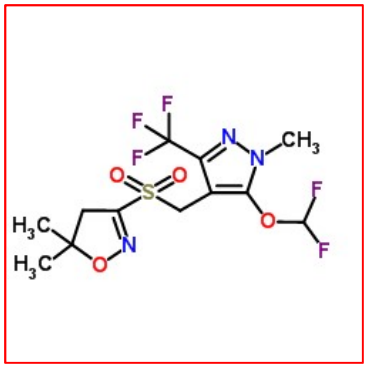
Zidua herbicide performance in California vegetable crops

Steve Fennimore, John Rachuy
University of California, Davis/Salinas

Introduction

- Herbicide chemistry - Zidua
- Weed control dose response - Zidua
- Zidua evaluation in garlic
- Zidua evaluation in leek
- Dual Magnum evaluation in transplanted lettuce

Zidua herbicide



- Pyroxasulfone
- Very long fatty acid inhibitor (group 15)
- Kumiai Chemical is evaluating in vegetables together with IR-4
- Not volatile, soil persistence similar to Dual Magnum

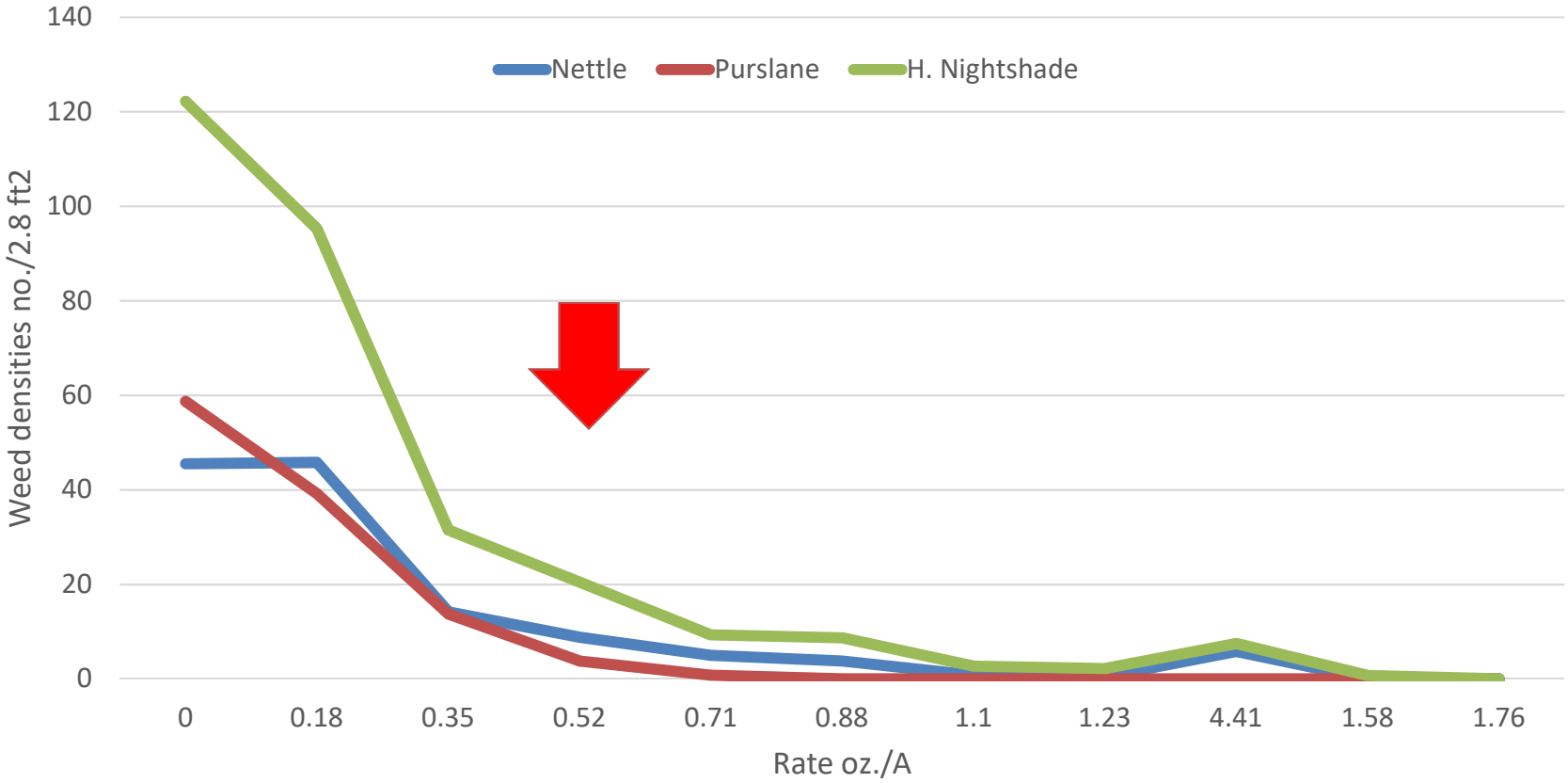
Zidua environmental fate

Adsorption/desorption soil	Koc 57-114 moderate
Soil dissipation	16-26 day half life
Aquatic dissipation	<1 day in water
Hydrolysis	stable
Photolysis	minimal

Weed control rates

- Tested Zidua at 0, 0.17, 0.35, 0.5, 0.7 0.9 1.1, 1.2 1.4 1.6 and 1.8 oz ai per acre
- Evaluated PRE and POST
- Weeds tested: nettle, purslane and hairy nightshade

Weed control with Zidua PRE



Zidua results

- Zidua PRE controlled nettle, purslane and hairy nightshade at about 0.5 oz/A
- POST Zidua did not control the weeds at tested rates

Zidua evaluation in garlic

- Plant date: Nov. 8, 2016
- Harvest date: Aug. 2, 2017
- Treatments were replicated 4 times, single bed wide by 20 ft. long

Zidua garlic treatments

Treatment	Rate oz ai/A	Timing
1. Zidua	0.5	PRE
2. Zidua	1.1	PRE
3. Zidua	2.1	PRE
4. Zidua	1.1	1st leaf
5. Zidua	0.5 fb 0.5	PRE fb 4-6 leaf
6. Zidua	1.1 fb 1.1	PRE fb 4-6 leaf
7. Chateau	3.1	PRE
7. Buctril	1 pt./A	30 day POST
8. Control	0	

Zidua garlic phyto %

Treatment	Rate oz ai/A	Timing	2/6/17	3/9/17
Zidua	0.5	PRE	0 c	0 a
Zidua	1.1	PRE	3 bc	0 a
Zidua	2.1	PRE	13 a	0 a
Zidua	1.1	1st leaf	0 c	0 a
Zidua	0.5 fb 0.5	PRE fb 4-6 leaf	0 c	0 a
Zidua	1.1 fb 1.1	PRE fb 4-6 leaf	3 c	0 a
Chateau fb Buctril	3.1 fb 1 pt	PRE fb 30 d POST	6 b	0 a
Control	0		0 c	0 a

