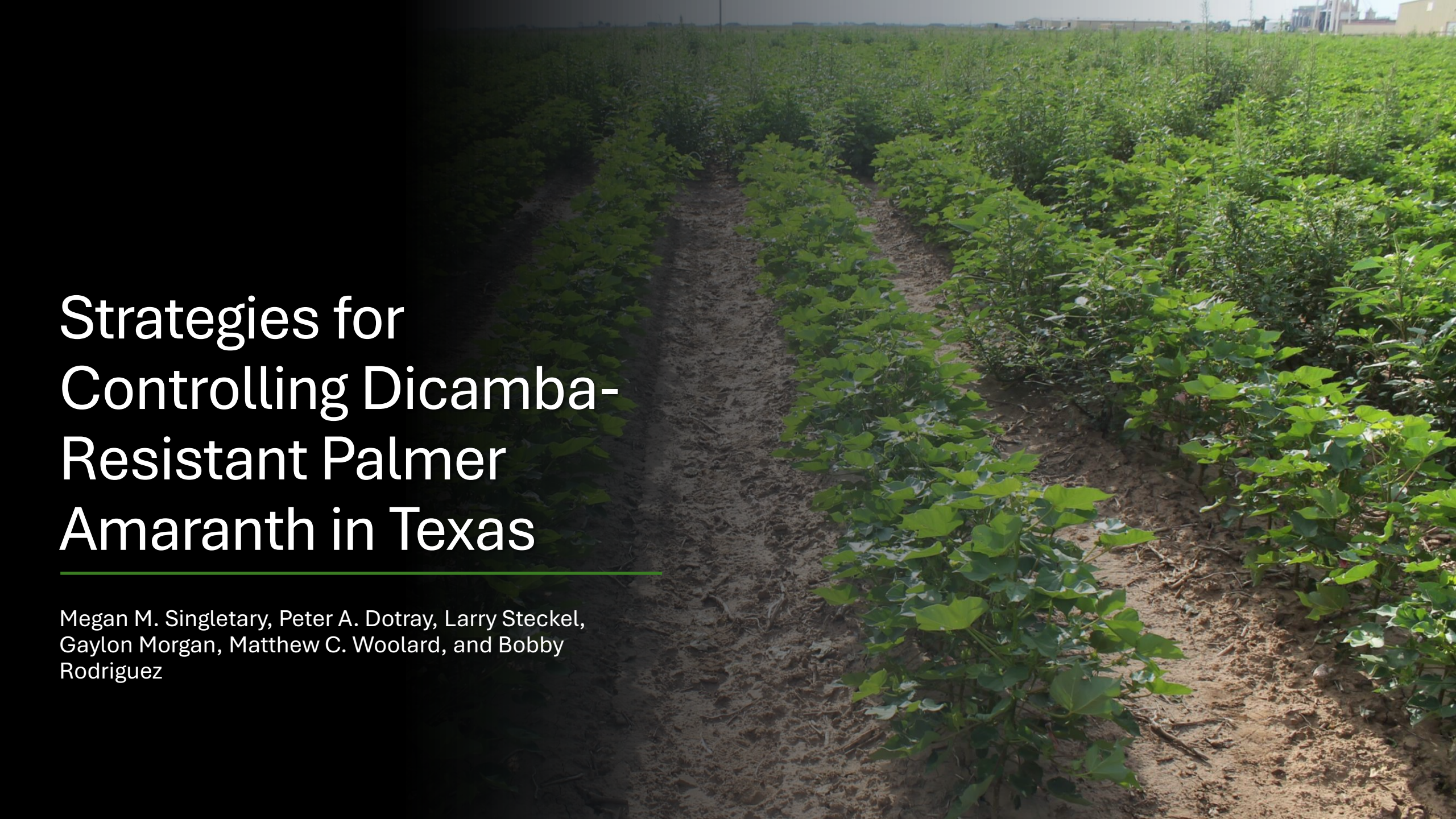
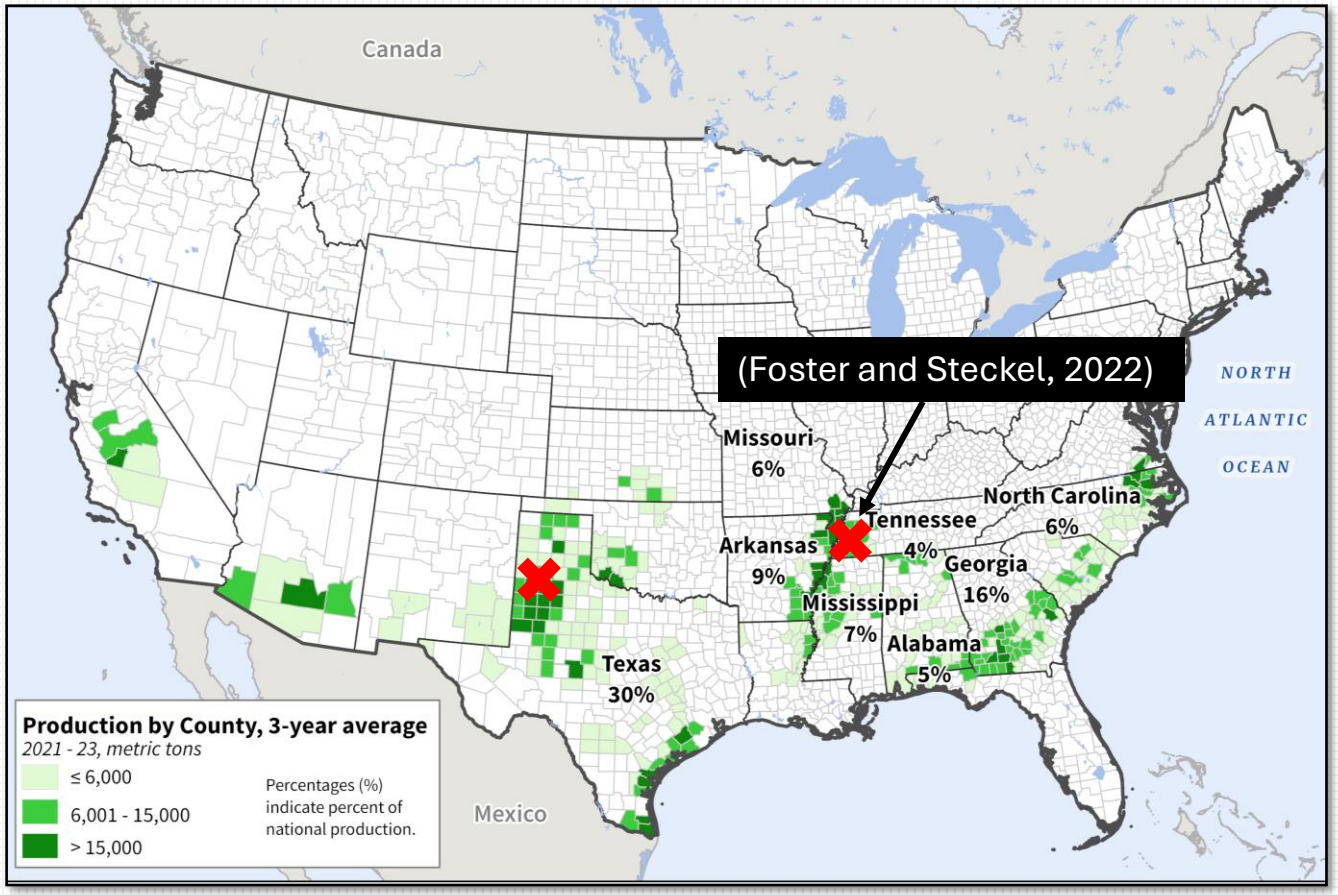
Strategies for Controlling Dicamba-Resistant Palmer Amaranth in Texas

Megan M. Singletary, Peter A. Dotray, Larry Steckel, Gaylon Morgan, Matthew C. Woolard, and Bobby Rodriguez

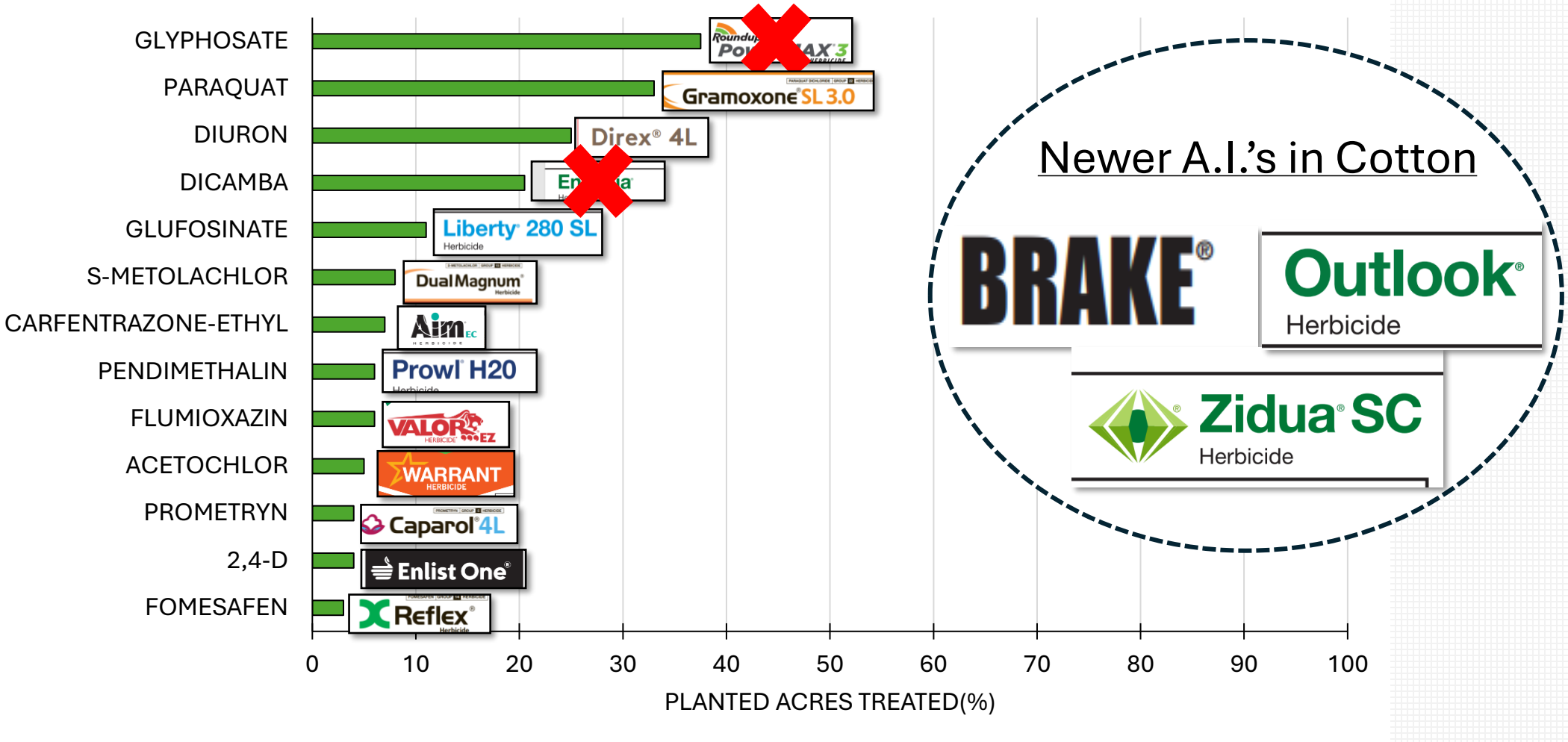


Dicamba-resistant Palmer amaranth identified in Tennessee (2020) and Texas (2022)



