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2010 Onion Weed Control in Tulelake

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Introduction: In 2010, two trials were conducted in processing onions near Tulelake to evaluate weed control with herbicides applied via broadcast and chemigation application methods. One trial was conducted at the Intermountain Research and Extension Center (IREC) on a silty clay loam soil with high organic matter. Another trial was conducted in a grower field in a sandy loam soil. Some herbicides listed in this report may not be labeled for use in onions. Please consult herbicide labels for use instructions.

General Trial Information:

Location: Tulelake, CA

Soil Type: Tulebasin mucky silty clay loam (IREC site); sandy loam (Grower site)

Planting Date: Aril 16th (IREC site); May 15th (Grower site)

Harvest Date: October 12th (IREC site); Yield was not measured at Grower site

Irrigation: Solid-set sprinklers; Total applied water was 25 inches at IREC.

Plot Size: 18 X 30 ft (IREC site); 6 X 20 ft (Grower site)

Row Spacing: 36 inch beds with 4 seed-lines per bed

Trt Replication: 4 replications

IREC herbicide treatment and data collection information:

	IREC Site Herbicide Treatment Timings				
	Planting	**Loop**	**1 Leaf**	**2 Leaf**	**3 Leaf**
Application dates:	4/23/10	5/14/10	6/3/10	6/11/10	6/25/10
Weed size at application:	None	Seedling	1-2"	3-5"	6-8"
Weed control & onion injury rating dates:		5/27/10	6/8/10	6/21/10	7/2/10

Herbicide Application Methods:

- Chemigation: ABI, a small-plot linear move irrigation apparatus pulled through the field with a reel system (same reel system used for big-gun sprinklers). Herbicides were applied with 0.1 acre inch of water and followed by a 0.25 acre inch irrigation.

- Broadcast treatment: Applied with CO_2 backpack sprayer at 20 GPA. Plot area was irrigated with 0.25 acre inch of water four hours after application.

Weed Density Counts and % Control Rating:

- Visual observations and counts were taken from a 6 X 15 ft sampling area in each plot. % weed control was visually estimated in the entire plot area.

Hand Weeding:

- Plots were hand-weeded by a five person crew on 7/13/10. Weeding costs were estimated by recording the amount of time it took for the crew to weed each plot. Weeding costs are based on $9 per hour labor wage.

Onion Stand Count and Onion Injury:

- Onion counts were taken on 6/14/10, 7/6/10, 7/26/10 and 10/5/10. Counts were taken in the same sampling area as the weed density ratings. Treatment stand counts were not statistically different for all sampling times. Onion injury was visually evaluated in the plot area using a 0 - 10 scale.

Grower site herbicide treatment and data collection information:

	Grower Site Herbicide Treatment Timings	
	Planting	**Loop**
Application dates:	14-May	10-Jun
Weed size at application:	None	.5-1"
Weed control & injury rating dates:	6/8/10	6/17/10 & 7/2/10

Herbicide Application Method:

- All treatments were broadcast applied with CO_2 backpack sprayer at 20 GPA. Plots were irrigated within one day of herbicide application. ***The grower applied Goal+Prowl H_2O over the entire trial area at the 1-leaf stage on 6/18/10 and 2-leaf stage.***

Weed Density Counts:

- Visual observations and counts were taken from a 6 X 15 ft sampling area in each plot. % weed control was visually estimated in the entire plot area.

Onion Stand Count:

- Onion counts were taken on 6/18/10 and 7/2/10. Counts were made in the same area as the weed density ratings. Treatment stand counts were not statistically different at all sampling times.

Results:

Weed Control

IREC weed control results for 2010 are presented in Table 1. The predominant weed in the 2010 IREC trial was kochia. The best treatments for kochia suppression included: Nortron or Dacthal applied at planting, Buctril + Goal applied at the 2-leaf stage, and Goal + Starane applied at the 2-leaf stage. These treatments resulted in lower kochia density compared to Prowl H20+Goal+Outlook combinations (Figure 1). Averaged across 2009 and 2010 IREC weed control trials, Nortron at planting or Buctril + Goal at the 2-leaf stage reduced kochia density an additional 50% compared to treatments with Goal, Prowl H20, and/or Outlook (Figures 4 & 5). When comparing broadcast to chemigation application at IREC, chemigation provided slightly better weed control (6%) averaged across herbicides. At the sandy loam site (grower field), Dacthal applied at planting provided 100% control of lambsquarter (Figure 3). Applying Dacthal or Nortron at planting provided the highest control of filaree (Figure 3).

Hand-weeding Costs

Hand-weeding costs for IREC are presented in Table 1 and Figure 2. Hand-weeding costs tracked very closely with weed density. The more weeds , the higher the weeding cost. The treatment with the highest weeding cost was Goal alone starting at the 2-leaf stage at $419 per acre. Treatments with the lowest weeding costs included those with Nortron, Dacthal, or Buctril. Most of these treatments had weeding costs below $100 per acre. When comparing broadcast to chemigation application, chemigation treatments had lower weeding costs ($50/acre) averaged across herbicides.