Zidua garlic weed densities

Treatment	Rate oz ai/A	Timing	Nettle # 2.8 ft^2	Total # 2.8 ft^2
Zidua	0.5	PRE	11 bc	17 bc
Zidua	1.1	PRE	14 b	19 b
Zidua	2.1	PRE	1 bc	3 cd
Zidua	1.1	1st leaf	32 a	46 a
Zidua	0.5 fb 0.5	PRE fb 4-6 leaf	11 bc	17 bc
Zidua	1.1 fb 1.1	PRE fb 4-6 leaf	6 bc	9 bcd
Chateau fb Buctril	3.1 fb 1 pt	PRE fb 30 d POST	0 c	0 d
Control	0		5 bc	23 b

Zidua garlic marketable yield

Treatment	Rate oz ai/A	Timing	Grams/ bulb	Tons/A
Zidua	0.5	PRE	86.7 a	4.9 a
Zidua	1.1	PRE	80.5 a	4.1 abc
Zidua	2.1	PRE	73.7 a	3.6 bc
Zidua	1.1	1st leaf	80.5 a	4.7 a
Zidua	0.5 fb 0.5	PRE fb 4-6 leaf	81.3 a	4.1 abc
Zidua	1.1 fb 1.1	PRE fb 4-6 leaf	81.2 a	4.0 abc
Chateau fb Buctril	3.1 fb 1 pt	PRE fb 30 d POST	68.8 a	3.3 c
Control	0		85.5 a	4.5 ab


2016.04 - Treatment #1
Zidua 85WG
15 g ai/Ac
PostPlant / PreEmerg


2016.04 - Treatment #2
Zidua 85WG
30 g ai/Ac
PostPlant / PreEmerg


2016.04 - Treatment #3
Zidua 85WG
60 g ai/Ac
PostPlant / PreEmerg


2016.04 - Treatment #4
Zidua 85WG
30 g ai/Ac
1st-Leaf


2016.04 - Treatment #5
Zidua 85WG
15 g ai/Ac @ PP / PRE
fb
Zidua 85WG
15 g ai/Ac @ 4-6 Leaf


2016.04 - Treatment #6
Zidua 85WG
30 g ai/Ac @ PP / PRE
fb
Zidua 85WG
30 g ai/Ac @ 4-6 Leaf


2016.04 - Treatment #7
Chateau 51WG
6 oz wt/Ac @ PP / PRE
fb
Buctril 4E
1 pt/Ac @ 30D Post Em


2016.04 - Treatment #8
Hand Weeded
Control

Zidua garlic summary

- Garlic is fairly tolerant of Zidua
- Garlic yields in Zidua treatments were in most cases as good or better than Chateau/ Buctril
- Best weed control was Zidua PRE at 2.1 oz/A
- Excellent weed control with Chateau/ Buctril
- POST Zidua provides little weed control

Zidua evaluation in leeks

- Transplanted July 28, 2017
- Will be harvested early November
- Treatments replicated 4 times single bed plots by 25 ft. long
- At Salinas, CA

Zidua leek treatments

Treatment	Rate	Timing
1. Control	0	-
2. Dacthal	1.3 gal	PRE
3. GoalTender	0.5 pt.	PRE
4. Prowl H_20	34 fl. oz.	7 days Post
5. Zidua	0.5 oz	PRE
6. Zidua	1.1 oz	PRE
7. Zidua	2.1 oz	PRE
8. Zidua	0.5 oz	7 days Post
9. Zidua	1.1 oz	7 days Post
10. Zidua	2.1 oz	7 days Post

Zidua leek stand & weed control

Treatment	Rate	Timing	Stand # 25 ft	Weed %
Control	0	-	79 a	0 f
Dacthal	1.3 gal	PRE	80 a	66 cd
Goaltender	0.5 pt.	PRE	80 a	92 ab
Prowl H_20	34 fl. oz.	7 d Post	83 a	57 d
Zidua	0.5 oz	PRE	78 a	80 bc
Zidua	1.1 oz	PRE	81 a	91 ab
Zidua	2.1 oz	PRE	79 a	99 a
Zidua	0.5 oz	7 d Post	82 a	39 e
Zidua	1.1 oz	7 d Post	79 a	69 cd
Zidua	2.1 oz	7 d Post	79 a	85 ab

Zidua phyto in leeks

Treatment	Rate	Timing	Phyto 7 DAT %	Phyto 27 DAT %
Control	0	-	0 b	0 a
Dacthal	1.3 gal	PRE	0 b	3 a
Goaltender	0.5 pt.	PRE	0 b	1 a
Prowl H_20	34 fl. oz.	7 d Post	0 b	0 a
Zidua	0.5 oz	PRE	0 b	0 a
Zidua	1.1 oz	PRE	3 a	0 a
Zidua	2.1 oz	PRE	0 b	0 a
Zidua	0.5 oz	7 d Post	0 b	0 a
Zidua	1.1 oz	7 d Post	0 b	0 a
Zidua	2.1 oz	7 d Post	0 b	0 a


2017.03 - Treatment #5
Zidua 85WG
15 g ai/Ac
PRE-Transplant


2017.03 - Treatment #6
Zidua 85WG
30 g ai/Ac
PRE-Transplant


2017.03 - Treatment #7
Zidua 85WG
60 g ai/Ac
PRE-Transplant


2017.03 - Treatment #9
Zidua 85WG
30 g ai/Ac
7-Days Post-Trans


2017.03 - Treatment #1
Weeded
Weedy Check


2017.03 - Treatment #2
Dacthal 6F
1.33 gal prod/Ac
PRE-Transplant


2017.03 - Treatment #3
GoalTender 4F
8 oz prod/Ac
PRE-Transplant


2017.03 - Treatment #4
Prowl H2O
34 oz prod/Ac
7-14D Post-Trans

Summary

- Garlic and leeks have good tolerance to Zidua
- Zidua is primarily a PRE herbicide and appears to have good efficacy at rates at and above 0.5 oz ai/A

