Herbicide Programs for Weed Control in Processing Onions

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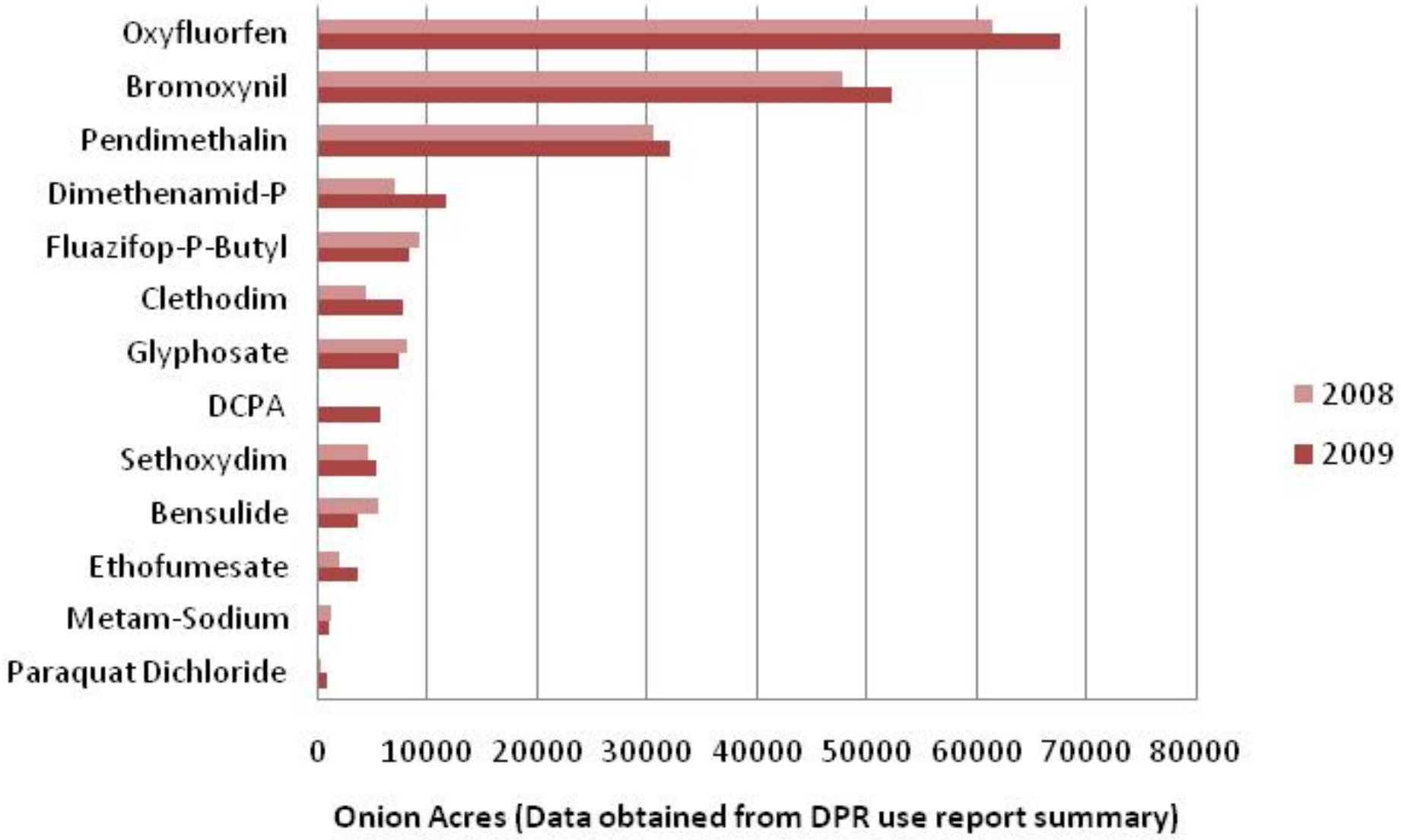
What's New in Onion Weed Control?

- Unfortunately, Not Much.
- CA onion producers are currently relying on a handful of herbicides for weed control in onions.

Herbicide Use for Dry Bulb Onion Weed Control in CA



Weed Control Trials

- Broadcast/Chemigation trial at IREC on high OM clay loam soil
- Pre-emergent herbicide trial in cooperation with local Tulelake grower on sandy soil type

The Influence of Herbicide Treatments in Processing Onions at IREC in 2010.

trt #	Herbicide	Post-Plant Pre	Loop	1-leaf	2-leaf	3-4 leaf	Kochia control* %	Kochia density** plants	Onion Injury*** %	Onion Stand**** plants	Onion Yield ton/A	Bulb Weight per Plant oz	Weeding Cost ***** $/Acre
1	Goal 2XL				6 fl. oz/A	6 fl. oz/A	63.75	104	3.12	171 NS	23.54	2.41	$230.00
1	Goal Tender			4 fl. oz/A									
2	Goal 2XL				6 fl. oz/A	6 fl. oz/A	47.5	94	2.25	196 NS	25.64	2.24	$419.00
3	Goal 2XL Broadcast				6 fl. oz/A	6 fl. oz/A	56.6	81	3.25	189 NS	25.74	2.26	$290.00
3	Goal Tender Broadcast			4 fl. oz/A									
4	Nortron	16 fl. oz/A				16 fl. oz/A	78.75	59	3.37	173 NS	25	2.47	$115.00
4	Goal 2XL				6 fl. oz/A	6 fl. oz/A							
4	Goal Tender			4 fl. oz/A									
5	Nortron	16 fl. oz/A				16 fl. oz/A	86.25	35	3.5	146 NS	22.72	2.74	$69.00
5	Prowl H20		1.5 pt/A			1.5 pt/A							
5	Goal 2XL				6 fl. oz/A	6 fl. oz/A							
5	Goal Tender			4 fl. oz/A									
6	Nortron	16 fl. oz/A				16 fl. oz/A	85	56	3.5	159 NS	23.98	2.55	$94.00
6	Prowl H20		1.5 pt/A			1.5 pt/A							
6	Goal 2XL				6 fl. oz/A	6 fl. oz/A							
6	Goal Tender			4 fl. oz/A									
6	Outlook				21 fl. oz/A								
7	Prowl H20		1.5 pt/A			1.5 pt/A	73.75	76	3.25	157 NS	22.53	2.54	$155.00
7	Goal 2XL				6 fl. oz/A	6 fl. oz/A							
7	Goal Tender			4 fl. oz/A									
7	Outlook				21 fl. oz/A								
8	Prowl H20 broadcast		1.5 pt/A			1.5 pt/A	66.25	89	3.125	168 NS	24.13	2.47	$248.00
8	Goal 2XL Broadcast				6 fl. oz/A	6 fl. oz/A							
8	Goal Tender Broadcast			4 fl. oz/A									
8	Outlook broadcast				21 fl. oz/A								
9	Dacthal	10 pt/A					81.25	24	2.875	188 NS	24.45	2.14	$49.00
9	Goal 2XL				6 fl. oz/A	6 fl. oz/A							
9	Goal Tender			4 fl. oz/A									
10	Goal 2XL				6 fl. oz/A	6 fl. oz/A	80	60	2.75	189 NS	25.54	2.36	$140.00
10	Goal Tender			4 fl. oz/A									
10	Buctril 2EC				16 fl. oz/A	16 fl. oz/A							
11	Goal 2XL Broadcast				6 fl. oz/A	6 fl. oz/A	77.5	66	3.5	189 NS	25.53	2.26	$136.00
11	Goal Tender Broadcast			4 fl. oz/A									
11	Buctril 2EC broadcast				16 fl. oz/A	16 fl. oz/A							
12	Goal 2XL				6 fl. oz/A	6 fl. oz/A	90.5	24	2.88	183 NS	24.9	2.29	$112.00
12	Goal Tender			4 fl. oz/A									
12	Starane				6 fl. oz/A	8 fl. oz/A							
13	Prowl H20		1.5 pt/A			1.5 pt/A	80	40	2.88	173 NS	24.49	2.52	$92.00
13	Goal 2XL				6 fl. oz/A	6 fl. oz/A							
13	Goal Tender			4 fl. oz/A									
13	Buctril 2EC				16 fl. oz/A	16 fl. oz/A							
13	Outlook				21 fl. oz/A								
14	Non-Weeded Control						0	179	0.8	179 NS	8.26	0.76	
15	Hand-weed Control									191 NS	24.2	2.09	
	LSD						10.4	45	0.55		4.52	0.58	$105.00