Source: U.S. Department of Agriculture, National Agricultural Statistics Service
Pima and Upland Cotton Production Combined

Texas – Cotton Herbicide Usage



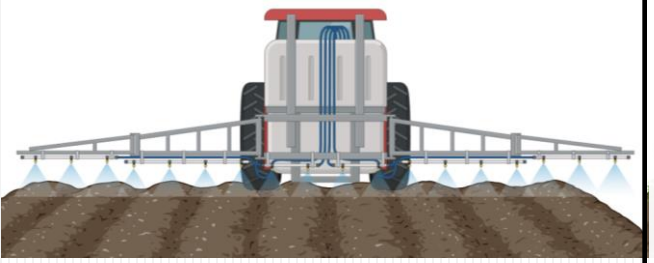
Source: U.S. Department of Agriculture, National Agricultural Statistics Service
2021 Cotton Pesticide Use

Study 1: Life Without Dicamba

Study 2: Reduced Tillage

Study 3: Cultivar Characteristics

Preemergence (PRE)



Cotoran® 4L
(32 fl oz ac^{-1})

-or-

Cotoran (24 fl oz ac^{-1})
+ Brake® (16 fl oz ac^{-1})

fb

(followed by)

Early-postemergence (EPOST)

Dual Magnum®
(16 fl oz ac^{-1})

-or-

Outlook®
(16 fl oz ac^{-1})

-or-

Dual Magnum
+ Roundup PowerMAX® 3
(32 fl oz ac^{-1})
+ Liberty® 280 SL
(43 fl oz ac^{-1})

-or-

Outlook + Roundup +
Liberty

fb

Postemergence-directed (PDIR)

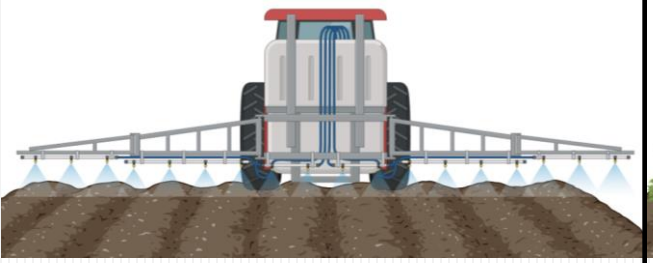
Zidua® SC
(3.2 fl oz ac^{-1})

fb

Layby (LAYBY)

Direx® 4L
(16 fl oz ac^{-1})
+ MSMA 6 Plus
(42 fl oz ac^{-1})

Preemergence (PRE)



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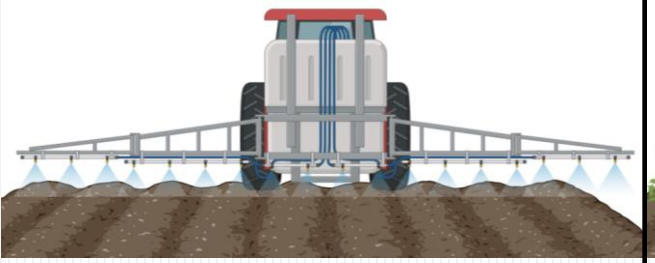

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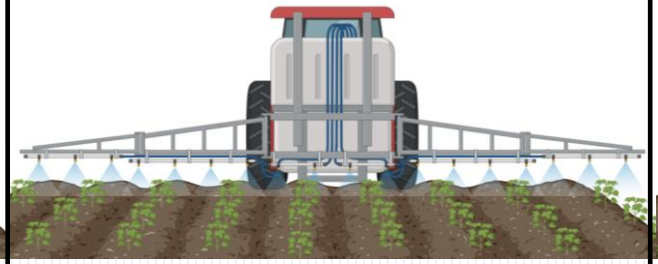