Evaluation of Dual Magnum in transplanted lettuce

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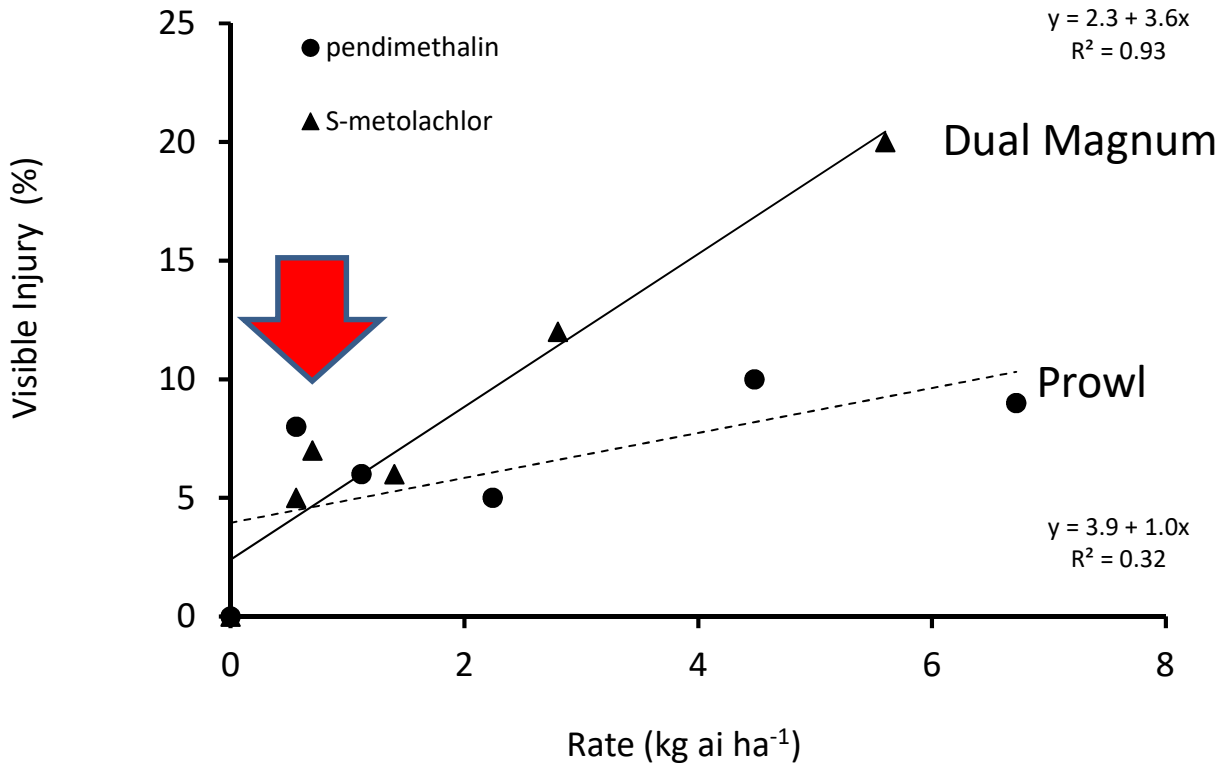
Dual Magnum: transplanted lettuce

- Previous studies have shown that transplanted lettuce is tolerant to Dual Magnum

Dual Magnum and Prowl H_2O dose response in lettuce



Dual Magnum evaluation: lettuce

Herbicide	Rate/A	Time
Kerb	2.9 pts	PRE transplant
Dual Mag.	0.67 pts	PRE transplant
Dual Mag.	1.3 pts	PRE transplant
Kerb	2.9 pts	POST transplant
Dual Mag.	0.67 pts	POST transplant
Dual Mag.	1.3 pts	POST transplant
Hand weed	0	NA
Control	0	NA

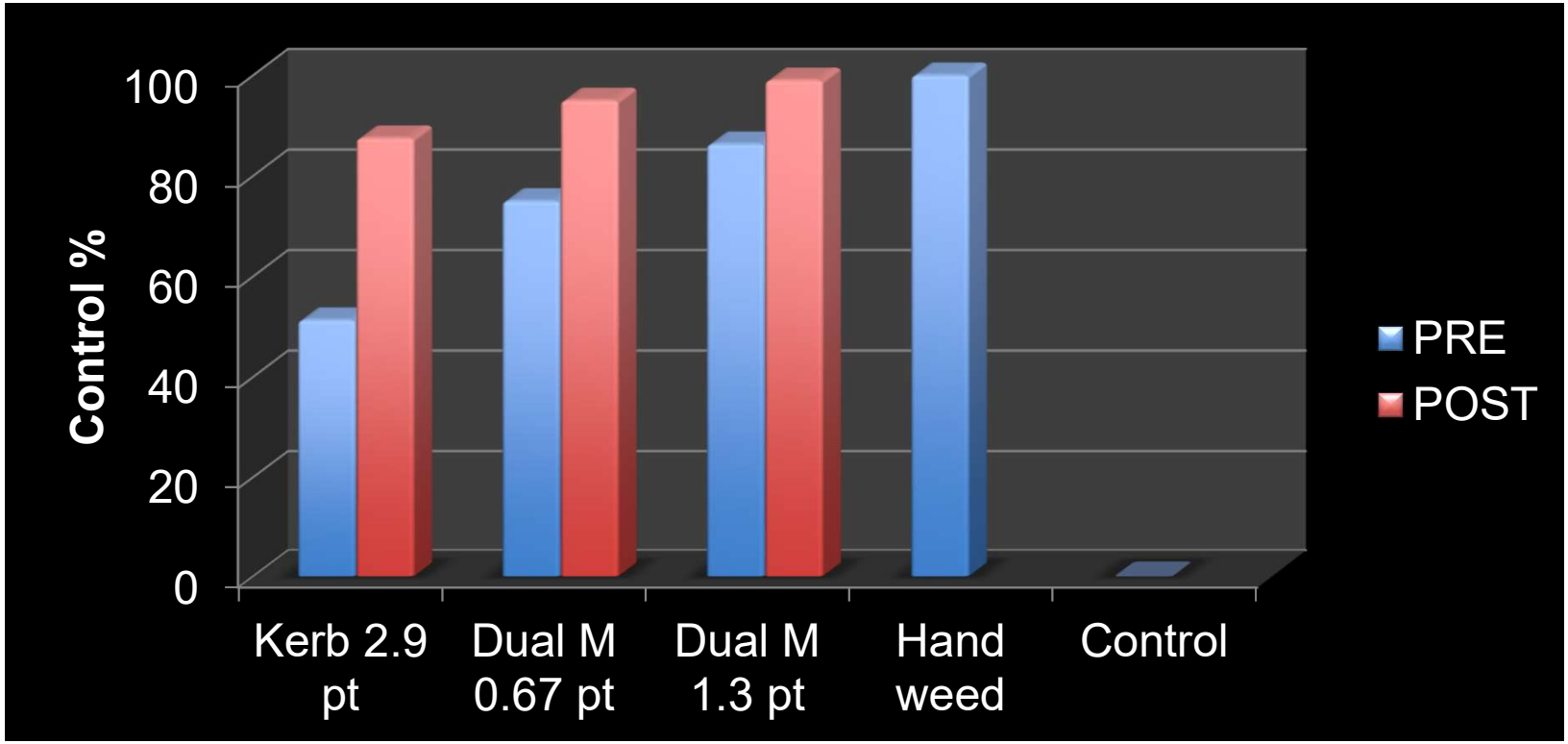
Dual Magnum critical dates

Type	Transplant	Harvest
Greenleaf	August 16	September 8
Redleaf	August 16	September 8
Butterhead	August 23	September 21
Iceberg	August 23	October 16
Romaine	August 23	October 19