* Kochia % control was measured when reached the 4-5 leaf stage.

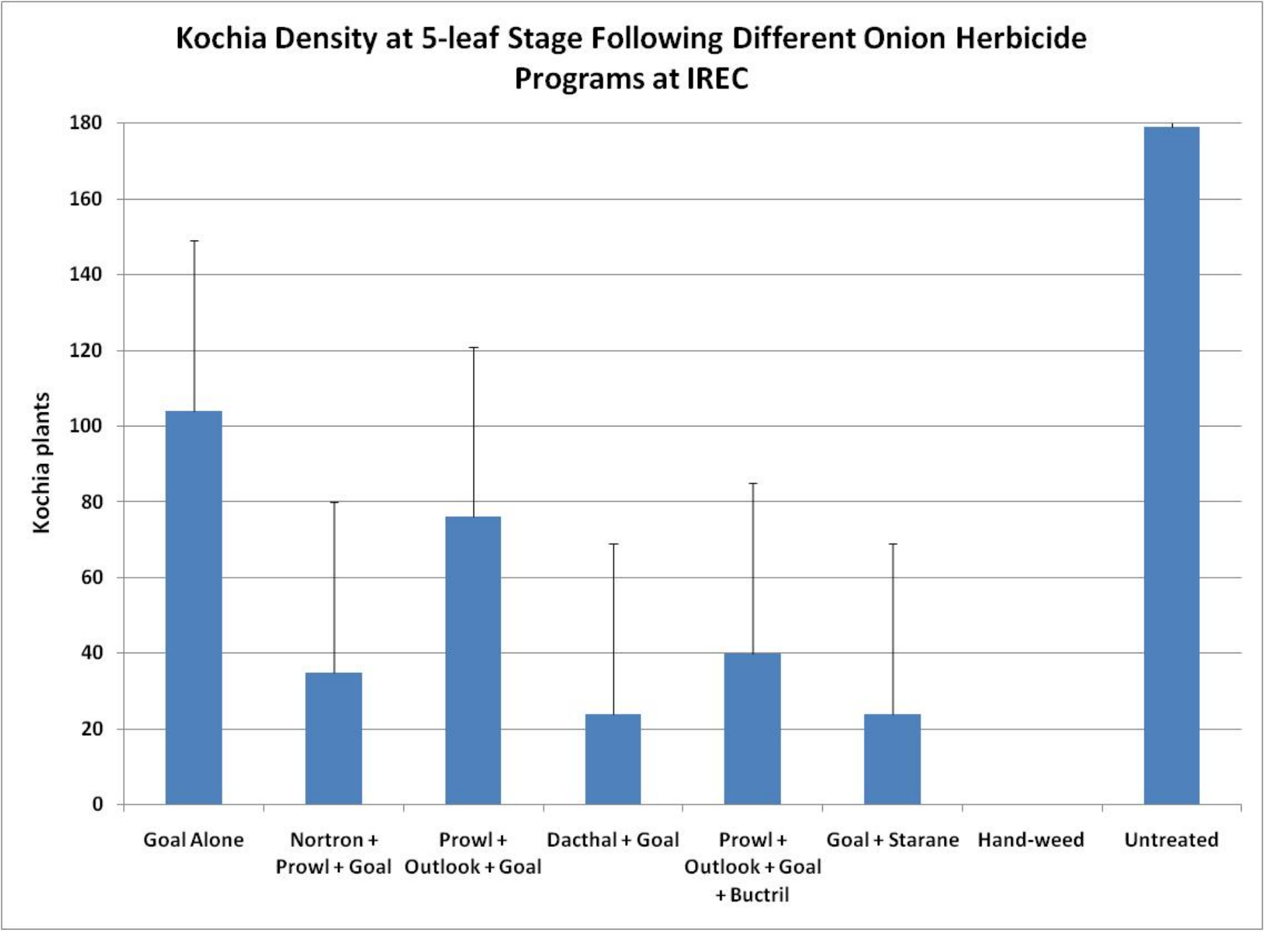
** Kochia density counts were taken from the center two rows in each plot for the entire plot length at the 4-5 leaf stage.