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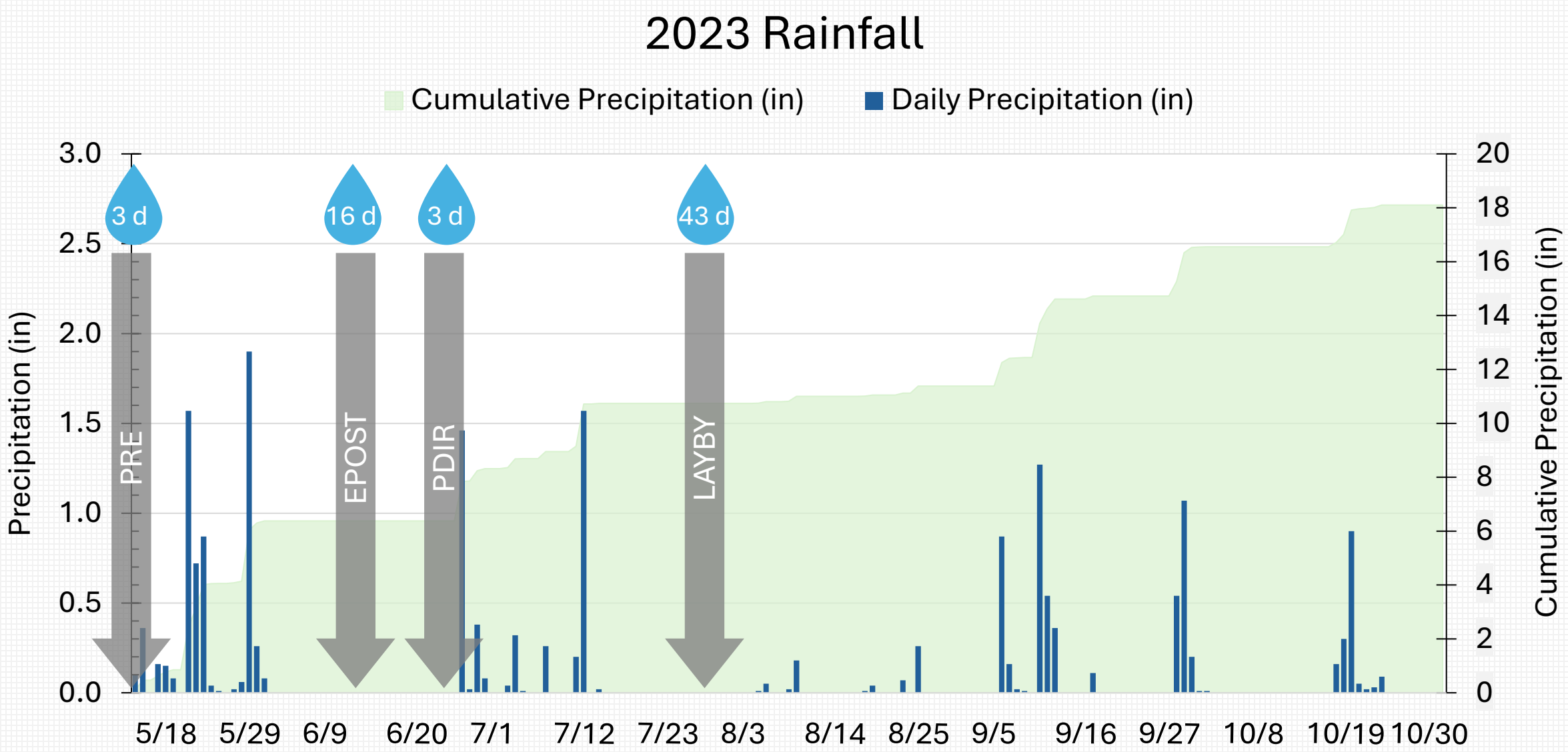
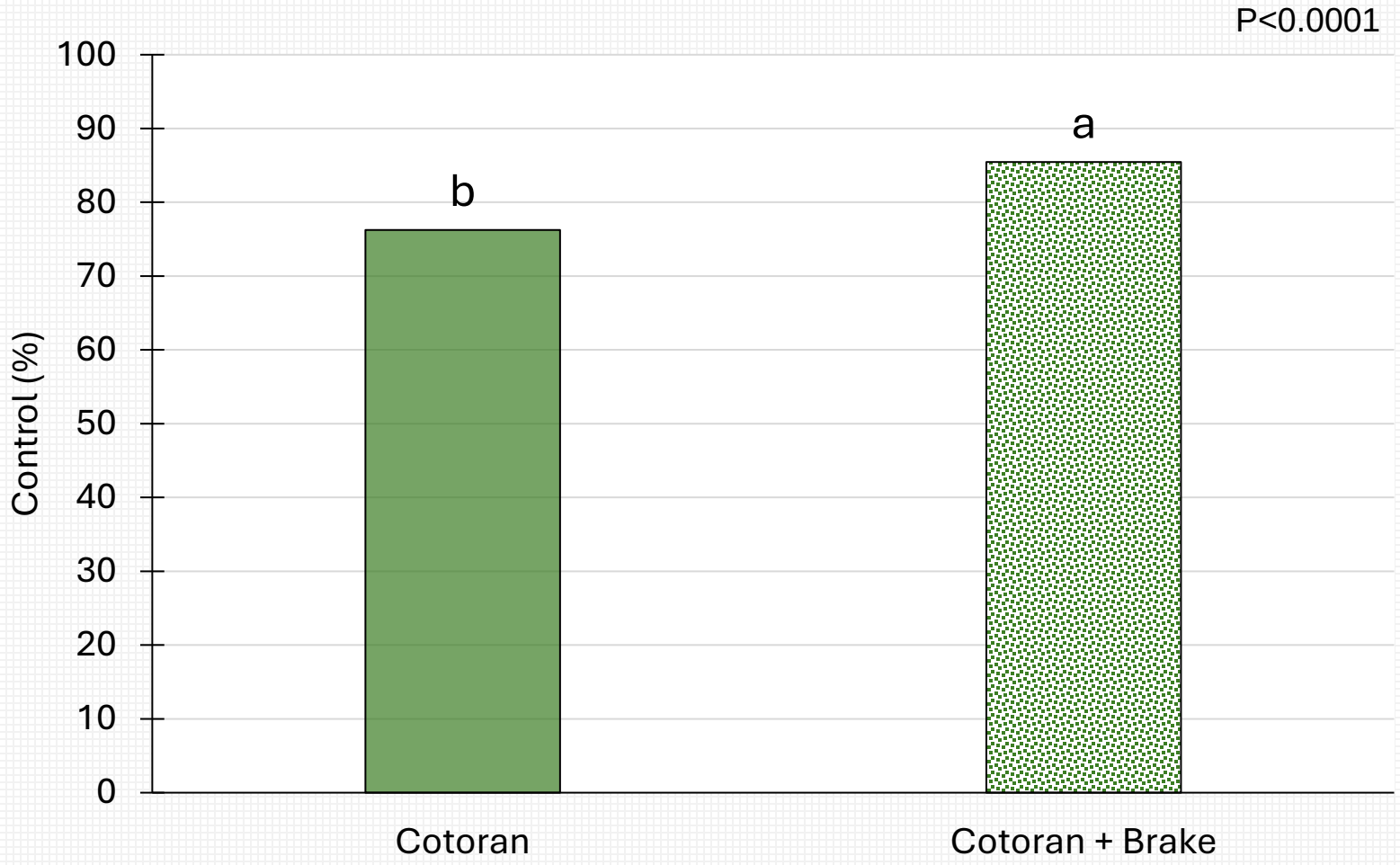
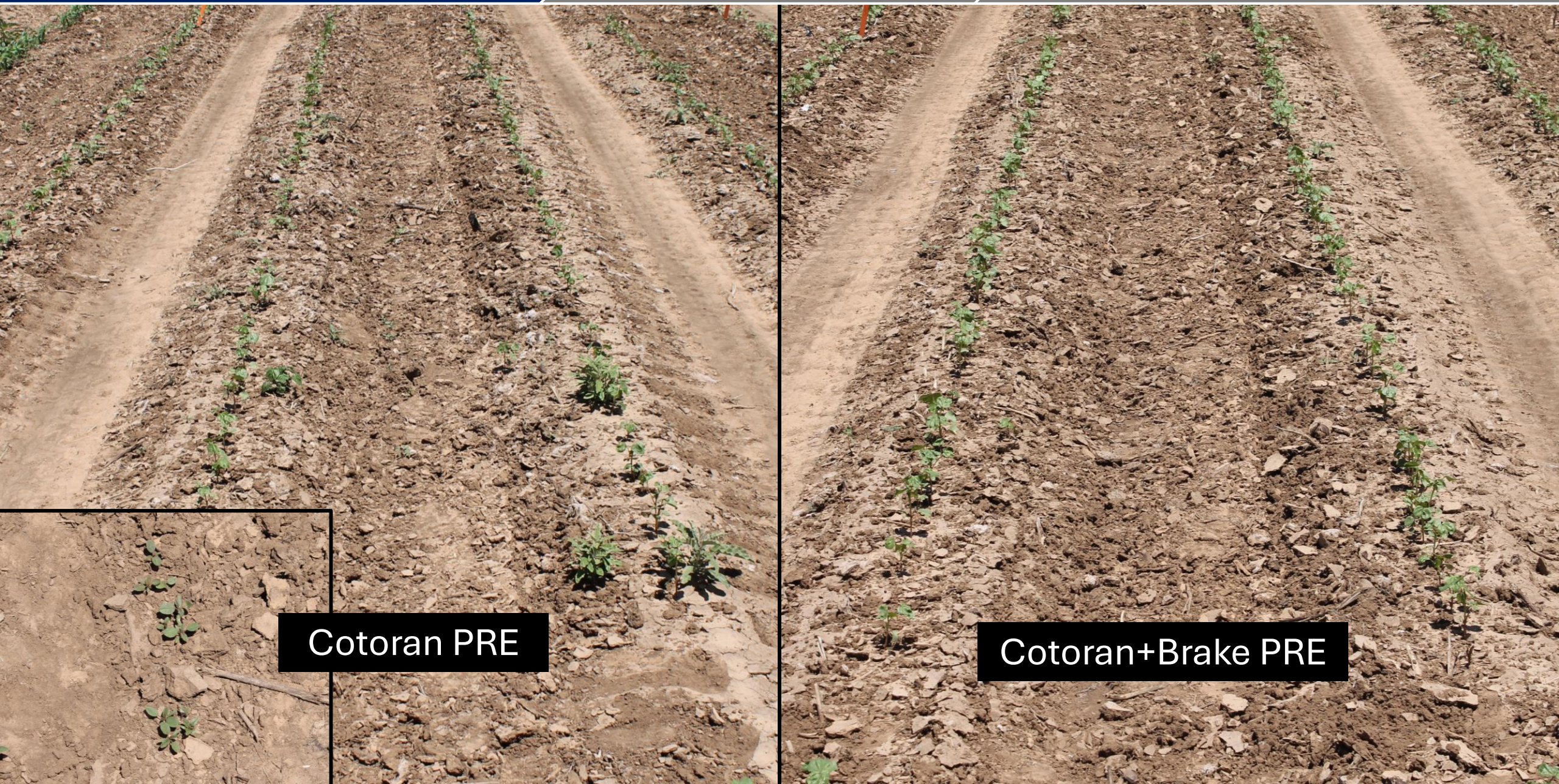
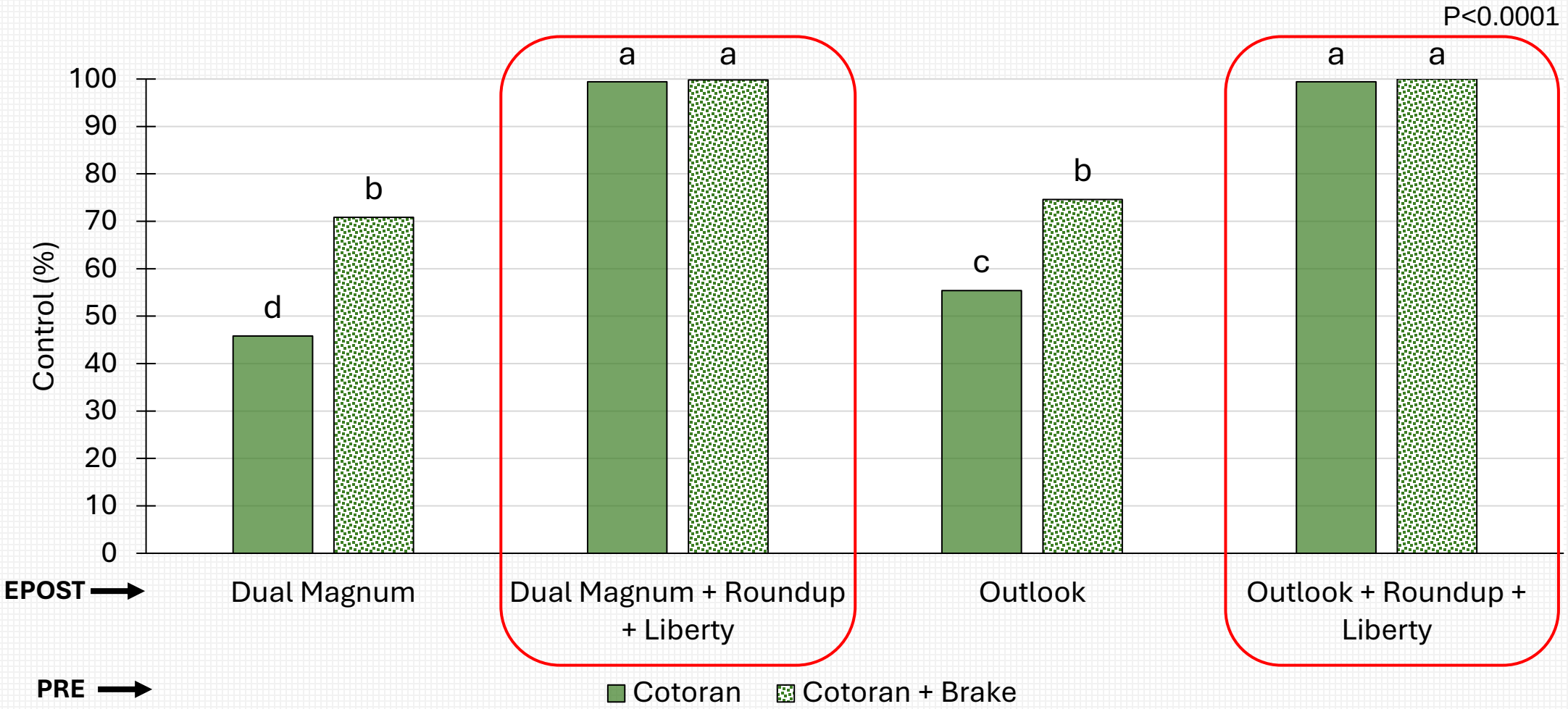

2023 Rainfall
Cumulative Precipitation (in)
Daily Precipitation (in)
Precipitation (in)
Cumulative Precipitation (in)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
20
18
16
14
12
10
8
6
4
2
0
3 d
16 d
3 d
43 d
PRE
EPOST
PDIR
LAYBY
5/18
5/29
6/9
6/20
7/1
7/12
7/23
8/3
8/14
8/25
9/5
9/16
9/27
10/8
10/19
10/30

