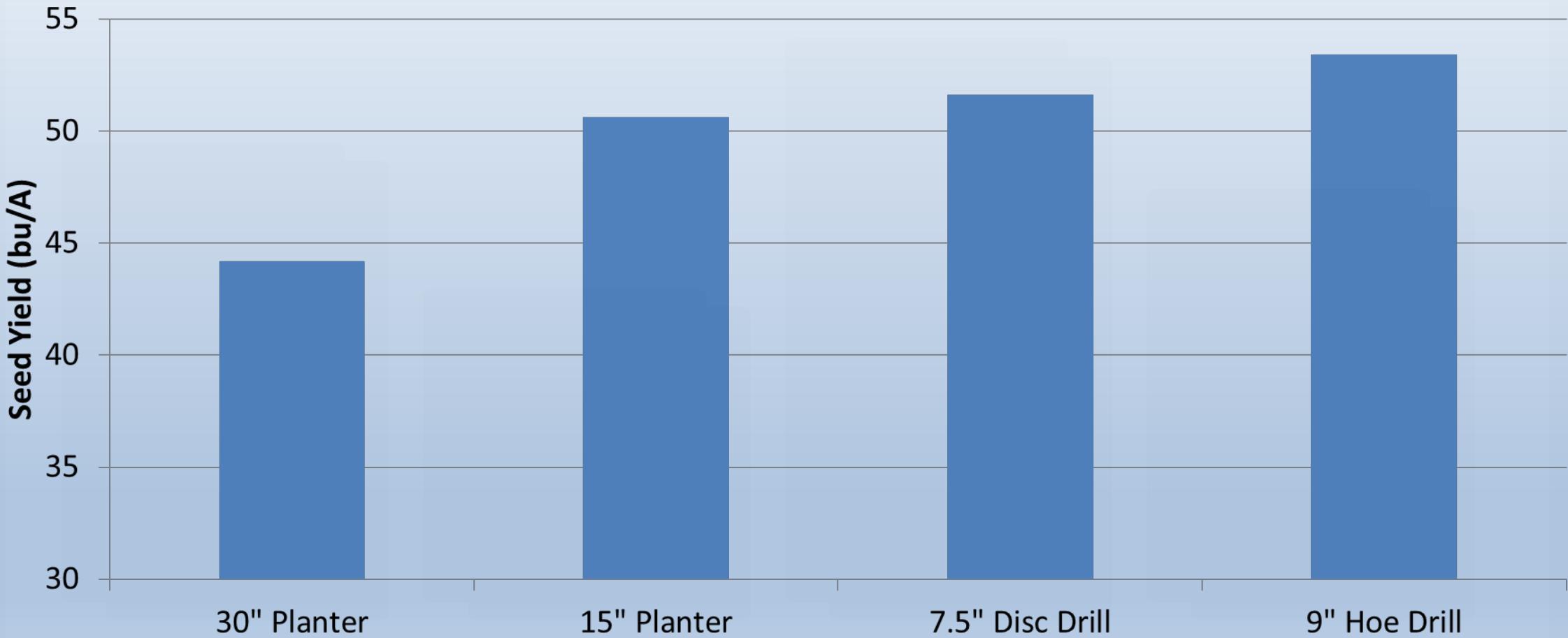


2014-2015 No-till Demo





2014-2015 No-till Demonstration

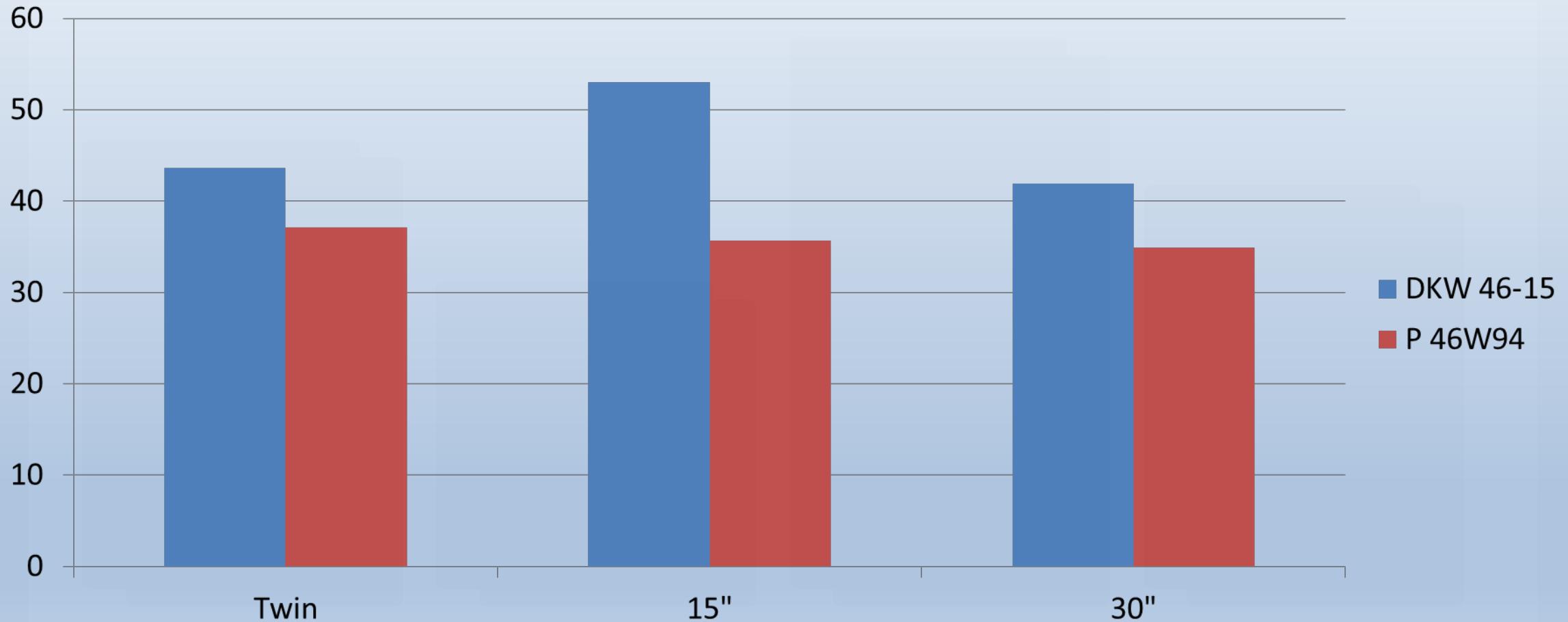


2014-2015 Monosem in No-till

- Evaluate vacuum planting into wheat stubble
- Three-way factorial
 - Row spacing (15", 30", and Twin (8" x 22"))
 - Variety (OP vs Hybrid, both RR)
 - Population (0.75" and 1" seed spacing)
- Single disc row cleaner
- Two locations
 - North central OK
 - South central OK (2015 not harvested)