*** Onion Injury was evaluated at the 3 leaf stage. 1 to 10 scale with 10 equal to plant death. The LSD was 0.9

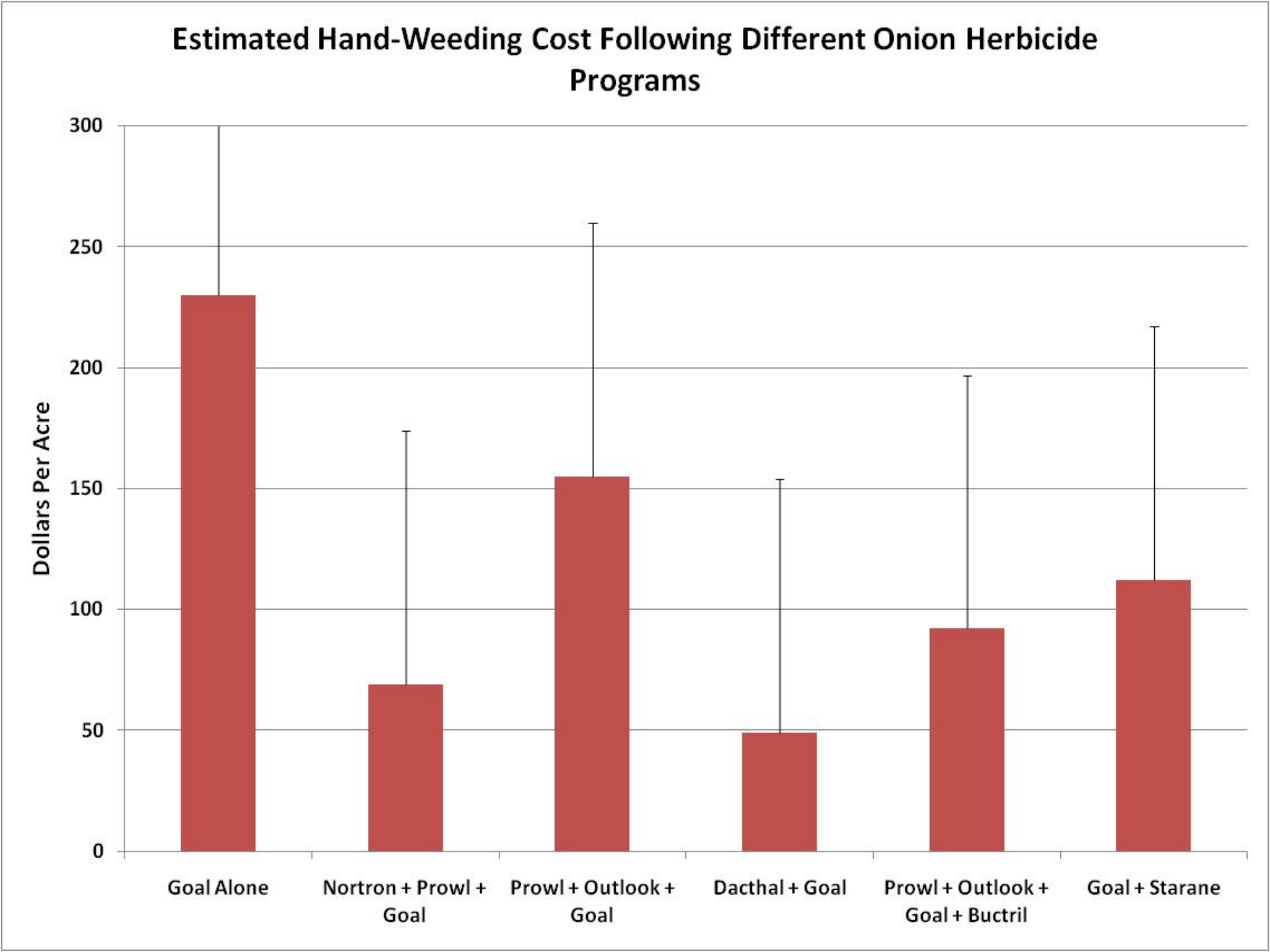
**** Onion stand counts were measured at 4-5 leaf stage. There were no significant differences between treatments.

***** Weeding cost based on $9 per hour labor wage. Weeding costs were estimated by recording the amount time required to weed research plots with a five person labor crew.

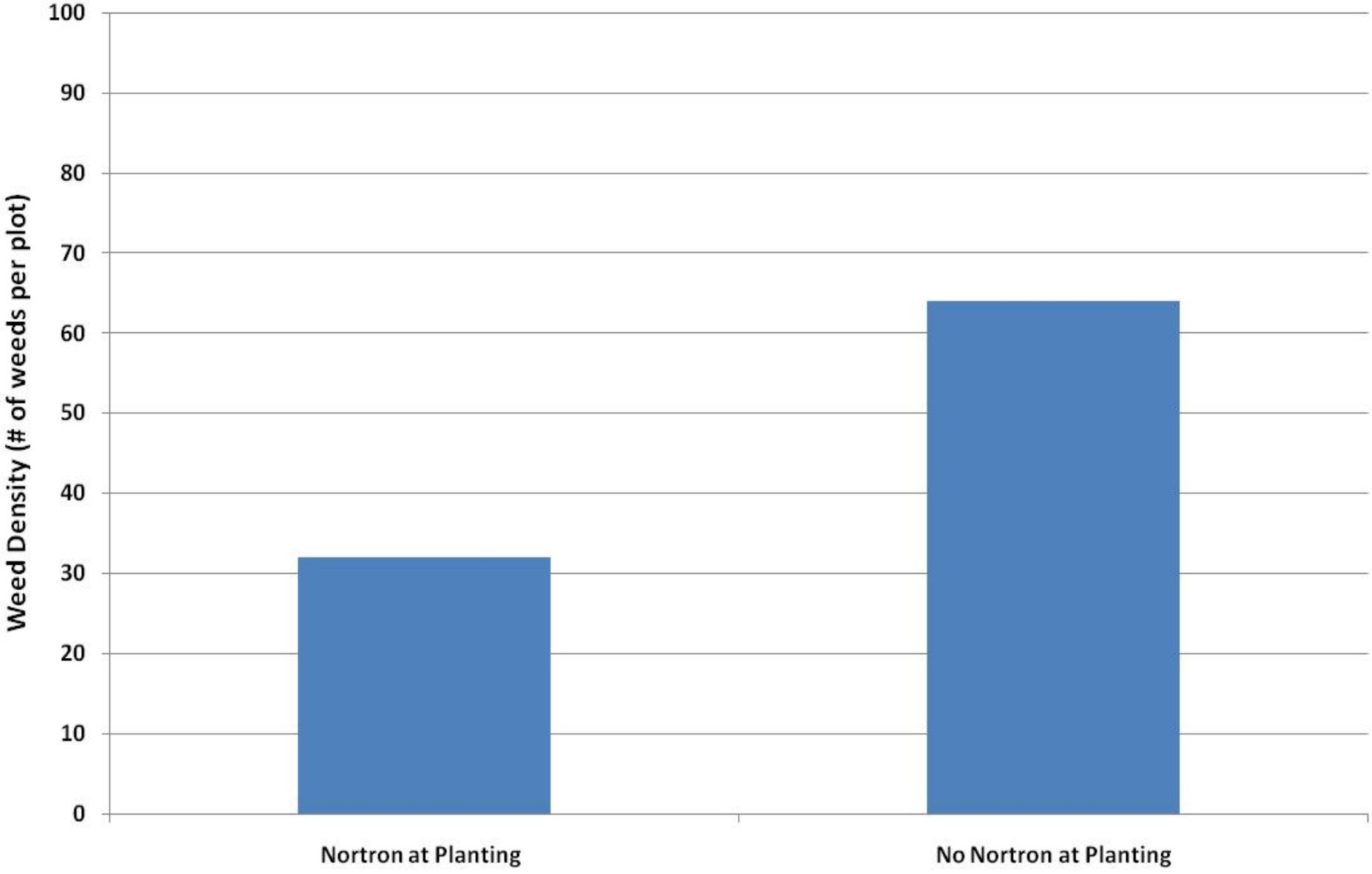

2-leaf stage


Kochia Density at 5-leaf Stage Following Different Onion Herbicide Programs at IREC
Kochia plants
180
160
140
120
100
80
60
40
20
0
Goal Alone
Nortron + Prowl + Goal
Prowl + Outlook + Goal
Dacthal + Goal
Prowl + Outlook + Goal + Buctril
Goal + Starane
Hand-weed
Untreated