Lettuce varieties

- Redleaf – New Red Fire
- Greenleaf – Big Star
- Romaine – DF-7 MI
- Iceberg – Regency 2.0
- Butterhead - Mirlo

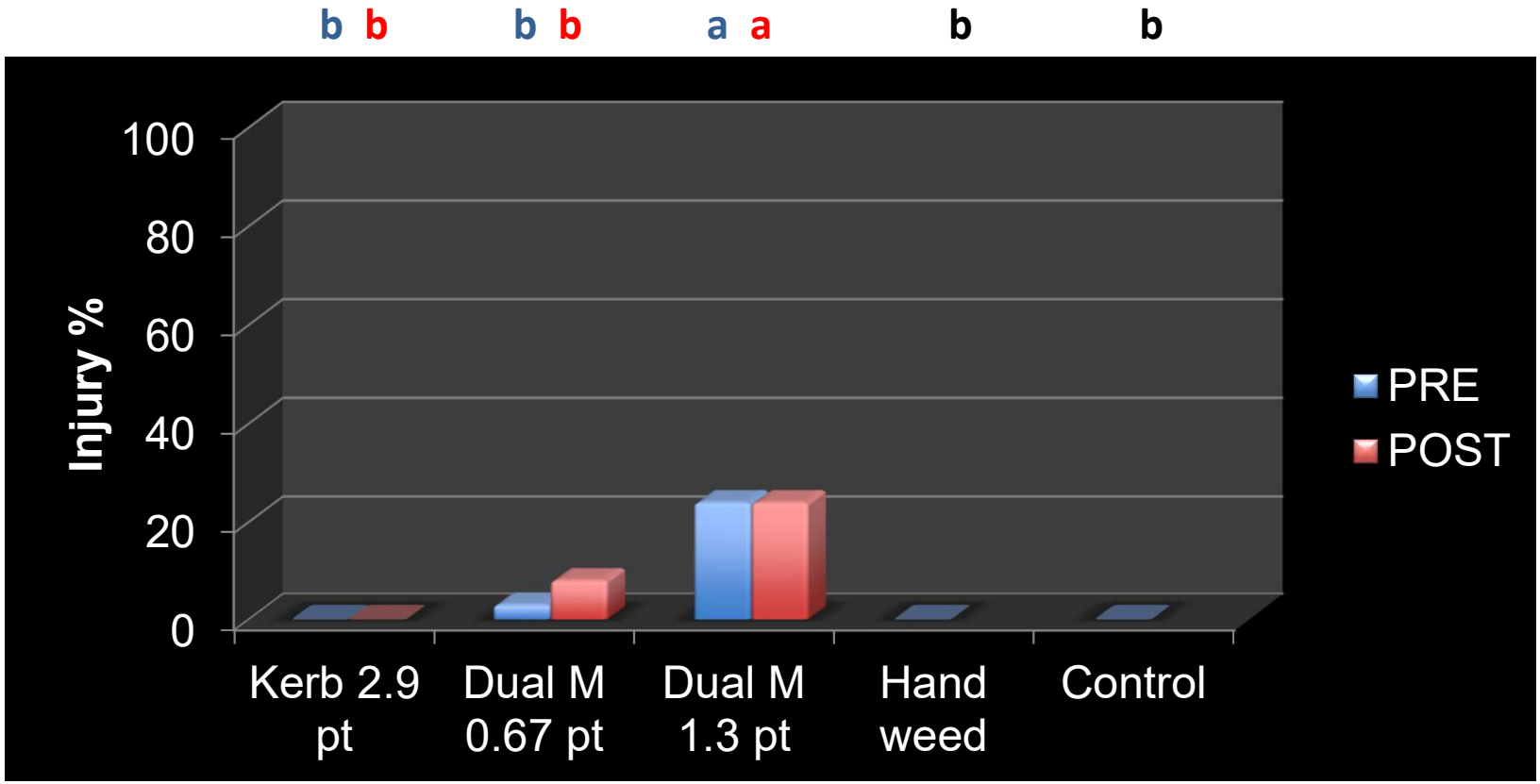
Weed control %



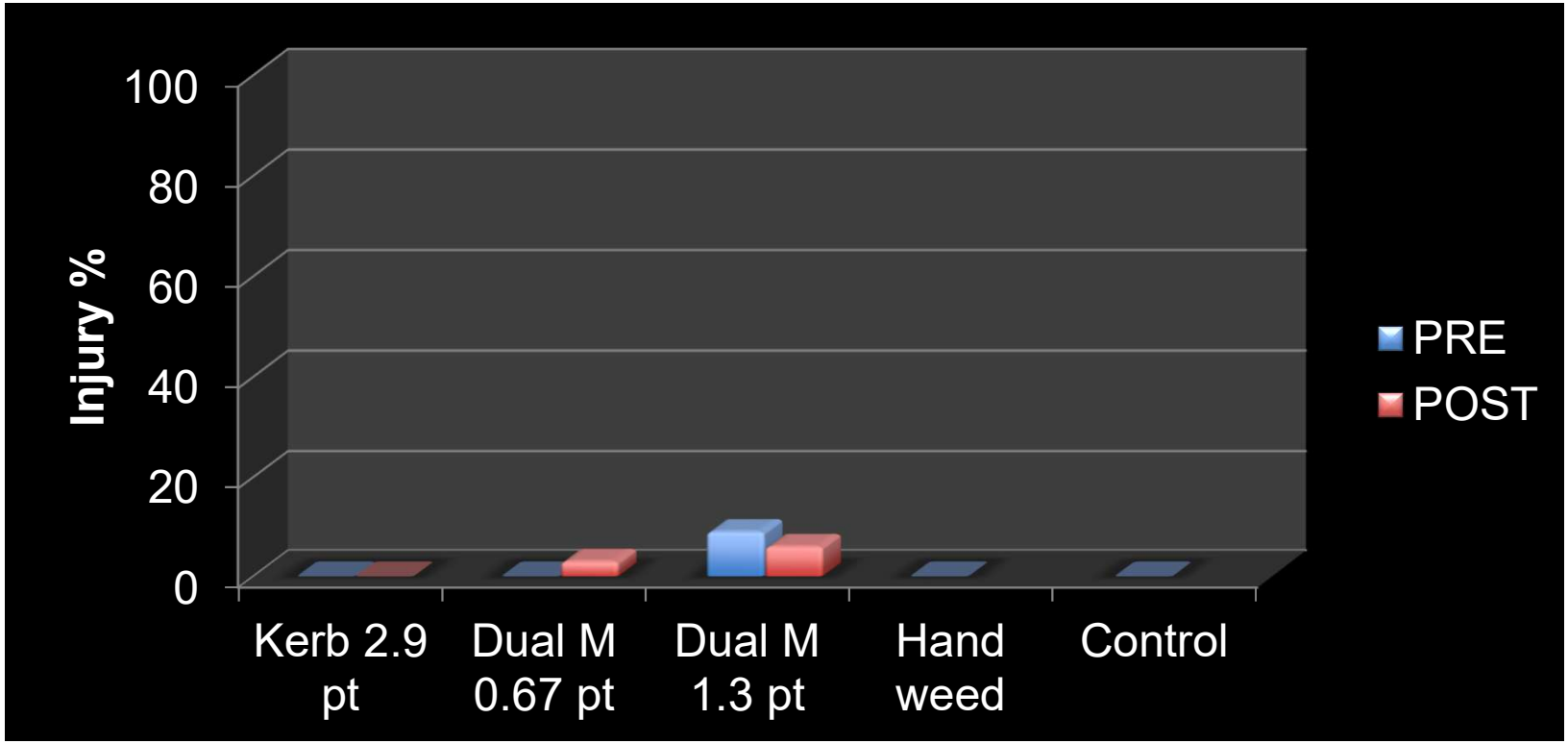
Lettuce injury evaluations

- Redleaf – no significant injury from Dual Magnum
- Greenleaf – no significant injury from Dual Magnum