2014-2015 Monosem in No-till



Tillage Trials



VT Intensity

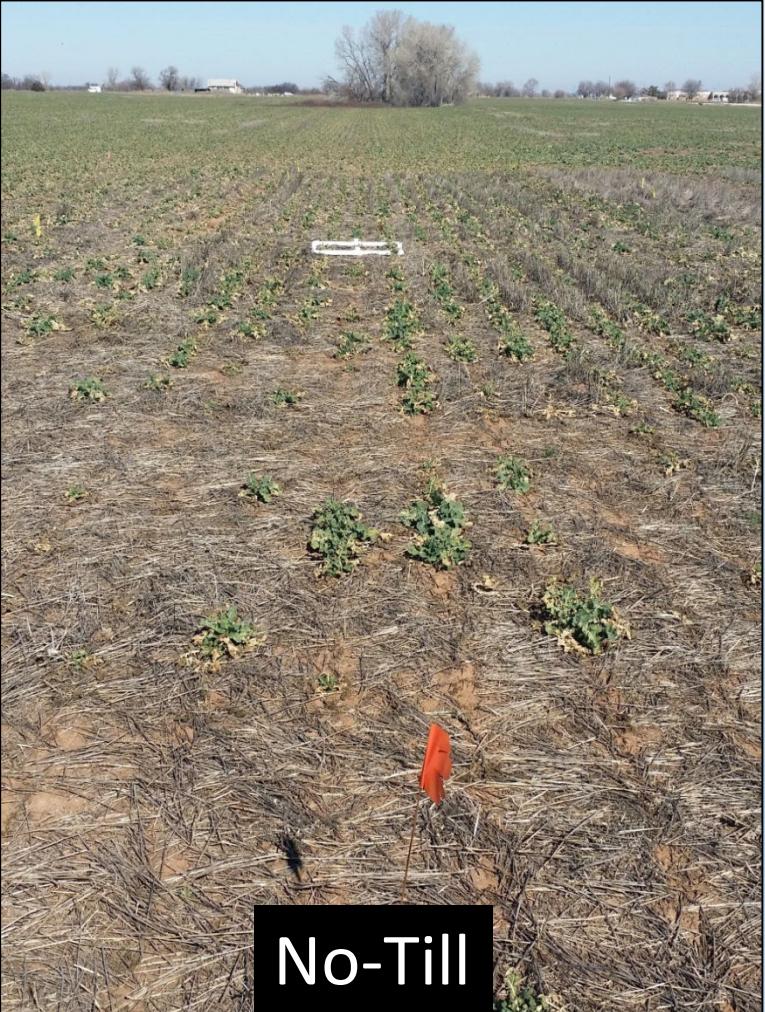


No-Till Canola Fairview January 2016

- Canola stands are excellent
- No difference in measured canopy among treatments
- Stand counts, NDVI, and crown height data are currently being compiled