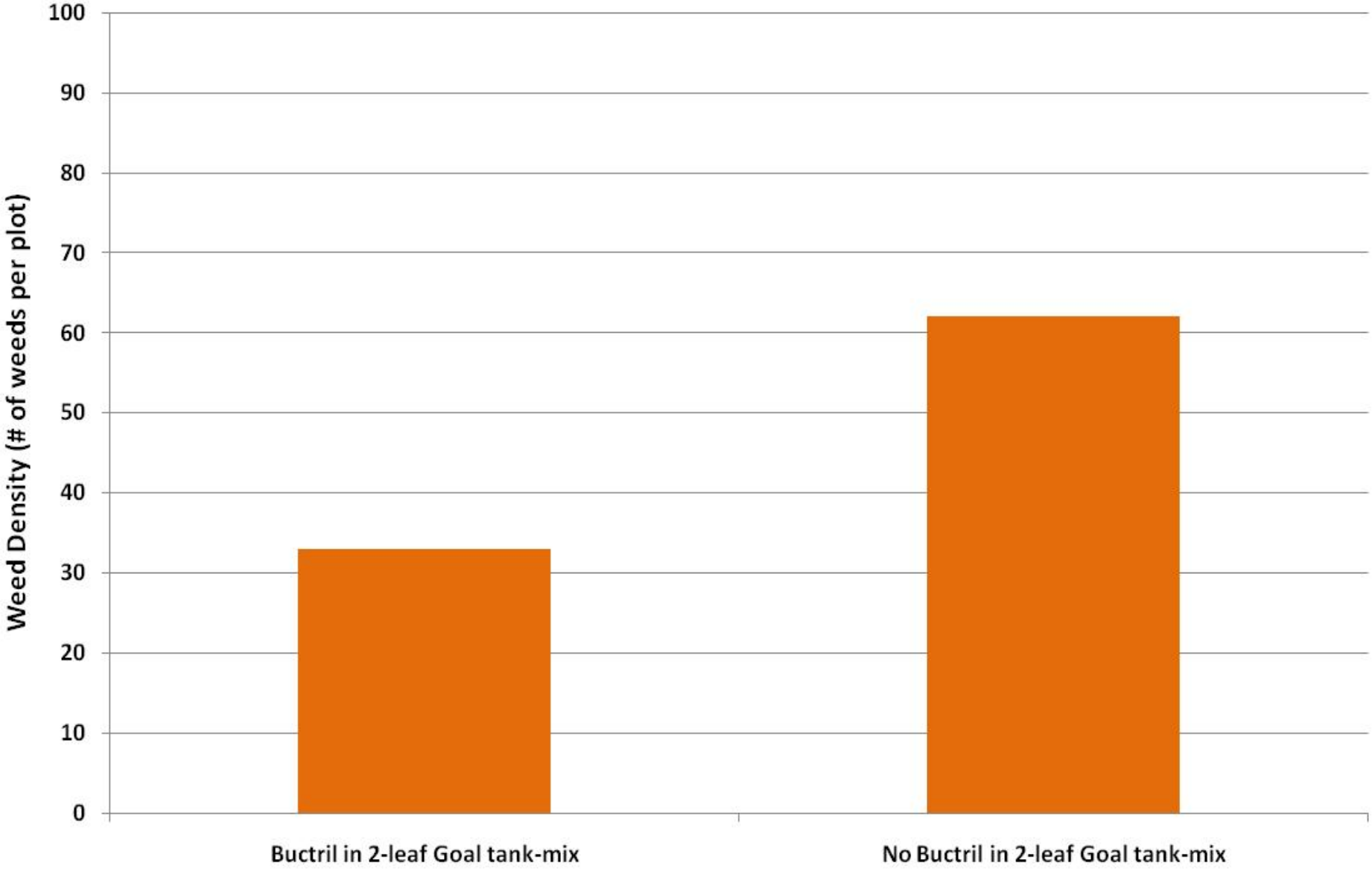

3-leaf stage

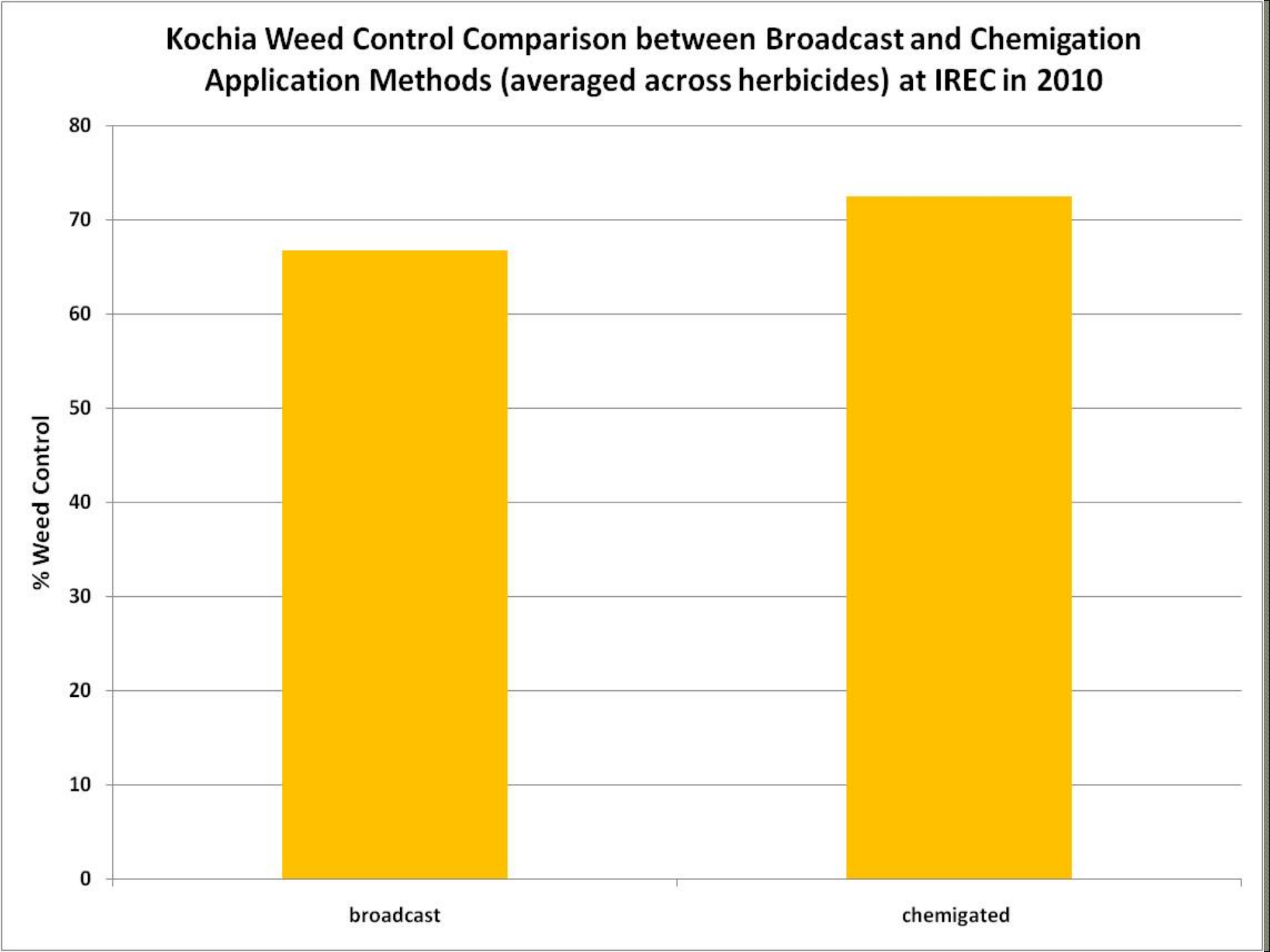

Estimated Hand-Weeding Cost Following Different Onion Herbicide Programs
Dollars Per Acre
300
250
200
150
100
50
0
Goal Alone
Nortron + Prowl + Goal
Prowl + Outlook + Goal
Dacthal + Goal
Prowl + Outlook + Goal + Buctril
Goal + Starane

Kochia Density Comparison between Adding Nortron at Planting versus No Nortron at Planting (averaged across all Prowl + Goal treatments) at IREC in 2009 & 2010