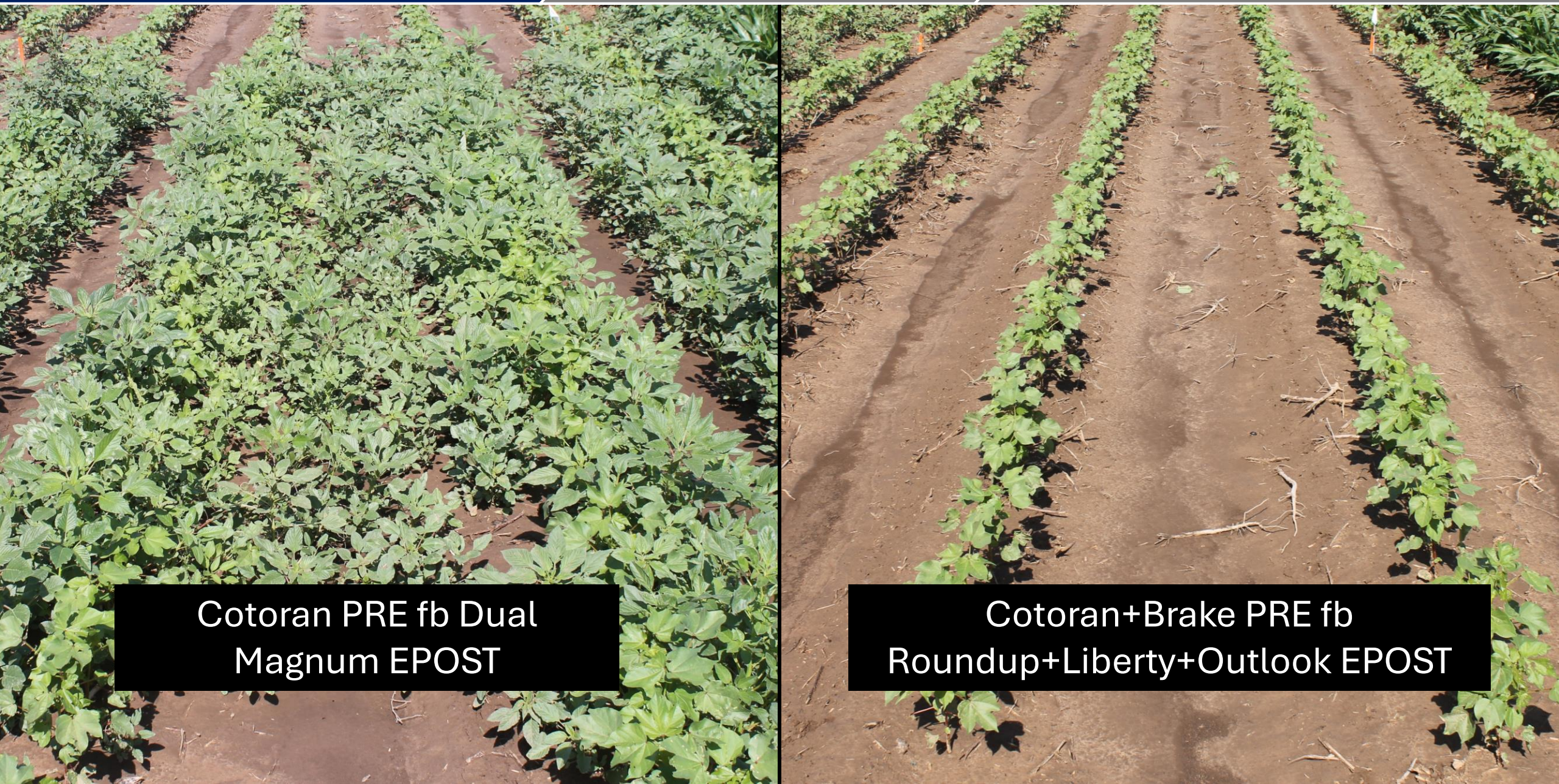
At 27 DAP in 2023, Cotoran + Brake PRE provided a 10% increase in residual Palmer amaranth control compared to Cotoran applied alone PRE



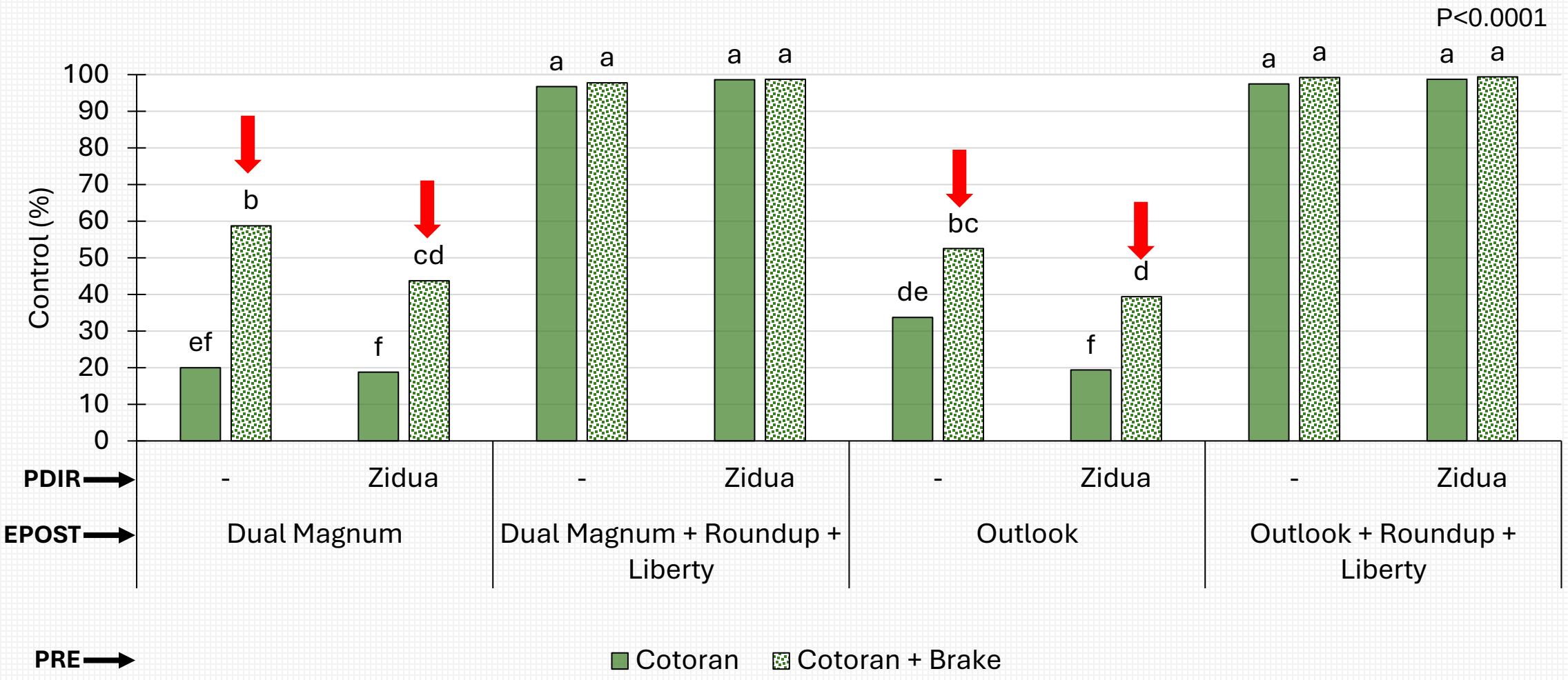

Cotoran PRE
Cotoran+Brake PRE

Treatments containing Roundup + Liberty EPOST provided complete Palmer amaranth control 43 DAP



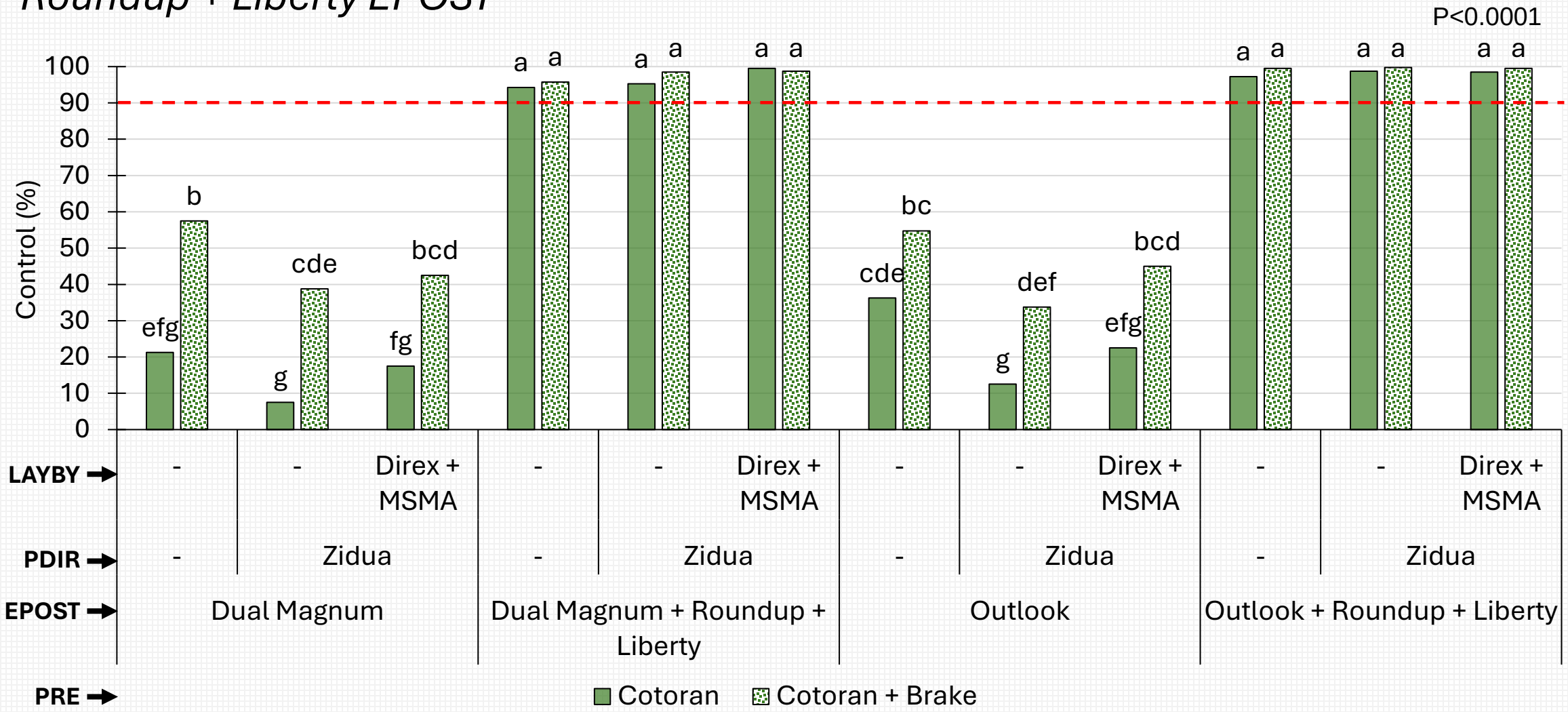

Cotoran PRE fb Dual Magnum EPOST
Cotoran+Brake PRE fb Roundup+Liberty+Outlook EPOST