Fairview Stand on Feb. 13, 2015

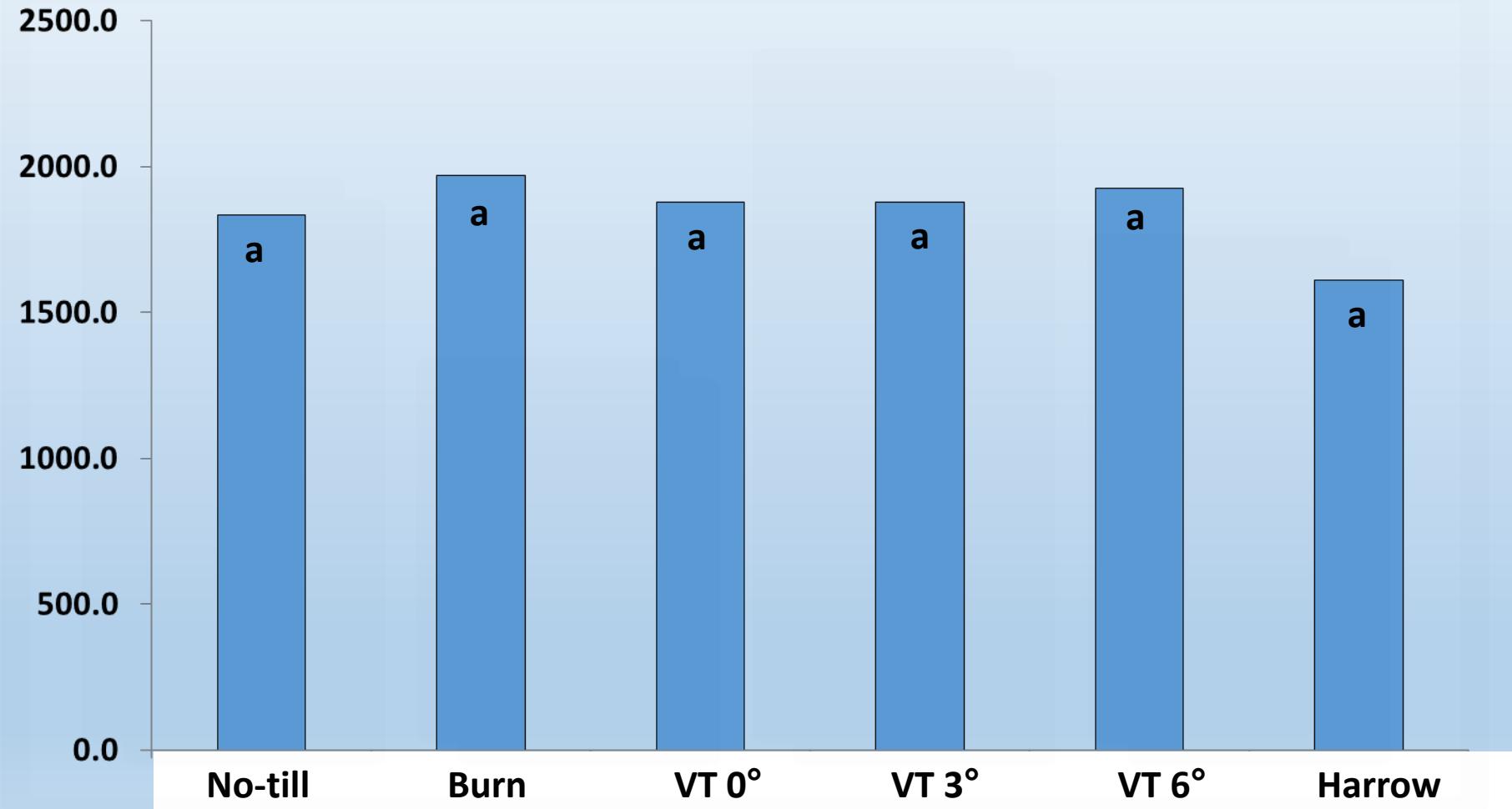


No-Till



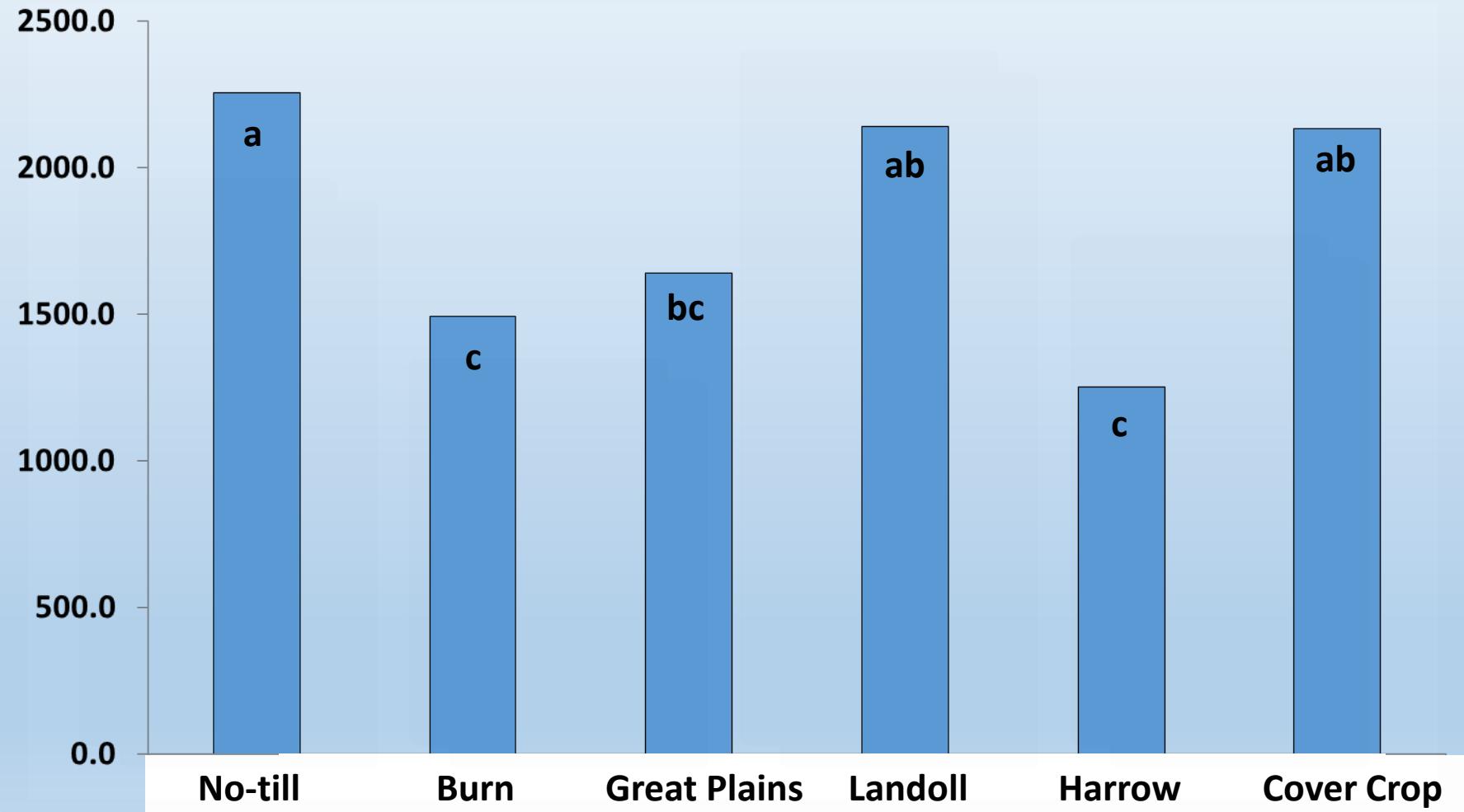
Vertical Tillage

2014-15 Fairview Yield



†Means with the same letter are not significantly different. Alpha = 0.05.

2014-15 Chickasha Yield



† Means with the same letter are not significantly different. Alpha = 0.05.