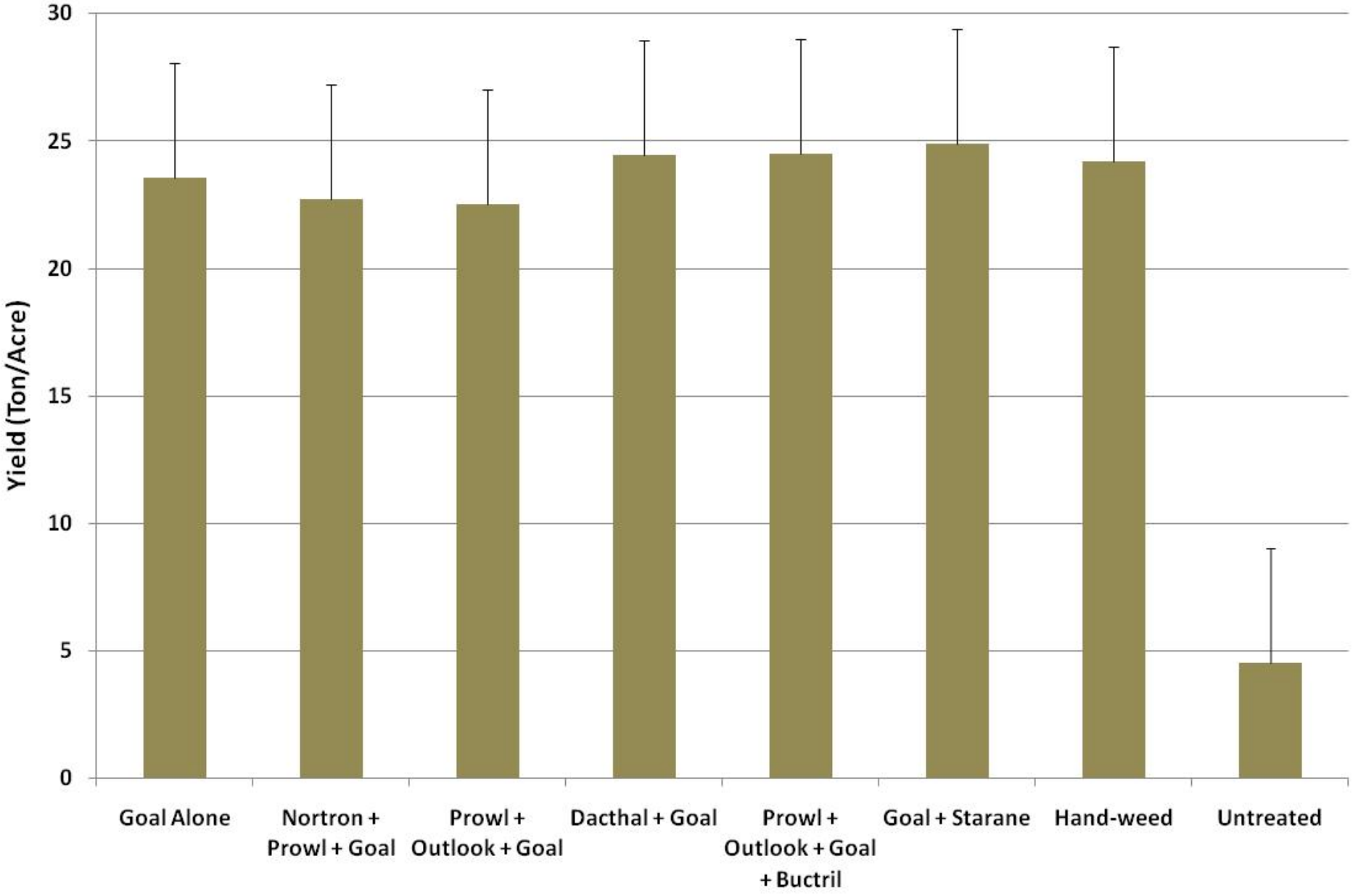
Kochia Density Comparison between Adding Buctril versus No Buctril at 2-leaf stage (averaged across all Prowl, Outlook, Goal treatments) at IREC in 2009 & 2010




Kochia Weed Control Comparison between Broadcast and Chemigation Application Methods (averaged across herbicides) at IREC in 2010
% Weed Control
80
70
60
50
40
30
20
10
0
broadcast
chemigated