At 70 DAP, residual Palmer amaranth control from treatments without an EPOST burndown was greatest with Cotoran + Brake PRE compared to Cotoran PRE

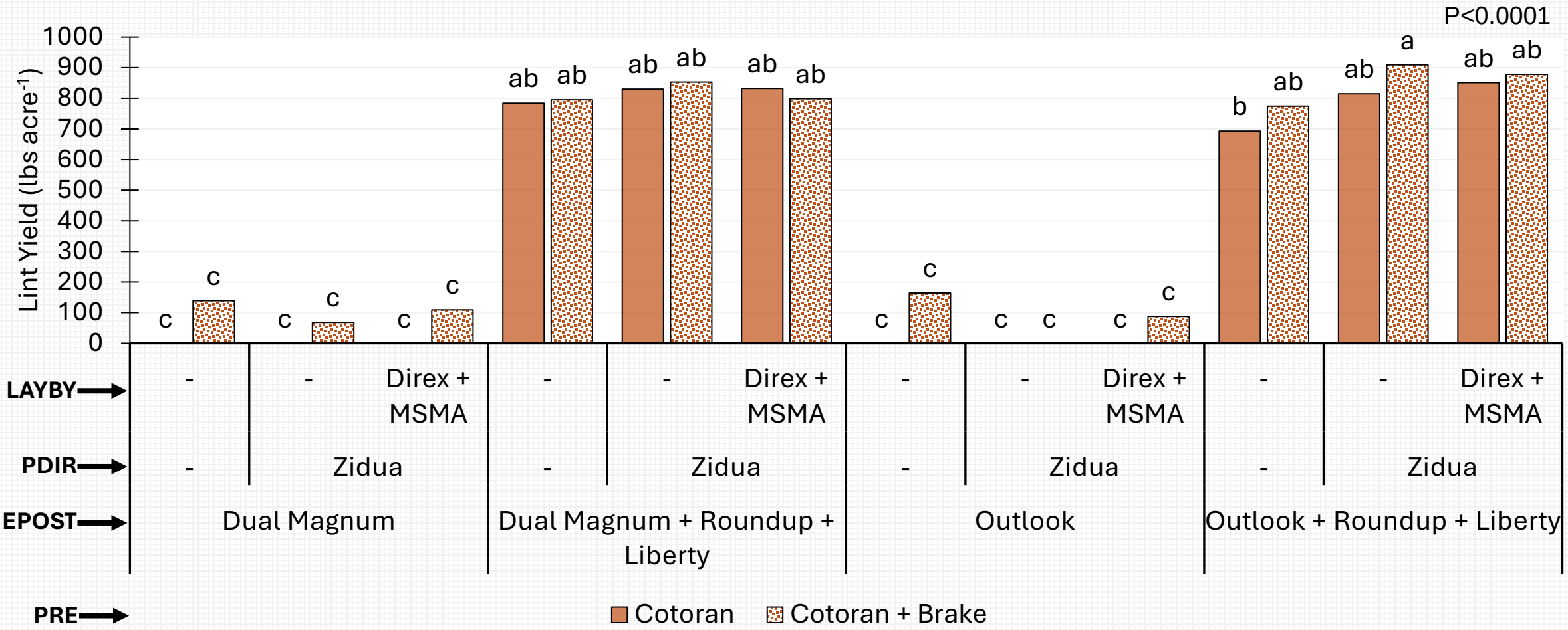


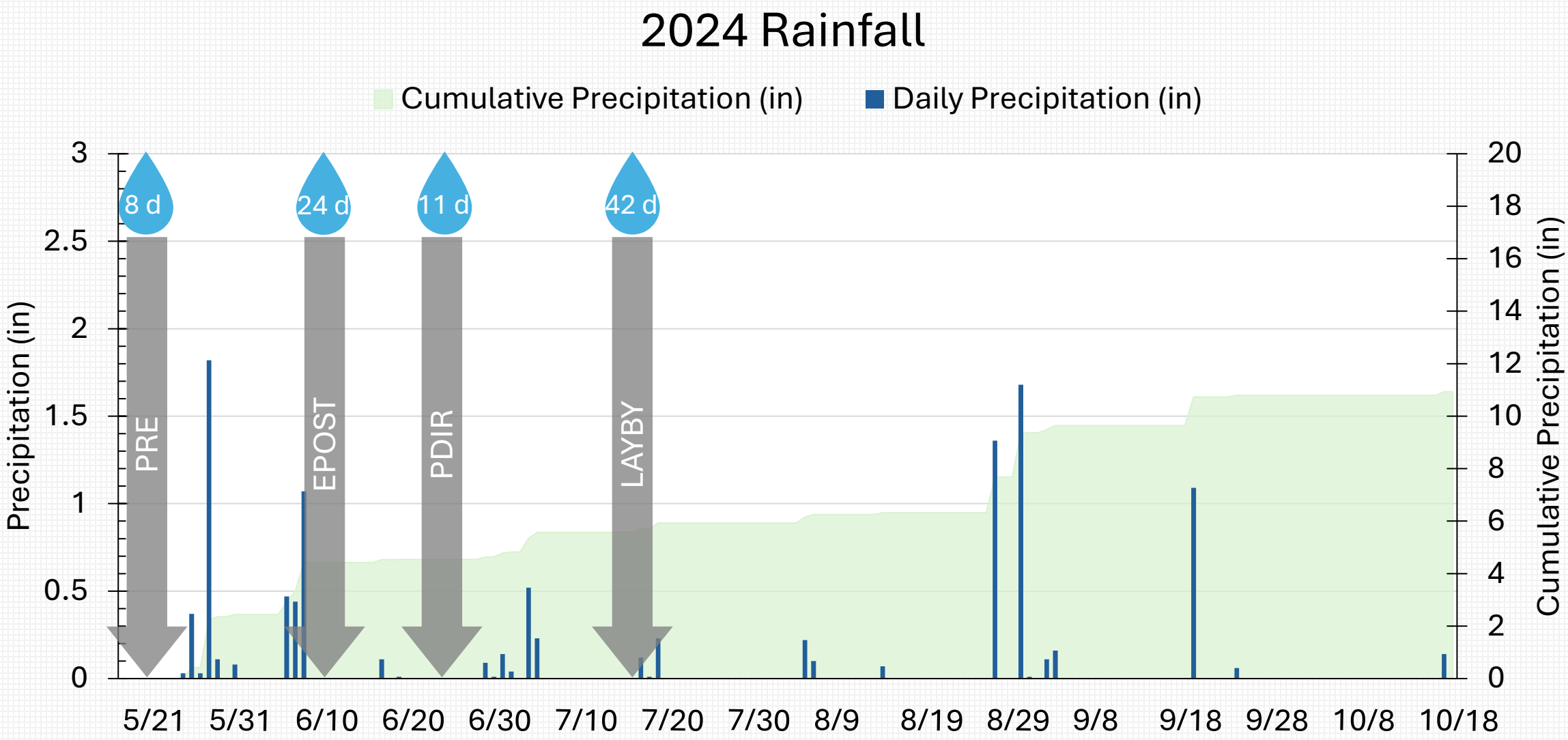
Study 1: Life Without Dicamba | Study 2: Reduced Tillage | Study 3: Cultivar Characteristics

Palmer amaranth control ≥94% was achieved 125 DAP from treatments containing Roundup + Liberty EPOST

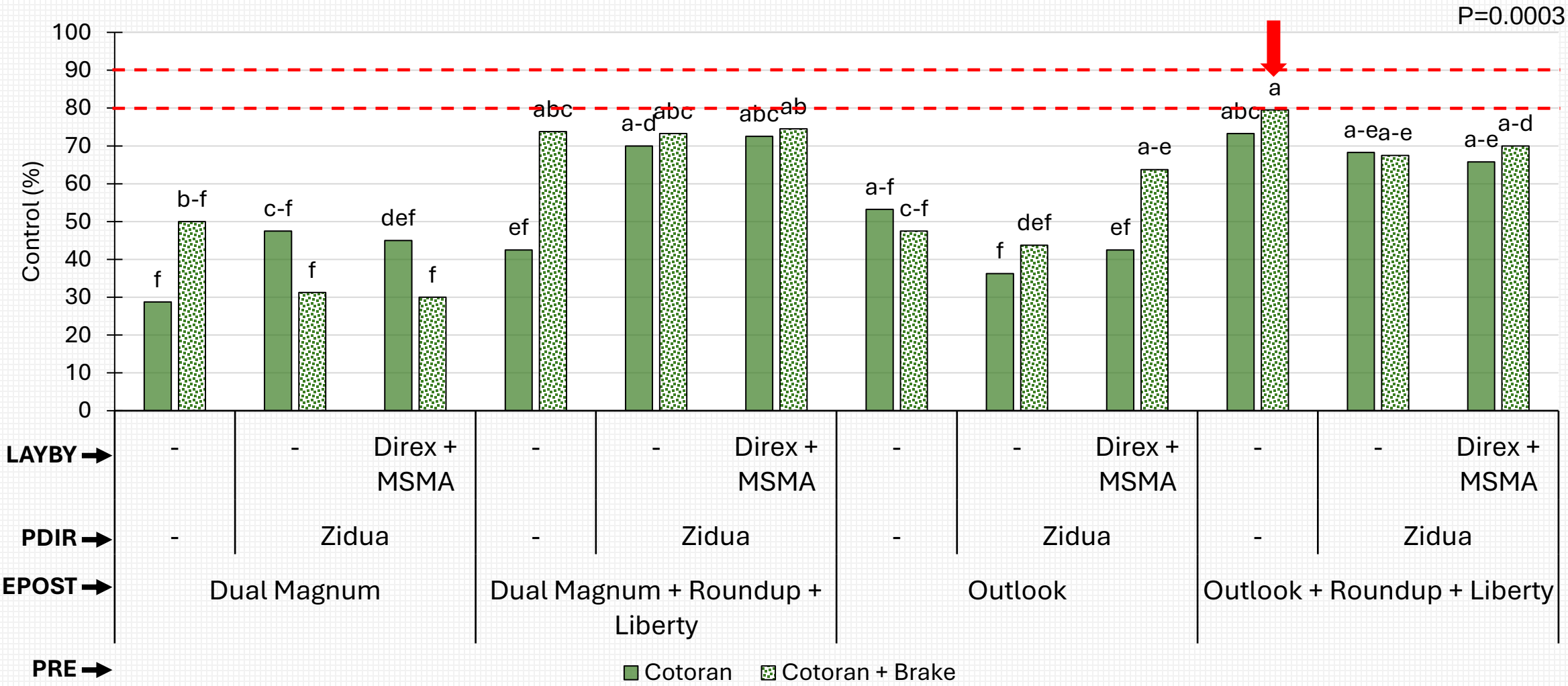


Treatments without an EPOST application containing Roundup + Liberty were un-harvestable in 2023