Integrated Pest Management

- Insect Scouting
- Insecticide Trials
- Screening for Blackleg resistance
- Preemergent weed control
- Pollinator health



Blackleg Major Gene Resistance

	Plant genes	
Pathogen genes	<i>Rlm1</i> Resistant	<i>rIm1</i> Susceptible
<i>AvrLm1</i> Avirulent	R 	S 
<i>avrLm1</i> virulent	S 	S 

Screening for Major-Gene Resistance to Black Leg

- 22 new entries screened against 3 races of *L. maculans* races polymorphic for AV1 and AV4
- Screened 63 entries to date
 - 20 (32%) have major-gene resistance
 - only 2 (3%) are round-up ready
 - Resistance to all races (likely *R7*) only found in 5 (8%) non-round-up ready entries



Screening Winter Canola Germplasm for Resistance to Black Leg

National Winter Canola Variety Trial

48 entries in replicated plots
planted and inoculated
good winter survival
leaf spot present in trial

KSU Breeding Lines

110 entries in observational plots
planted and inoculated
good winter survival
leaf spot present in trial



Impacts of Pest Management Testing



Improved
Black leg
screening

Identification
of resistant
lines

Incorporation
into breeding
stock for
variety
development



Growers can now select
varieties for blackleg resistance

Industry should look to develop
better resistance in RR varieties

Objective: Develop an efficient scouting plan that can be used as a decision aid for determining the need for preventive fall applications of pyrethroid insecticides.

*Scouting over 50 fields throughout the western half of Oklahoma to clarify pest activity periods. Goal is to validate and improve calendar below.

SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Army Cutworm-----|

Beet Armyworm-----|

Diamondback Moth-----|

*Aphids not present in fall with use of insecticidal seed treatment

Turnip Aphid-----|

Green Peach Aphid-----|

Cabbage Aphid-----|

False Chinch Bug-----|

Harlequin bug-----|

Variegated Cutworm--|



***Results to date:** No unexpected infestations. No detection of seed-pod weevil which is a severe pest in SE United States.

Weed Management

- Five herbicide sites throughout OK investigating herbicide programs for preemergent weed control
- Improve databank to request section 18 and 24C registrations where necessary
- Rotational studies investigating crop rotation intervals following wheat