TARE 6820
TARE 8520

Average Onion Yield Following Different Onion Herbicide Programs at IREC

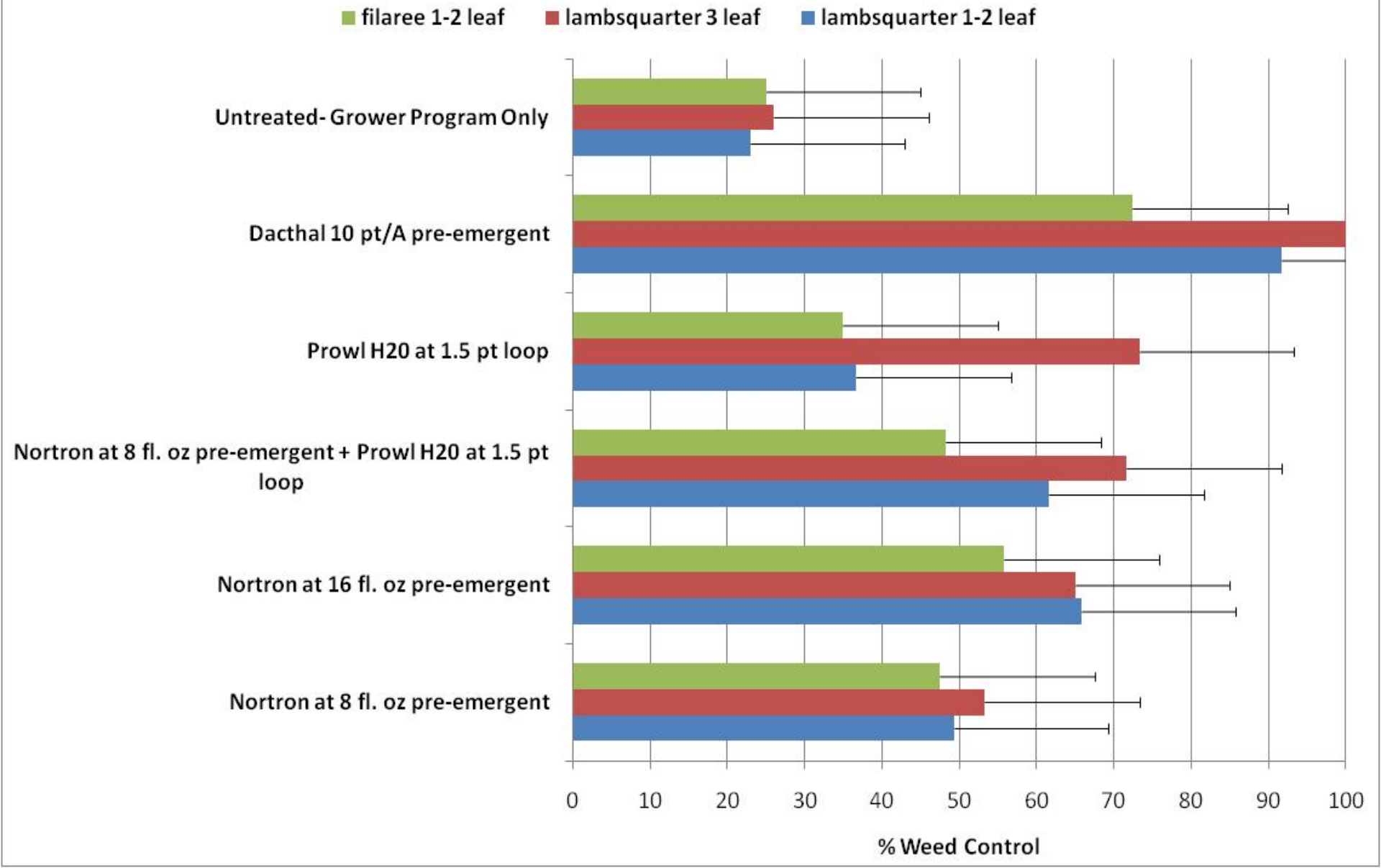


Sandy Loam Site

- Nortron and Dacthal were applied at planting
- Prowl H_20 was applied at loop stage
- Grower applied his normal herbicide program over the trial area. Goal at 1.5-leaf, and Goal at 2-leaf.
- Nortron, Dachtal, and Prowl treatments did not cause onion stand reduction or visual injury to onions at loop or 2-leaf stage

Lambsquarter and Redstem Filaree Suppression from Pre-emergent Herbicides Applied to Onions Grown on a Sandy Soil Type

(Grower Applied Post Emergent Treatments starting at 1 leaf stage)



Possible Optimal Treatment Strategy

- Datchal and/or Nortron at planting
- When possible, apply glyphosate to control early germinating weeds before onion emergence
- Prowl H2O at loop
- Goal Tender at 1.5 -leaf
- Goal +Buctril at 2-3 leaf as soon as weeds show re-growth from first Goal application
  - Add Outlook or 2nd shot of Prowl if needed
- Apply Selective Grass Herbicide (Fusilade, Select, or Poast) as needed when grasses are 3 to 5 inches tall
- Try to avoid repeated Goal applications after 4-5 leaf stage

Tips for Maximizing Chemigation Performance

- Chemigate early in the morning when temperatures are cool and winds are calm
- Use caution with applications on sunny, warm days immediately after cool, high humidity weather events
- Make sure your sprinklers have uniform coverage

Biological Inoculants and White Rot Management

- Objective: Determine the influence of biological products on onion growth, onion yield, and white rot suppression
- Treatments included biological products with and without Folicur at 10.3 oz/A applied in-furrow at planting

Biological Products Tested

- Superzyme- bacterium and fungi(*Bacillus, Pseudomonas, Trichoderma*)
- MycoApply and Biolife- mycorrhizal fungi and non-pathogenic bacteria
- Galaxy PGPR and Stealth- bacterium mixture (*Bacillus azotofixans, Azotobacter chroococcum, Pseudomonas putida, and Pseudomonas fluorescens*)

Treatments	Onion Stand* 6/15/2010 plants/A	Early Vigor** 3-4 leaf stage 6/15/2010 0-5 scale	Late Season Leaf Dieback Rating*** 9/24/2010 % leaf dieback	Total Yield 10/11/2010 tons/acre	Clean Yield 10/11/2010 tons/acre	Yield with white rot 10/11/2010 %
1. Folicur in-furrow	303907	4.25	20	20.25	15.87	22.00%
2. STO-01 + Folicur in furrow	295803	4.375	20	19.24	14.98	22.50%
3. Superzyme + Folicur in furrow	309985	4.25	23	19.57	15.44	21.70%
4. MycoApply+ Biolife + Folicur in-furrow	307959	4.625	26	19.39	14.09	27.40%
5. Untreated	340376	4.875	43	17.54	9.04	48.00%
6. Superzyme in furrow	309985	4.5	38	17.6	10.608	40.10%
7. MycoApply + Biolife in furrow	320115	4.75	41	16.65	8.88	46.80%
8. Galaxy PGPR in furrow & Stealth applied at 5 and 7 leaf stage	324167	4.625	39	17.31	10.07	42.00%
LSD	NS	0.47	12	2.09	3.7	14.30%

* Onion stand counts equal number of plants/acre. Treatments were not statistically different (NS).