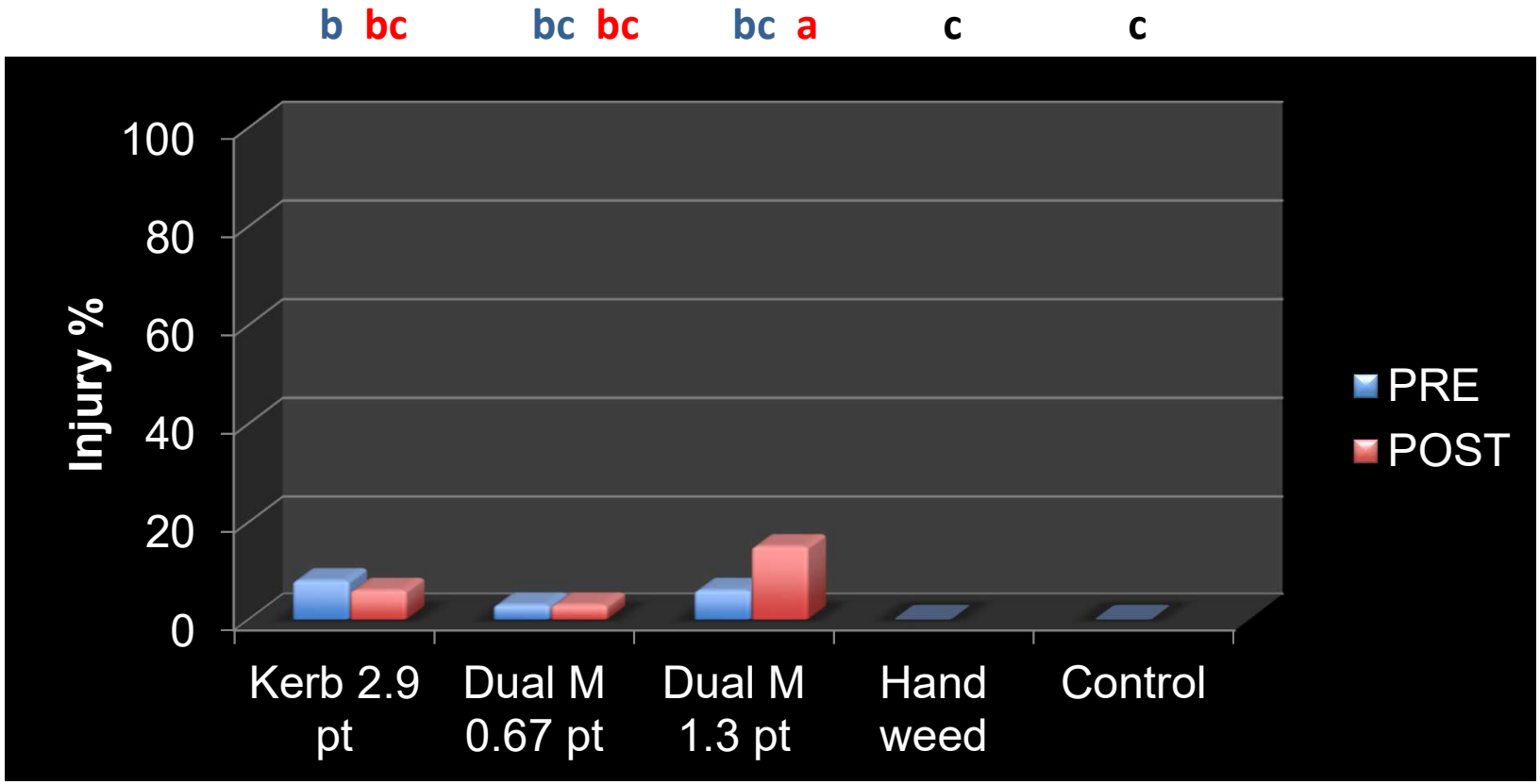
Lettuce injury Romaine 28 DAT



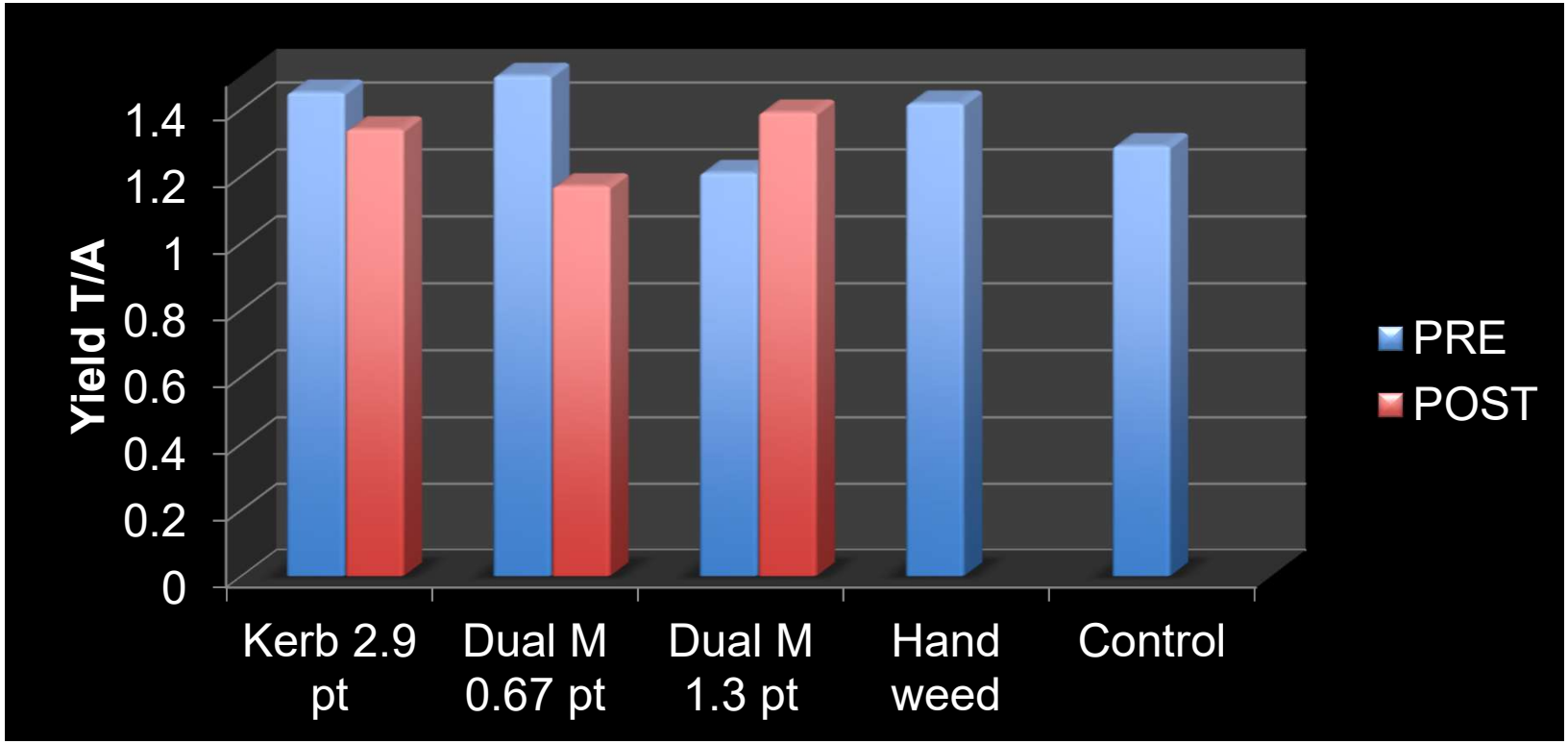
Lettuce injury Iceberg 28 DAT



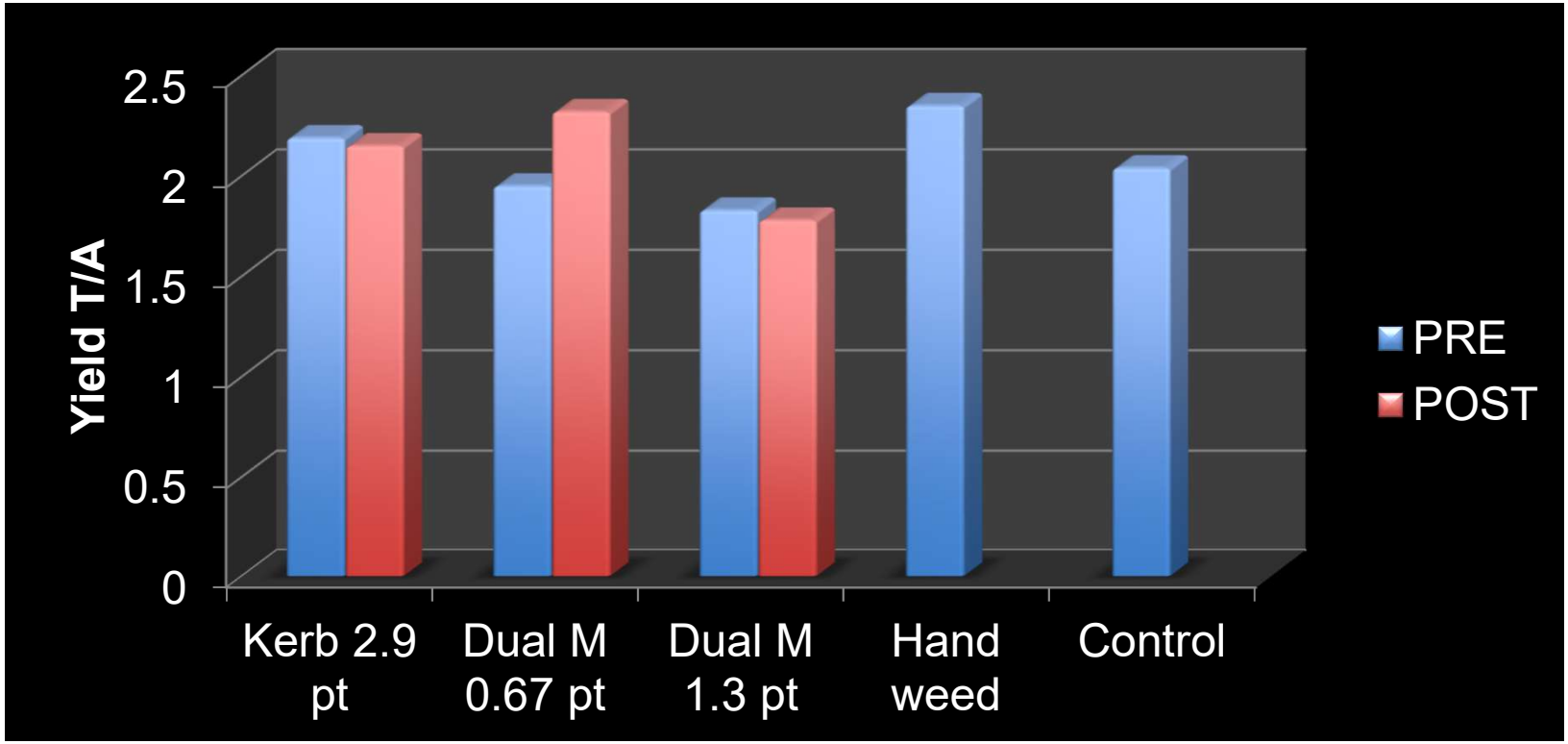
Lettuce injury Butterhead 28 DAT



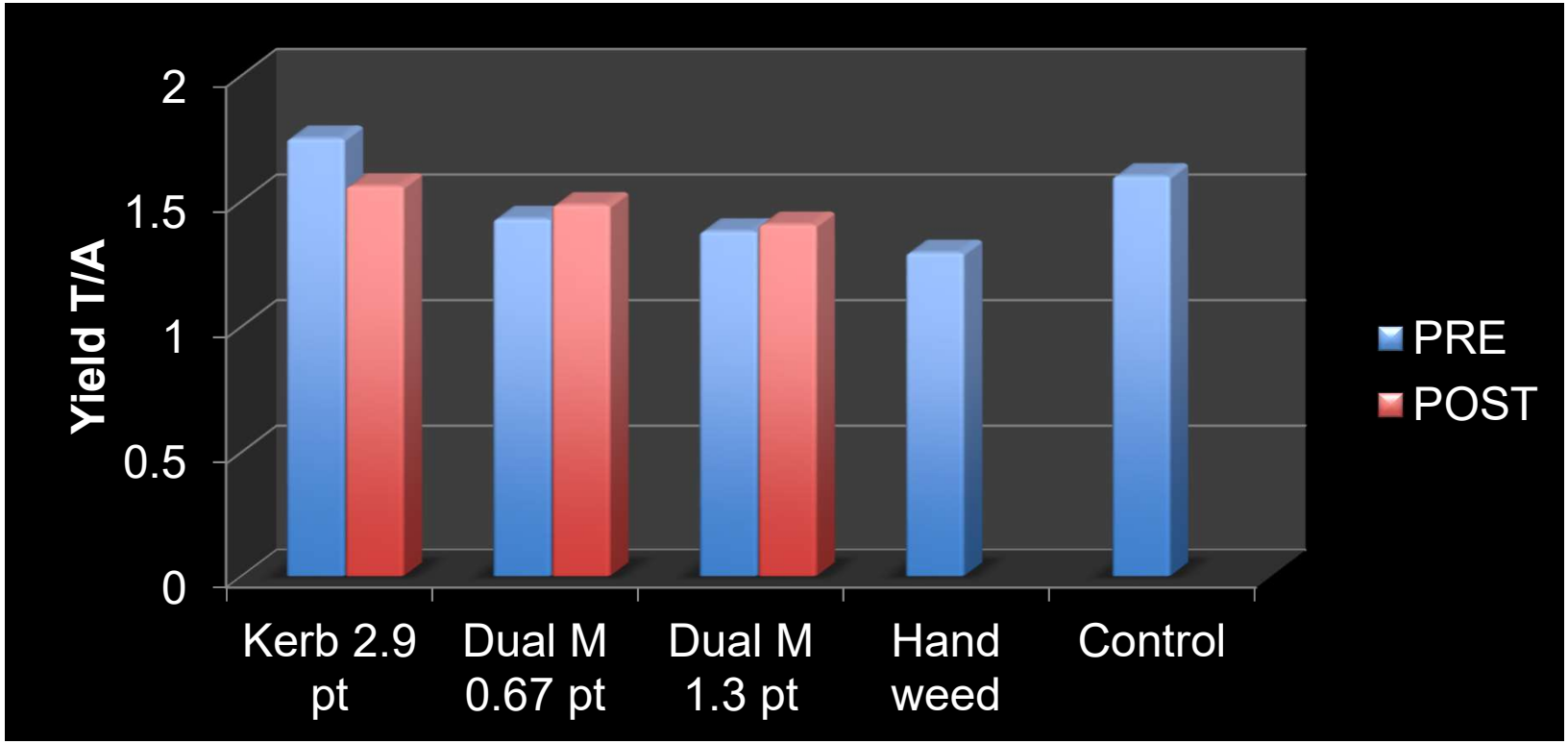
Greenleaf yield Tons /A



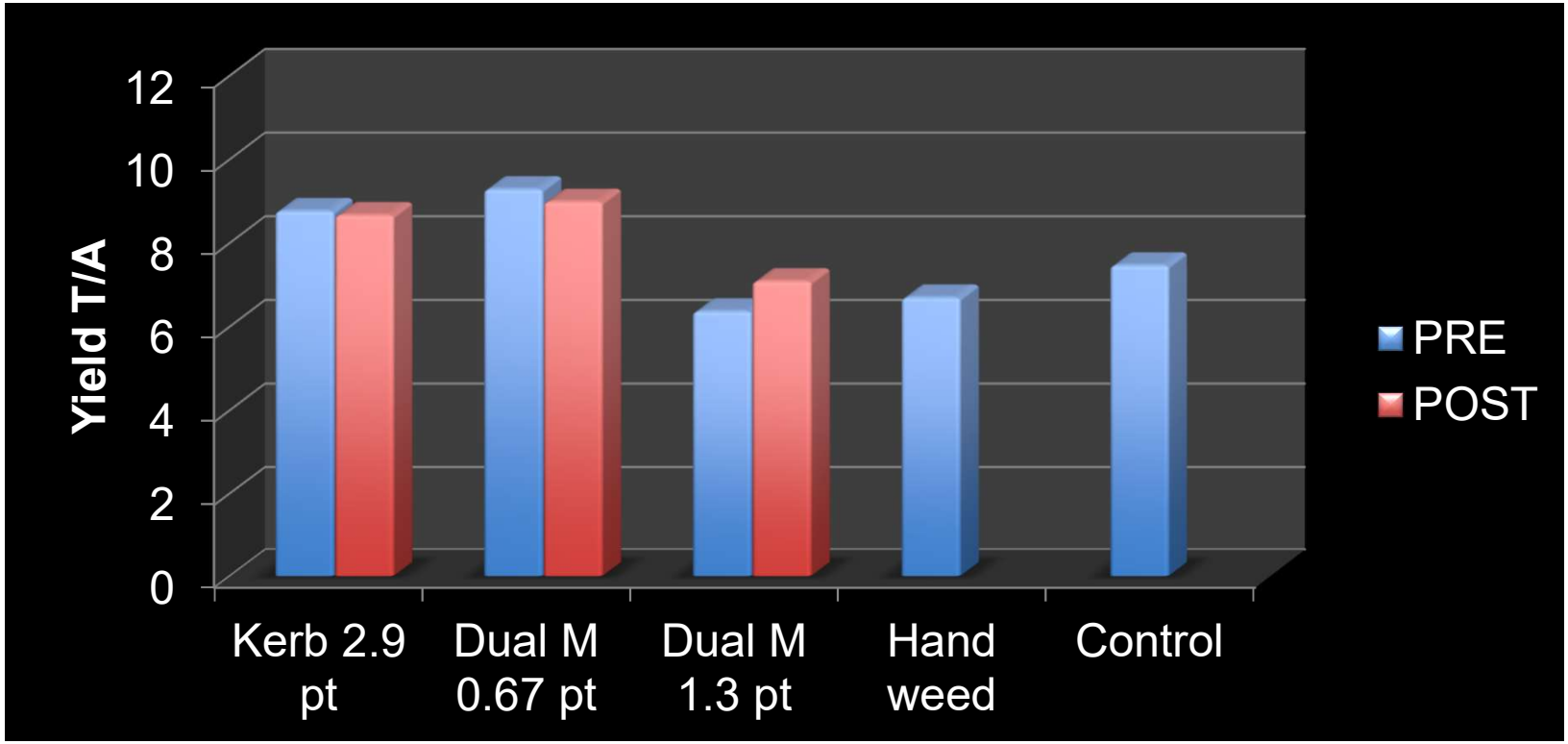
Redleaf yield Tons /A



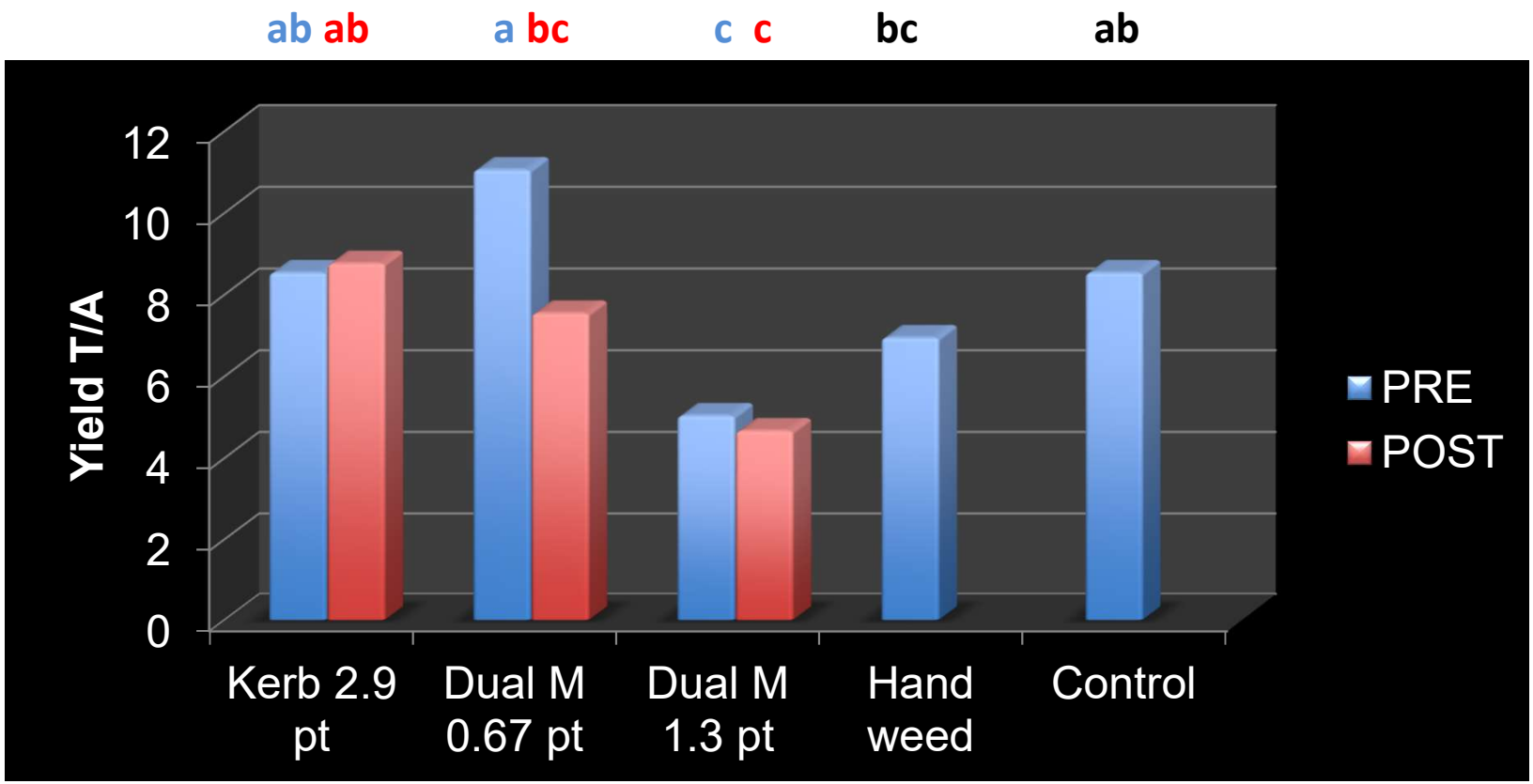
Butterhead yield Tons /A