Pollinator Health

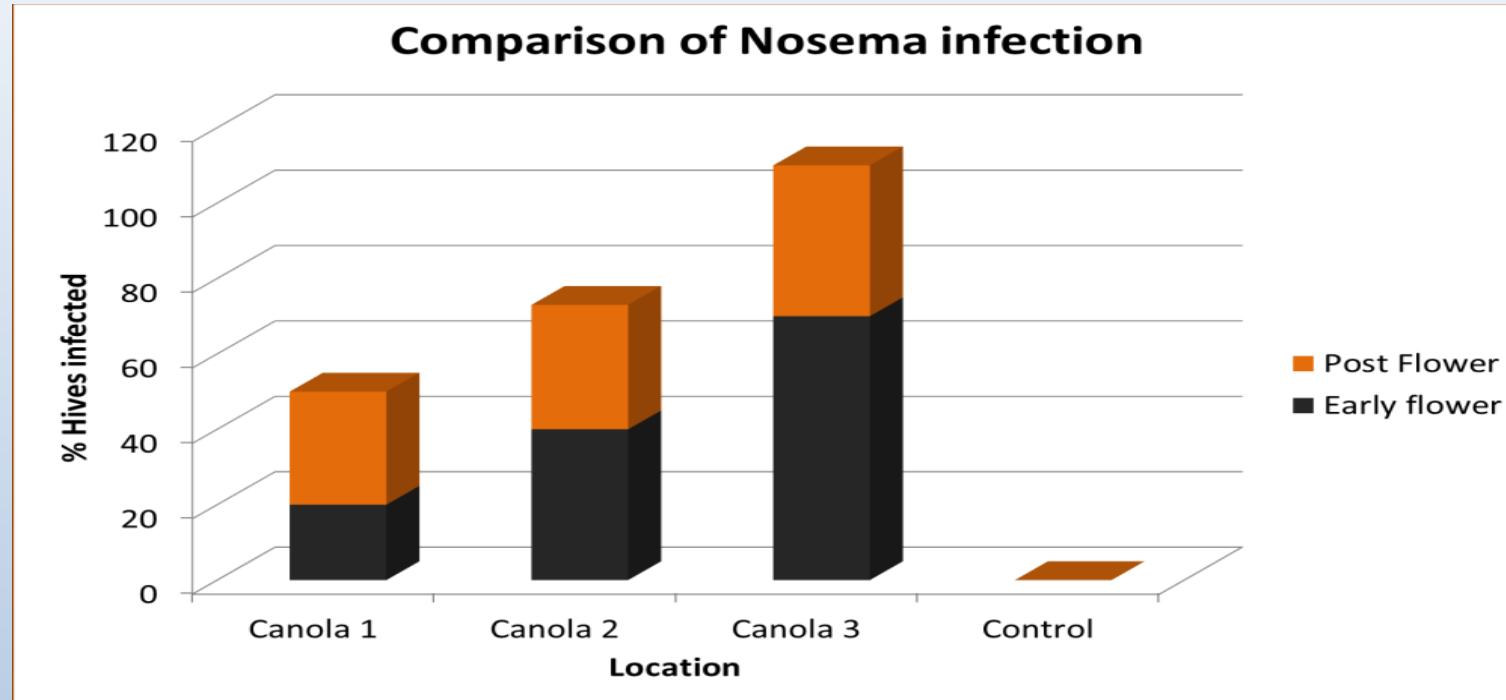


- 3 canola locations
- 1 control location
- Weighed and sampled hives preflower and post flower
- Sampled for Nosema and Varroa mites



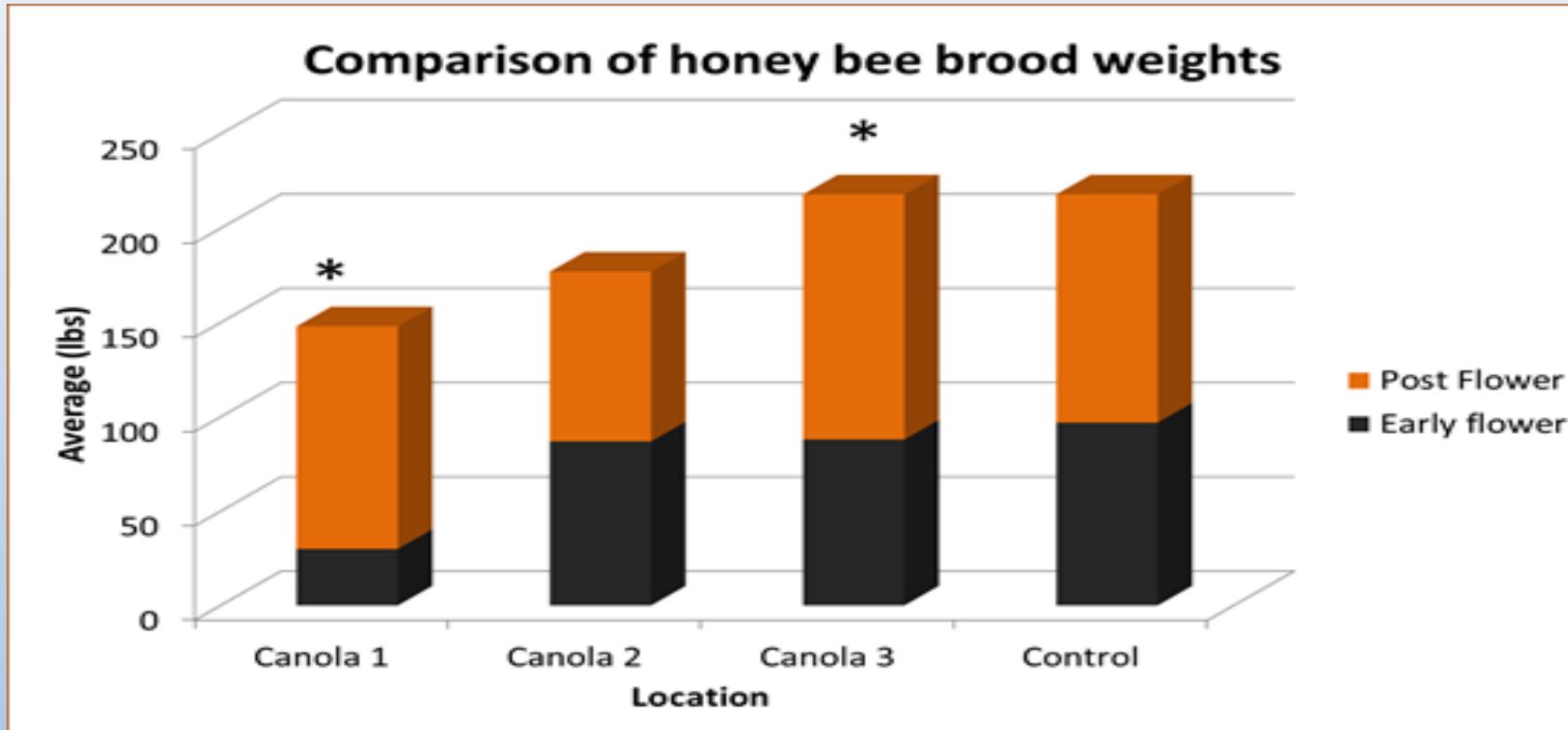
Objective: Determine if canola increases pollinator health