** Onion vigor based on 0 to 5 scale; 0= low and 5 = high

*** The percentage of plants with the majority of leaves showing leaf dieback.

Product Rates

Folicur	10.3 oz/A
STO-01	4 pts/A
Superzyme	4 qts/100 gallons H20
MycoApply	4 oz/A
Biolife	1 pt/A
Galaxy PGPR	2 oz/A
Stealth	4 oz/A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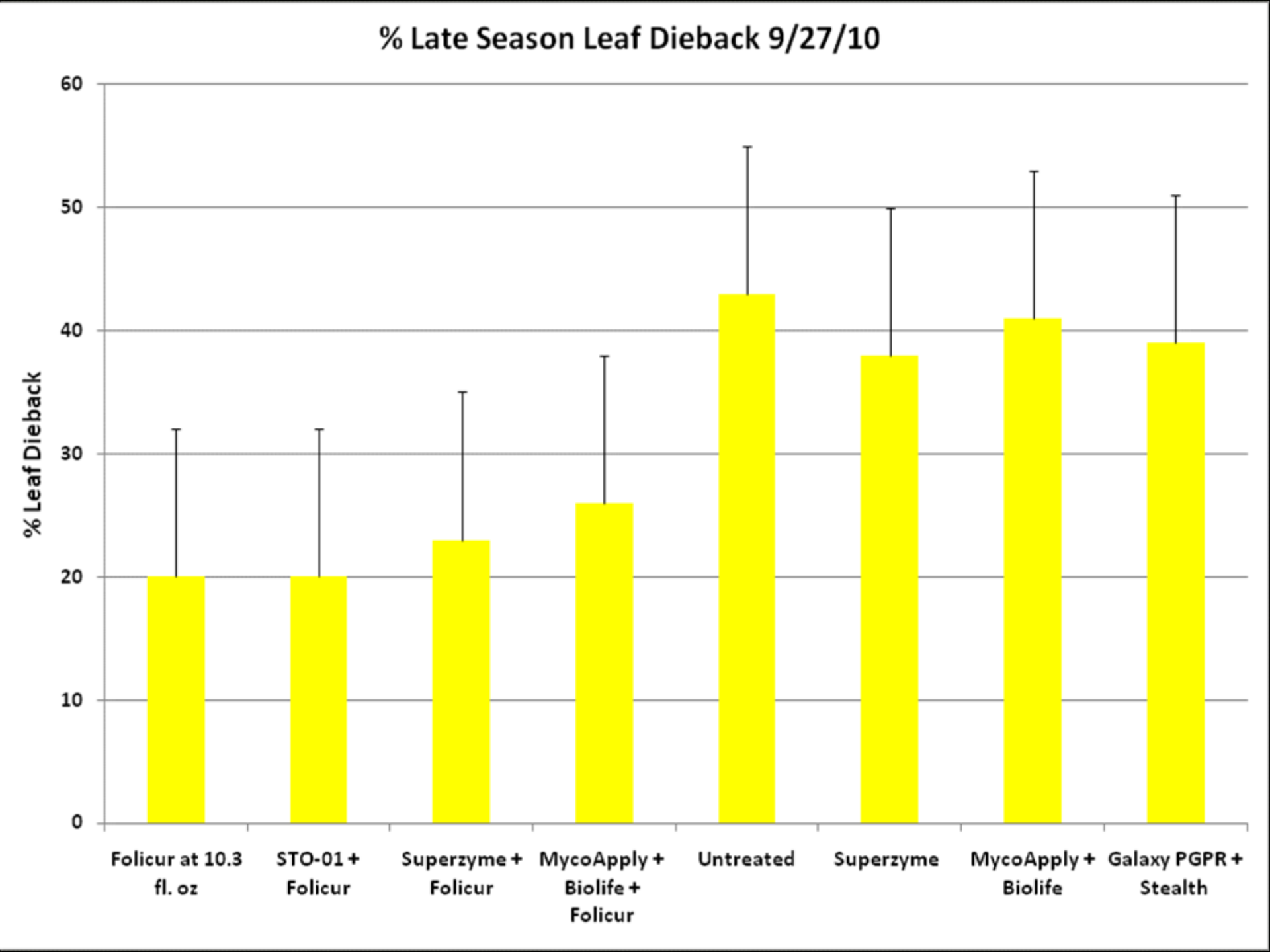
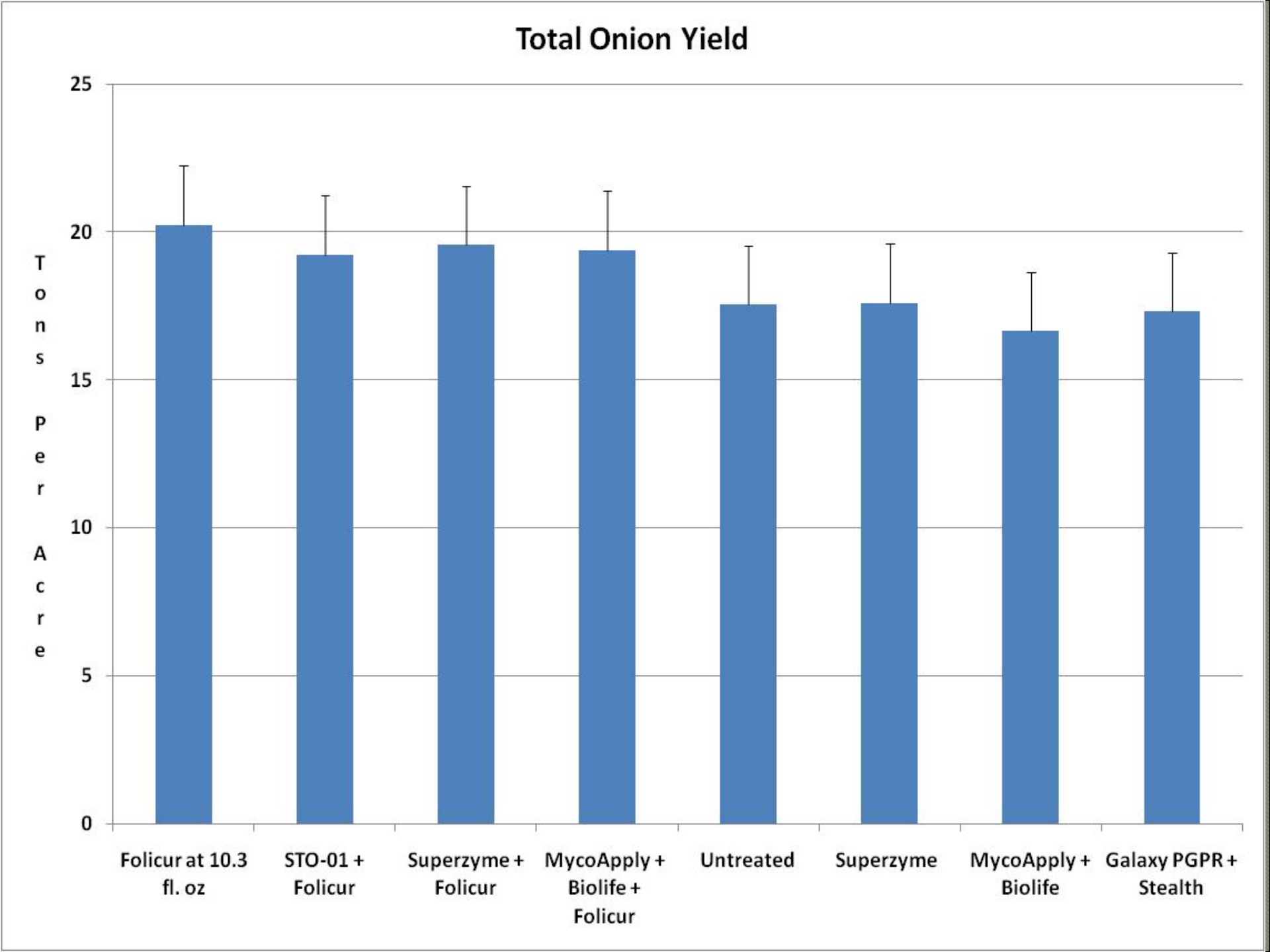