Iceberg yield Tons /A



Romaine yield Tons /A

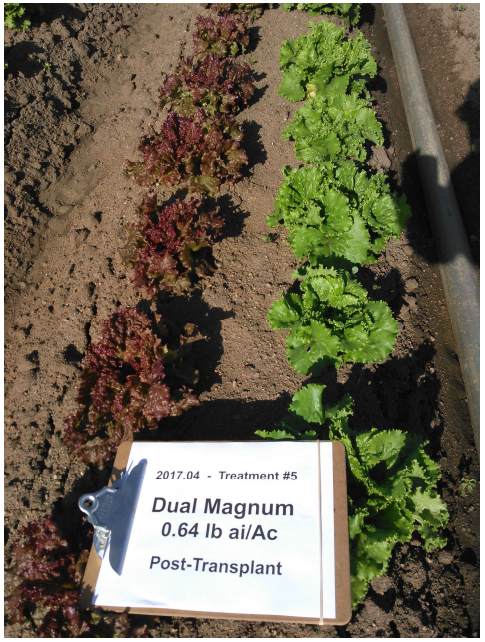



2017.04 - Treatment #1
Kerb 3.3SC
1.2 lb ai/Ac
PRE-Transplant


2017.04 - Treatment #2
Dual Magnum
0.64 lb ai/Ac
PRE-Transplant


2017.04 - Treatment #3
Dual Magnum
1.28 lb ai/Ac
PRE-Transplant


2017.04 - Treatment #4
Kerb 3.3SC
1.2 lb ai/Ac
Post-Transplant


2017.04 - Treatment #5
Dual Magnum
0.64 lb ai/Ac
Post-Transplant


2017.04 - Treatment #6
Dual Magnum
1.28 lb ai/Ac
Post-Transplant


2017.04 - Treatment #1
Kerb 3.3SC
1.2 lb ai/Ac
PRE-Transplant


2017.04 - Treatment #2
Dual Magnum
0.64 lb ai/Ac
PRE-Transplant


2017.04 - Treatment #3
Dual Magnum
1.28 lb ai/Ac
PRE-Transplant


2017.04 - Treatment #4
Kerb 3.3SC
1.2 lb ai/Ac
Post-Transplant


2017.04 - Treatment #5
Dual Magnum
0.64 lb ai/Ac
Post-Transplant


2017.04 - Treatment #6
Dual Magnum
1.28 lb ai/Ac
Post-Transplant

Dual Magnum lettuce summary

- Safe in Redleaf, and Greenleaf lettuces at 0.67 and 1.3 pts
- Butterhead tolerated 0.67 pts PRE and POST transplant but only tolerated 1.3 pts PRE (not POST)
- Iceberg and Romaine tolerate 0.67 pts of DM but not 1.3 pts
- Weed control with DM was better than Kerb

Funding Acknowledgements

- Syngenta Crop Protection
- Kumiai Chemical
- California Leafy Greens Research Program