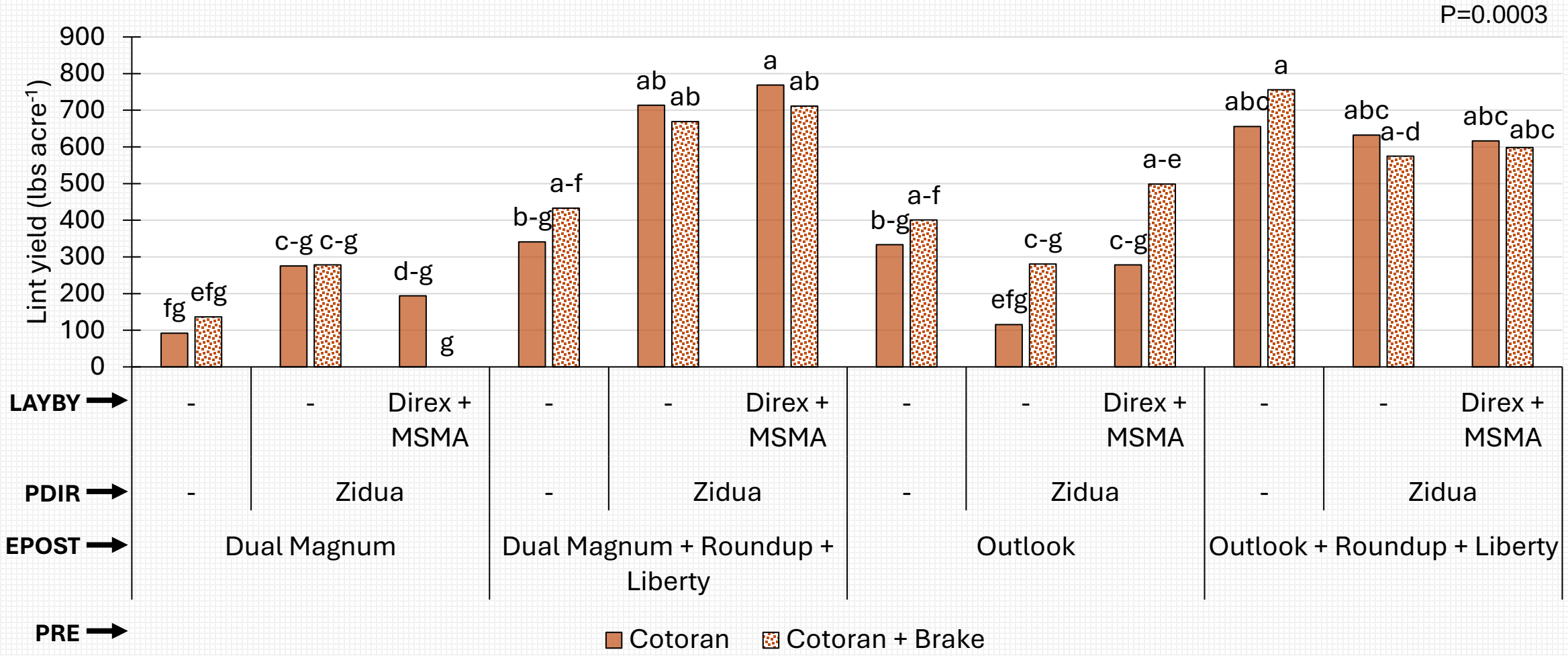



2024 Rainfall
Cumulative Precipitation (in)
Daily Precipitation (in)
8 d
24 d
11 d
42 d
PRE
EPOST
PDIR
LAYBY
Precipitation (in)
Cumulative Precipitation (in)
3
2.5
2
1.5
1
0.5
0
20
18
16
14
12
10
8
6
4
2
0
5/21
5/31
6/10
6/20
6/30
7/10
7/20
7/30
8/9
8/19
8/29
9/8
9/18
9/28
10/8
10/18

In 2024 at 94 DAP, Palmer amaranth control ≥ 80% was achieved with Cotoran + Brake PRE fb Outlook + Roundup + Liberty EPOST



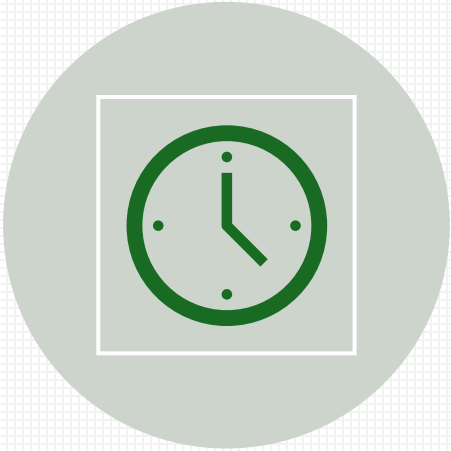
On average, treatments containing a residual + burndown EPOST achieved greater yields than treatments with only a residual EPOST



Study 1: Life Without Dicamba | Study 2: Reduced Tillage | Study 3: Cultivar Characteristics

EPOST applications of Roundup+Liberty+Outlook or Dual Magnum were a critically important input for dicamba-resistant Palmer amaranth management

Additional soil active herbicides at-plant were also critical for effective season-long weed management



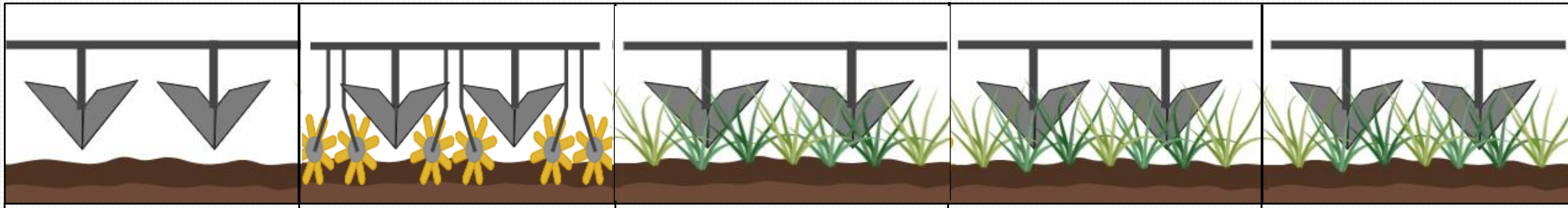
Dicamba-resistant Palmer amaranth can be effectively controlled without the use of dicamba if timely applications are made

Weed Management in a Reduced Tillage Organic Cotton System

Megan M. Singletary, Peter A. Dotray, Katie L. Lewis, Joseph A. Burke, Muthu V. Bagavathiannan, M. Cole Woolard, and Bobby Rodriguez

"Organic production [is] a production system that [integrates] cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biological diversity"

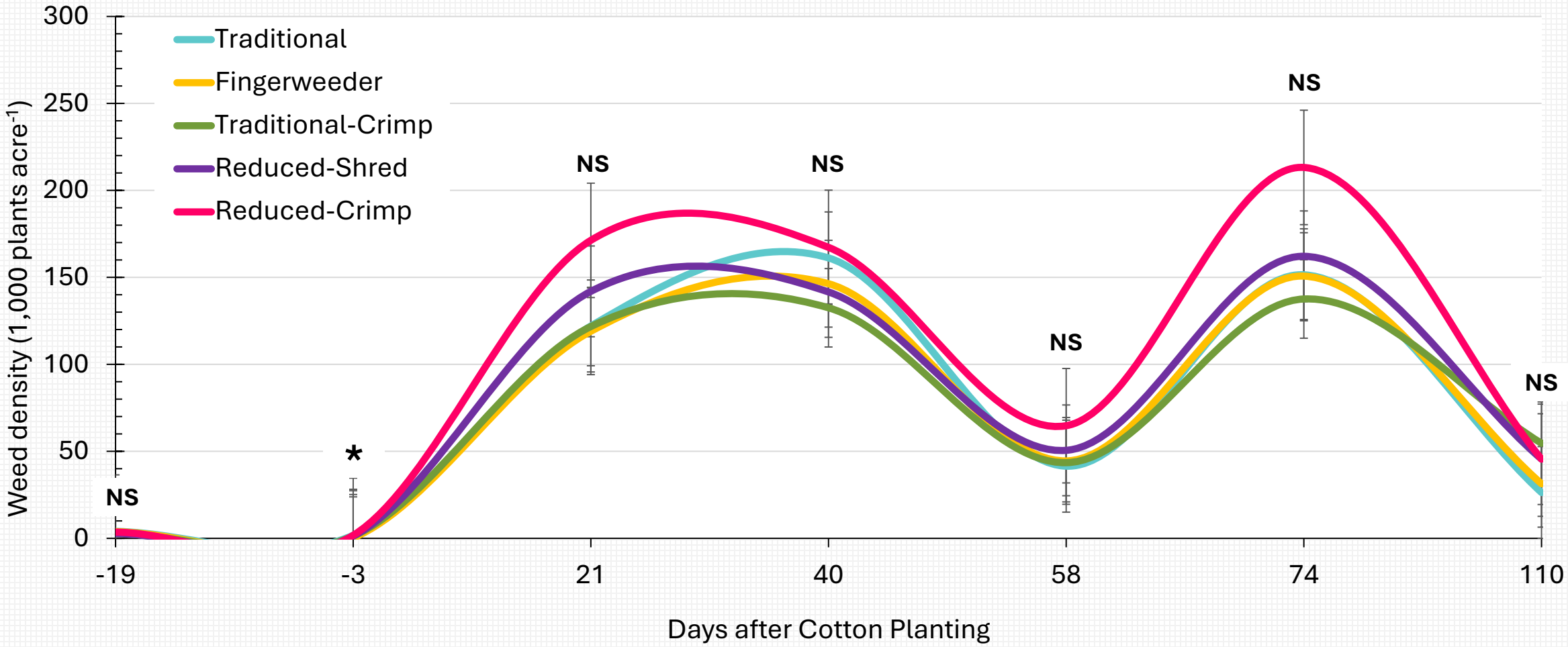
- National Organic Program



	Traditional	Finger-weeder	Traditional-Crimp	Reduced-Shred	Reduced-Crimp
Winter	Tillage	Tillage	Tillage + CC	Tillage + CC	Tillage + CC
Preplant	Mow + Bed-prep	Hand hoe	Crimp	Mow + Strip-till	Crimp
In-Season	Inter-row cultivation (5X)	Intra-row cultivation(2X) + Inter-row cultivation (2X)	Inter-row cultivation (4X)	Inter-row cultivation (2X)	Inter-row cultivation (2X)
Total	**7**	**5**	**5**	**4**	**3**