% Late Season Leaf Dieback 9/27/10
% Leaf Dieback
60
50
40
30
20
10
0
Folicur at 10.3 fl. oz
STO-01 + Folicur
Superzyme + Folicur
MycoApply + Biolife + Folicur
Untreated
Superzyme
MycoApply + Biolife
Galaxy PGPR + Stealth


Total Onion Yield
Tons Per Acre
25
20
15
10
5
0
Folicur at 10.3 fl. oz
STO-01 + Folicur
Superzyme + Folicur
MycoApply + Biolife + Folicur
Untreated
Superzyme
MycoApply + Biolife
Galaxy PGPR + Stealth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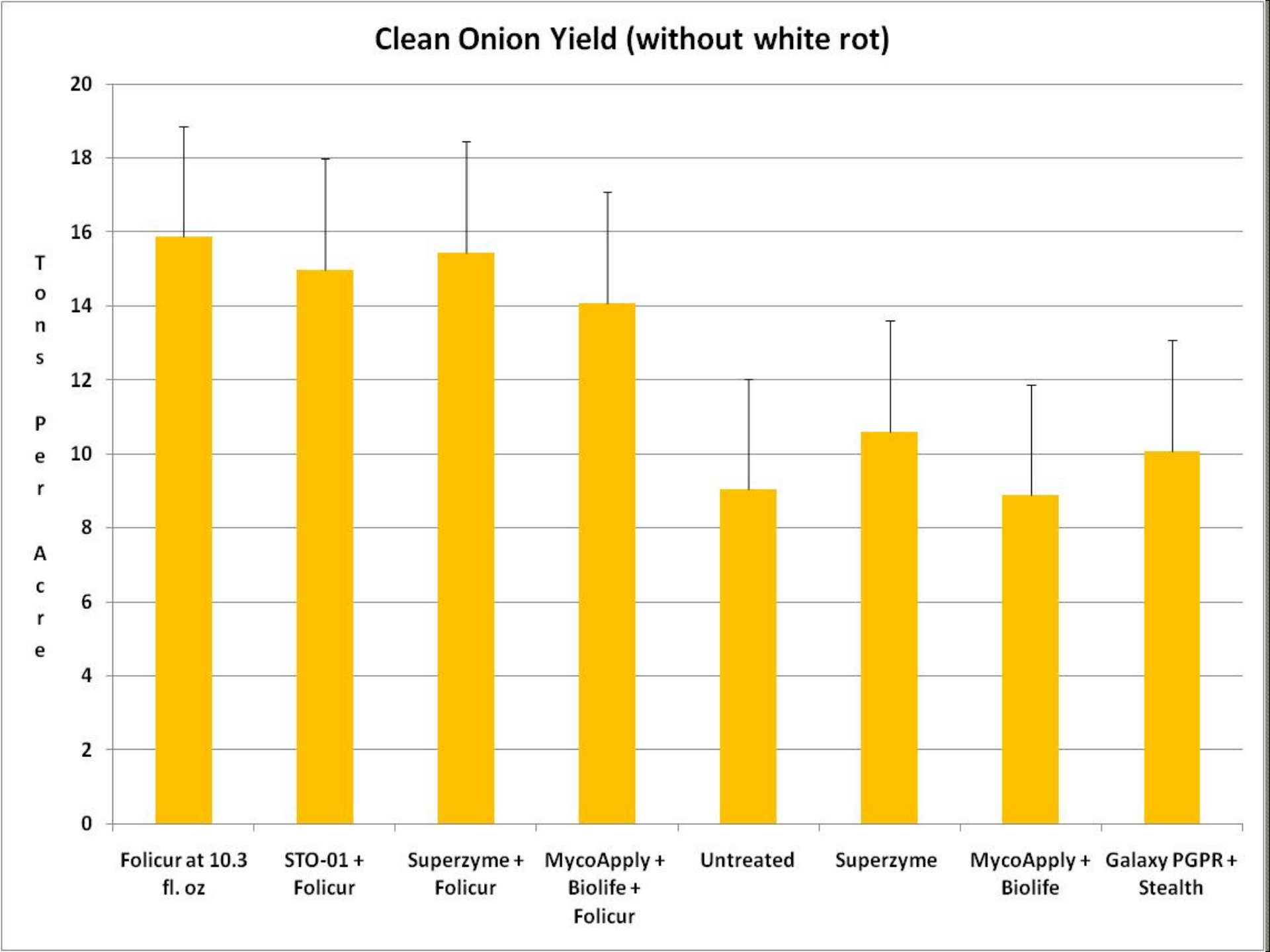
Clean Onion Yield (without white rot)
Tons Per Acre
20
18
16
14
12
10
8
6
4
2
0
Folicur at 10.3 fl. oz
STO-01 + Folicur
Superzyme + Folicur
MycoApply + Biolife + Folicur
Untreated
Superzyme
MycoApply + Biolife
Galaxy PGPR + Stealth

Thank You to the CA Garlic and Onion Research Advisory Board