Preliminary Data



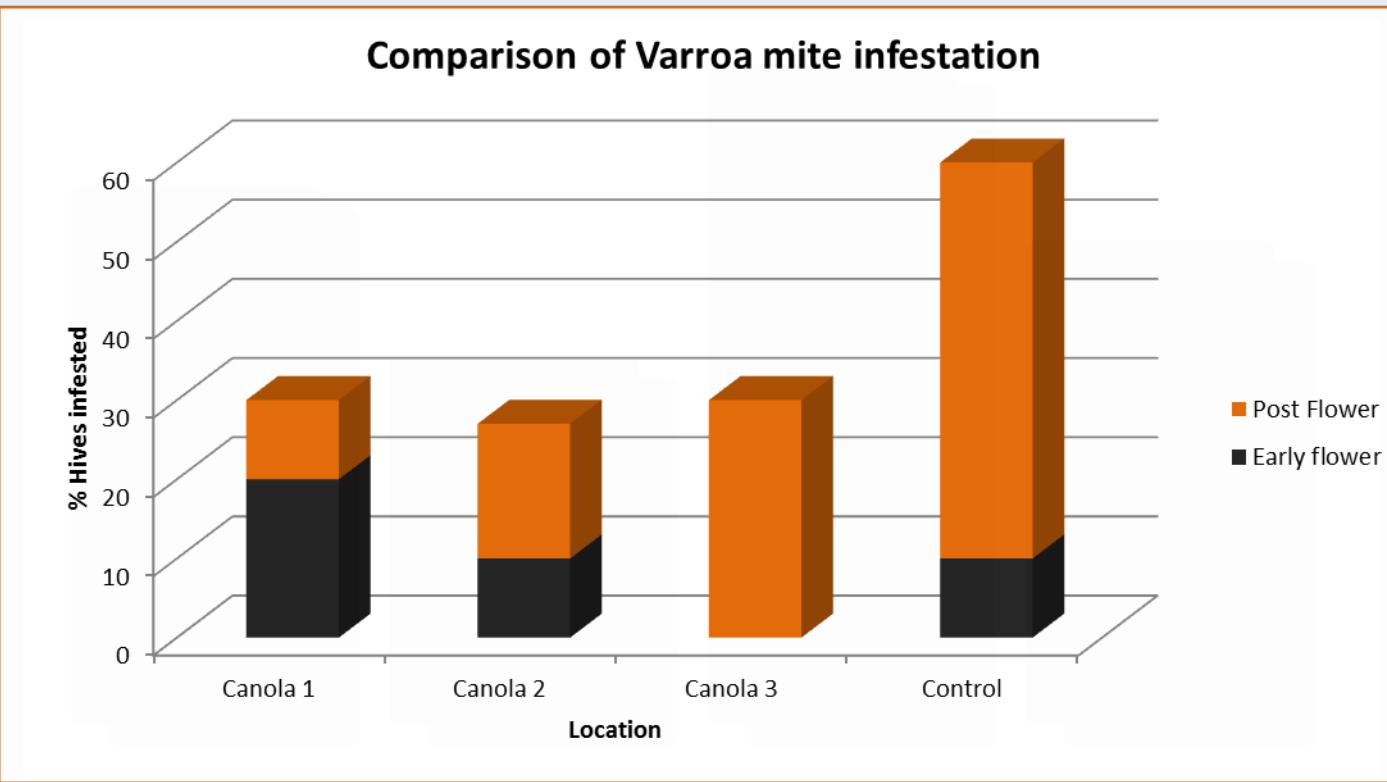
- Nosema infection decreased at 2 of the 3 locations
- Control was not infected
- Hives will be evaluated for Nosema infection before being set in research locations to ensure uniform infection levels in 2016
- Sampling Procedure will be changed for 2016 utilizing both molecular and microscopy techniques

Preliminary Data



- Brood weights increased at all locations and significantly at two locations
- Data will be analyzed looking at the ratio of increase for 2016

Preliminary Data



- Varroa mite infestation decreased at one location, but increased in 2 others and the control
- The control location had more Varroa mites present than canola locations