Soil Disturbance Intensity

A cover crop mixture of rye and hairy vetch was not effective at suppressing weed densities relative to fallow treatments



3 days before planting (June 6)


Traditional: Mow + Bed-prep


Fingerweeder: Handweeding


Traditional-Crimp: Bed-prep rollers


Reduced-Shred: Mow


Reduced-Crimp: Bed-prep rollers

21 days after planting (June 27)

47 days after planting (July 23)


Traditional: Interrow (2X)


Fingerweeder: Intra + Interrow (2X)


Traditional-Crimp: Interrow (1X)


Reduced-Shred: Interrow (1X)


Reduced-Crimp: Interrow (1X)

48 days after planting (July 24)


Traditional: Interrow (2X)


Fingerweeder: Intra + Interrow (2X)


Traditional-Crimp: Interrow (1X)


Reduced-Shred: Interrow (1X)


Reduced-Crimp: Interrow (1X)

110 days after planting (September 24)


Traditional: Interrow (5X)

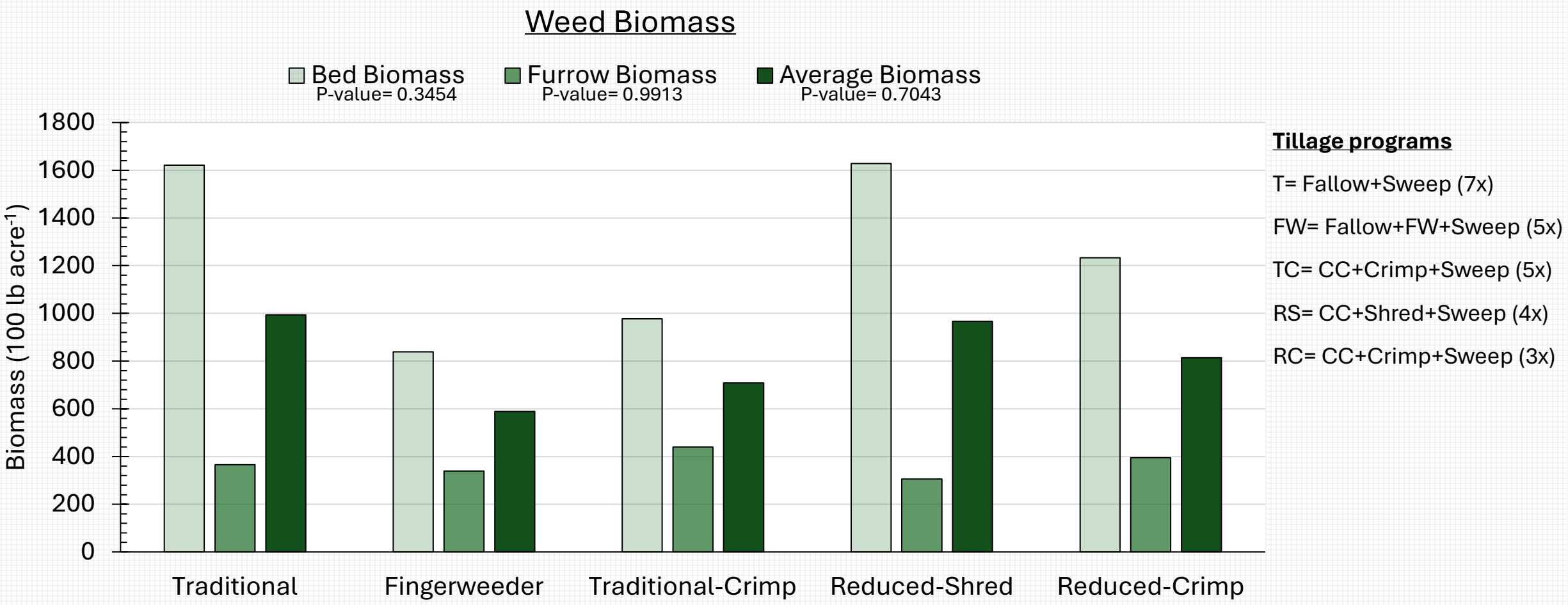

Fingerweeder: Intra + Interrow (4X)


Traditional Crimp: Interrow (4X)

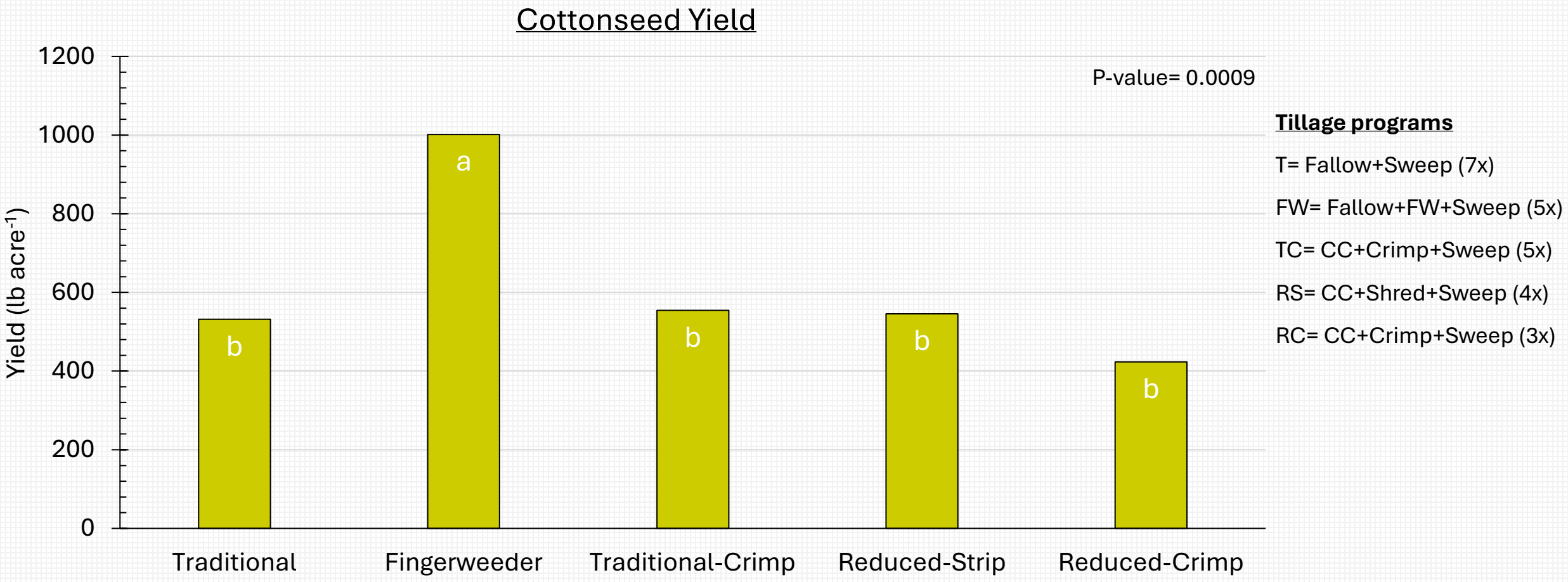

Reduced-Shred: Interrow (2X)


Reduced-Crimp: Interrow (2X)

End-of-season weed biomass was greatest on the beds and did not vary among tillage practices



Cottonseed yields were greatest from treatments containing in-season intra- and interrow cultivation



A cover crop mix of rye + hairy vetch did not reduce weed density relative to no cover crop

Weed densities can become unmanageable in an organic system if not properly controlled within the first couple of days post-planting

Do Cultivar Characteristics Impact Weed Management in Organic Cotton Production?

Megan M Singletary, Peter A Dotray, Carol M Kelly, Muthu V Bagavathiannan, Matthew C Woolard, and Bobby Rodriguez