Impacts of Pest Management Testing

Improved Scouting
Protocols



Targeted Pesticide
Applications



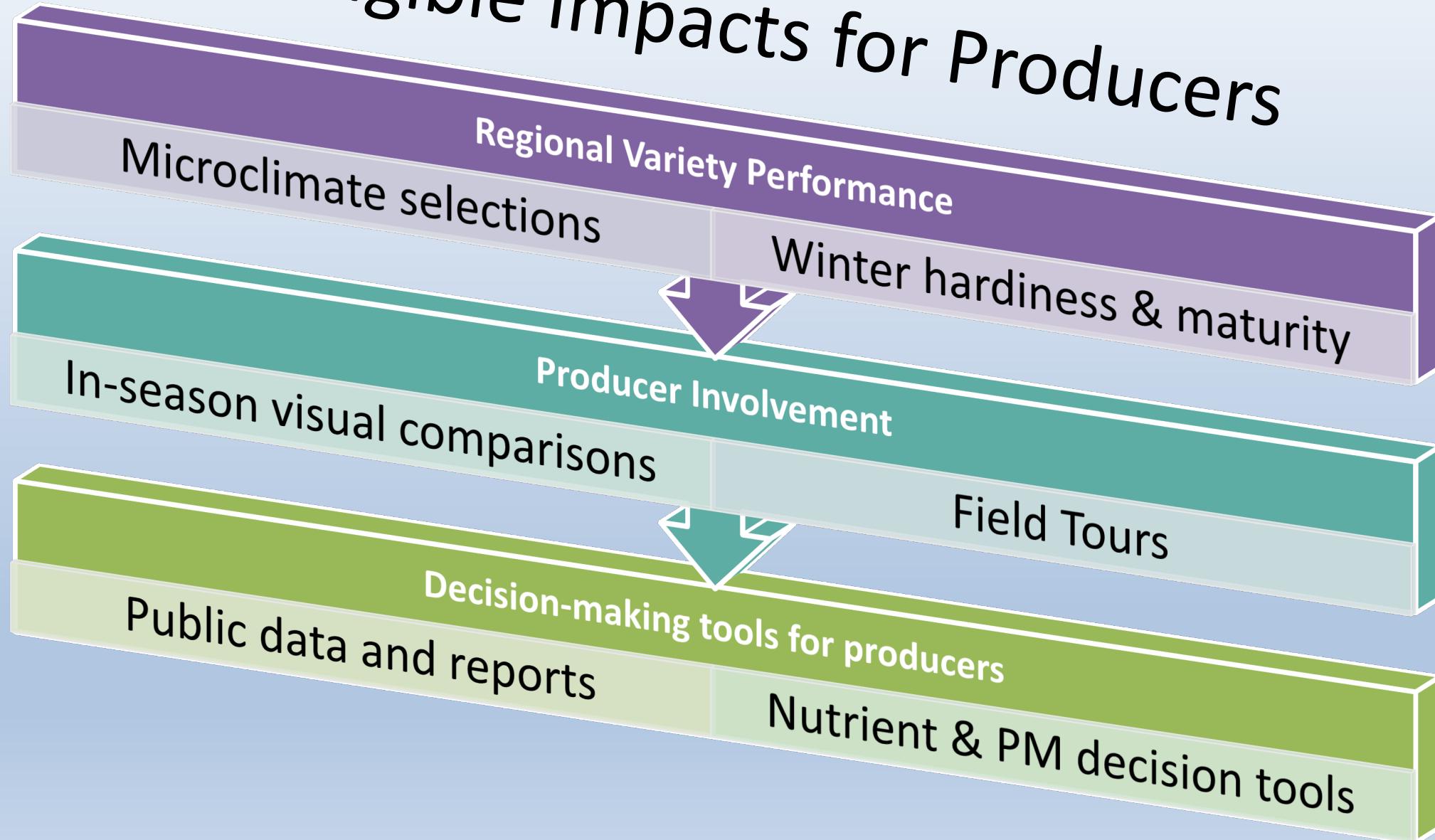
Increased safety
to beneficial
pollinators

Decreased pesticide load in
the environment



Benefits to commercial
pollination enterprises through
increases brood weights and
potential decrease pests &
diseases in season.

Tangible Impacts for Producers



Extension Programming

- Winter Crops School & County Canola Extension Events
- Canola College just completed Feb 19th (165 in attendance)
- Field Plot Tours
- Last year we directly impacted over 1500 individuals with attendance at canola extension events and direct media views



Winter Canola Variety Trial at McGregor, TX



Tank contamination by cooperator of Roundup killed non-Roundup Ready canola varieties. Photo taken February 16, 2016.