Commercial

FM 958
FM 989
DP 491

Recently Released

CA 4019
CA 4014
CA 4015

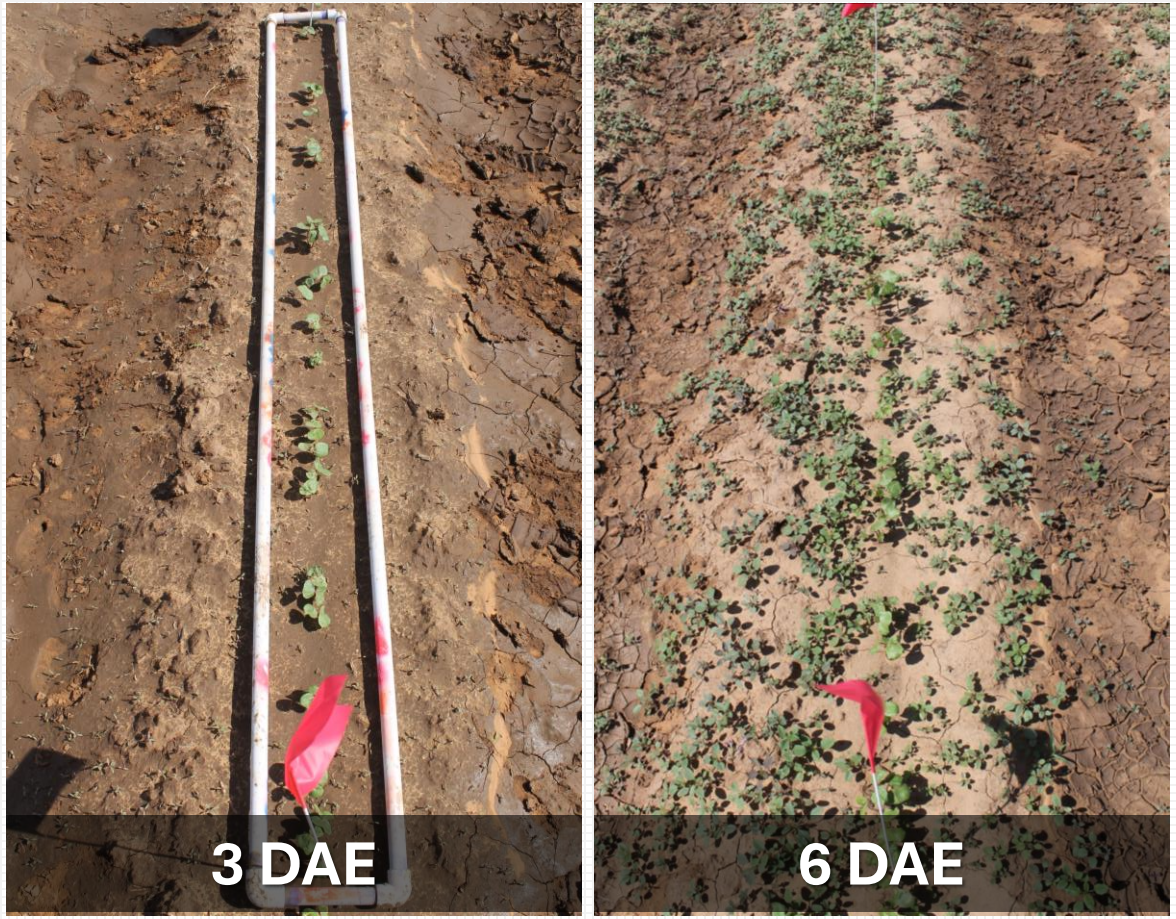
Breeding Lines

LBB 7
LBB 8
LBB 9
LBB 10
LBB 11
LBB 12
LBB 13
LBB 14
LBB 15
LBB 16

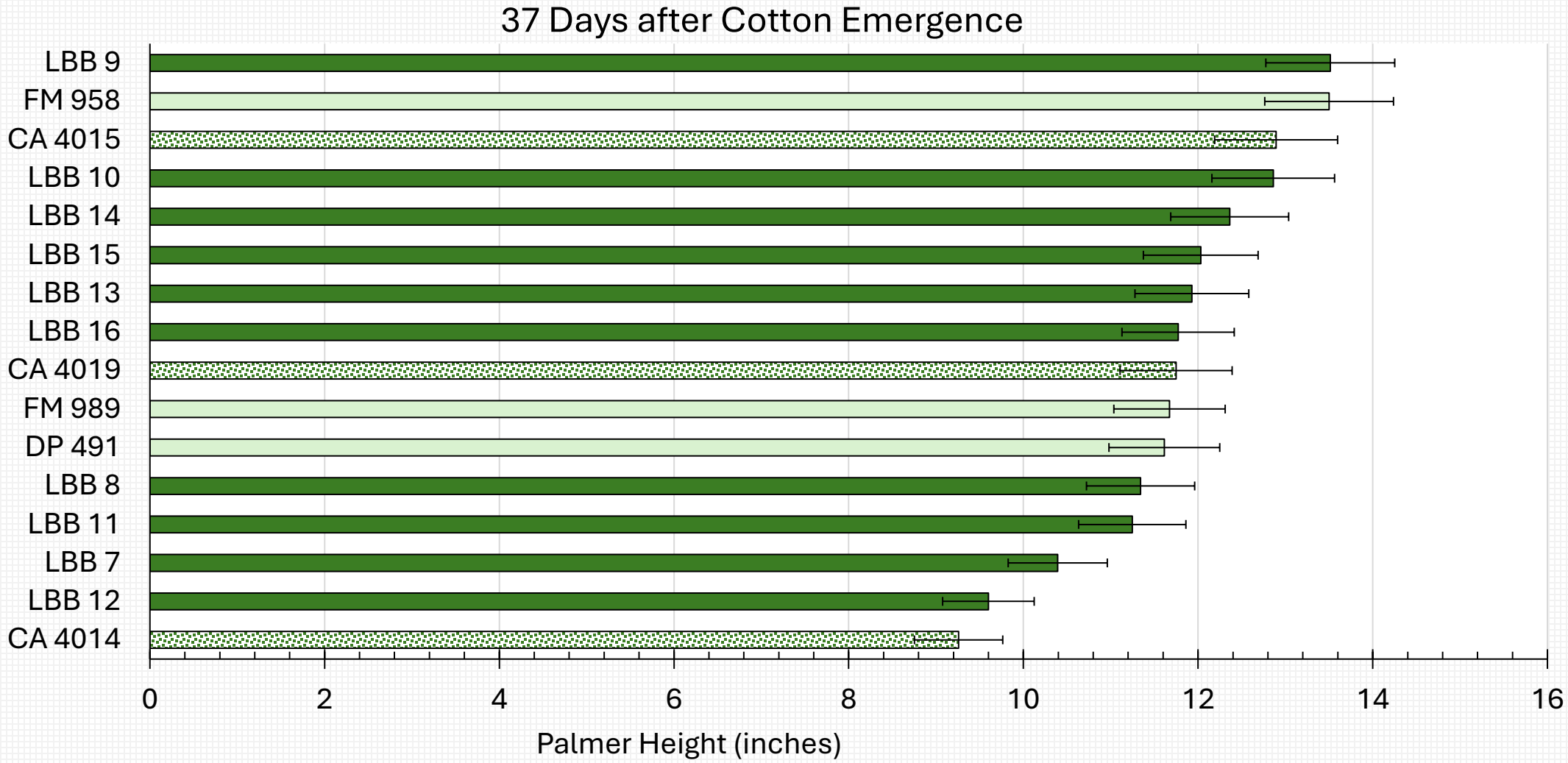
Palmer amaranth densities did not vary among the 16 cultivars from 3 to 50 days after cotton emergence (DAE)

‘FM 958’

‘CA 4014’



Palmer amaranth plants were 20% shorter in the presence of cultivar 'CA 4014' when compared to commercial organic varieties

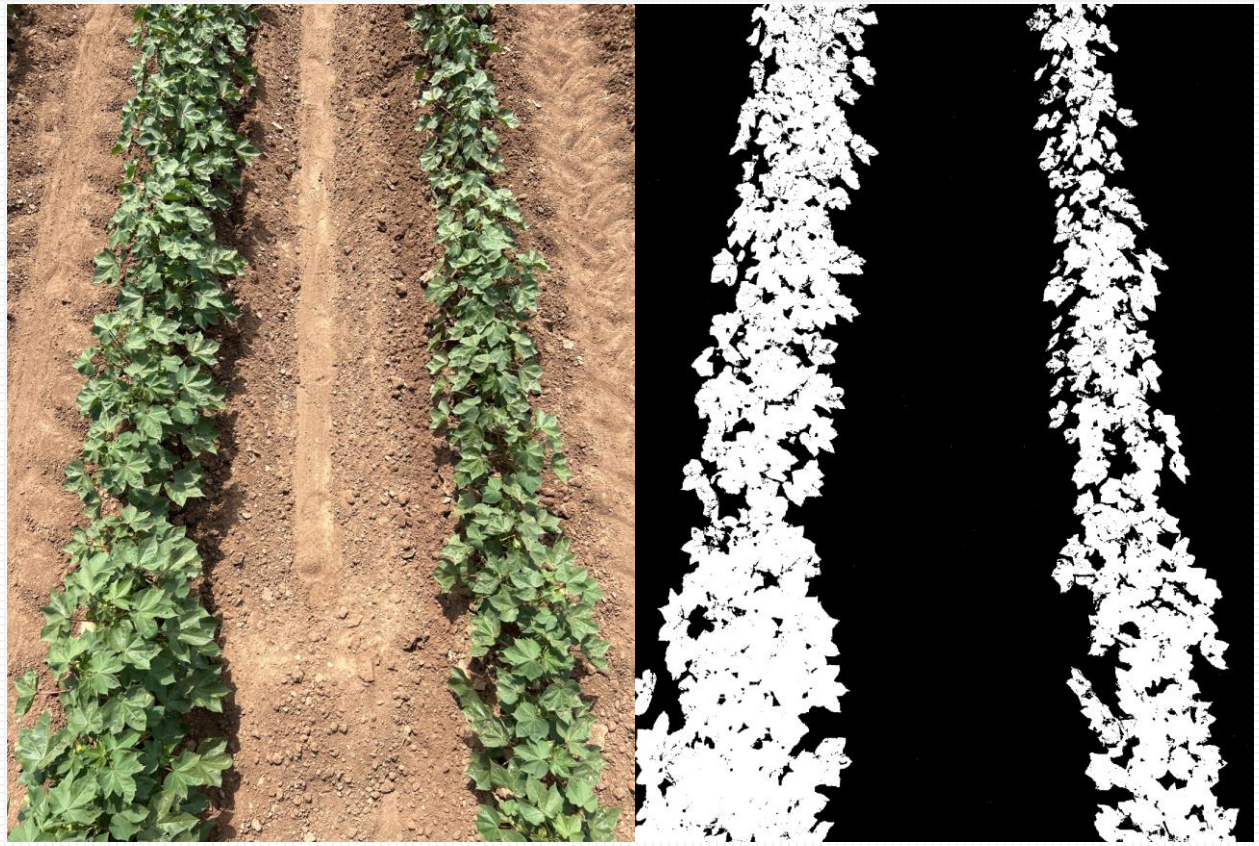


Normal Leaf

Okra Leaf

Leaf shape (normal vs okra) did not affect green canopy cover or Palmer amaranth density

Normal Leaf
Canopy Cover: 30.66%



Okra Leaf
Canopy Cover: 28.21%

Palmer amaranth densities did not vary among the cotton cultivars

Cotton leaf shape did not influence weed density or height

Certain cotton cultivars may have the potential to reduce the canopy height of weeds such as Palmer amaranth.

Megan Singletary

Graduate Research Assistant

Texas Tech University

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