Onion Injury, Stand, and Yield

Onion injury, stand, and yield data are presented in Table 1. All treatments injured onion plants compared to the untreated control when evaluated at the 2-leaf, 3-leaf, and 4-leaf stage. Onions in all treatments did not display visual herbicide injury at the July evaluation. Onion yield and average bulb weight did not differ between herbicide treatments. When comparing broadcast to chemigation application, broadcast application of Goal + Buctril at the 2-leaf stage caused higher crop injury compared chemigation of Goal + Buctril. Chemigation and broadcast did not differ with regard to yield and average bulb size for all herbicide treatments.

Special Thanks: The research team would like to thank the California Garlic and Onion Research Advisory Board for financial support for this research.

Table 1. Comparison 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*** 0-10 scale	Onion Stand**** plants	Onion Yield ton/A	Average Bulb Weight 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 weeds reached the 4-5 leaf stage.

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

*** Onion Injury was evaluated at the 3 leaf stage. 0 to 10 scale with 10 equal to plant death.

**** Onion stand was measured at 4-5 leaf stage. There were no significant differences between treatments at all sampling times.

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

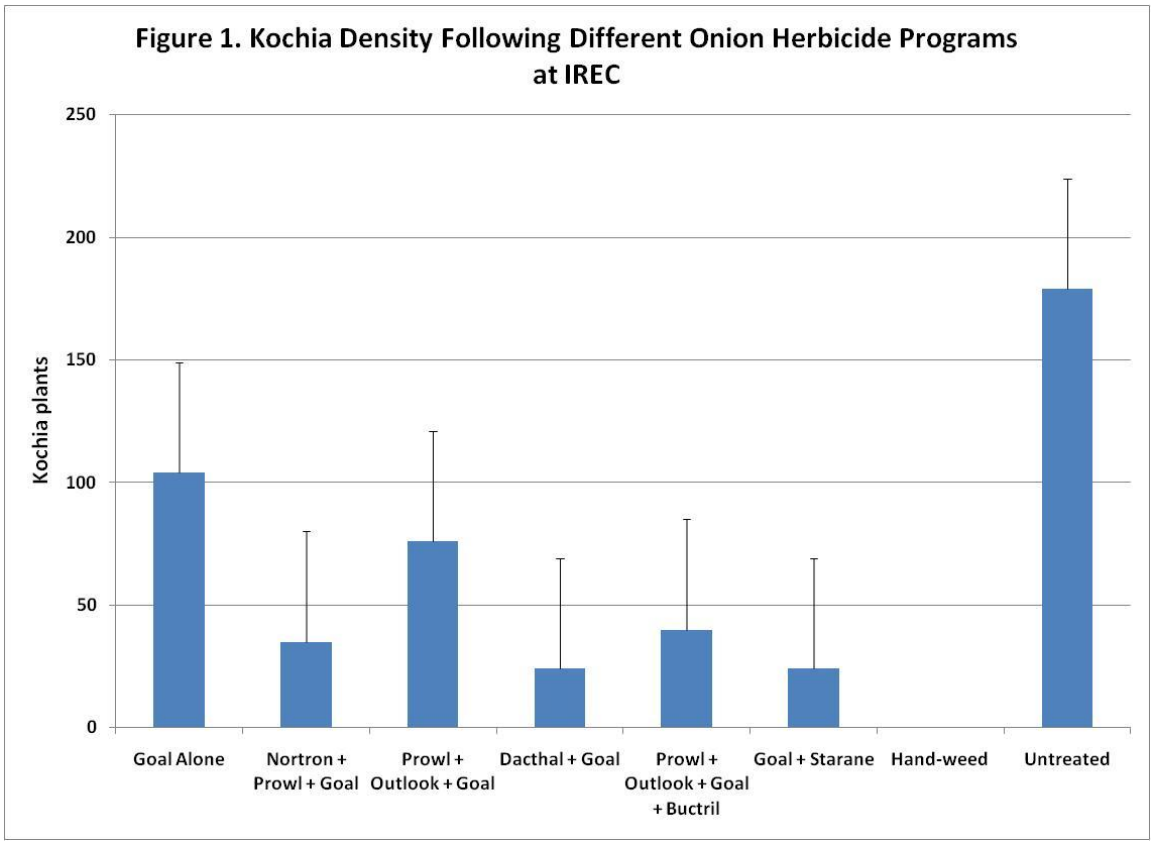


Figure 1. Kochia Density Following Different Onion Herbicide Programs at IREC
Kochia plants
250
200
150
100
50
0
Goal Alone
Nortron + Prowl + Goal
Prowl + Outlook + Goal
Dacthal + Goal
Prowl + Outlook + Goal + Buctril
Goal + Starane
Hand-weed
Untreated

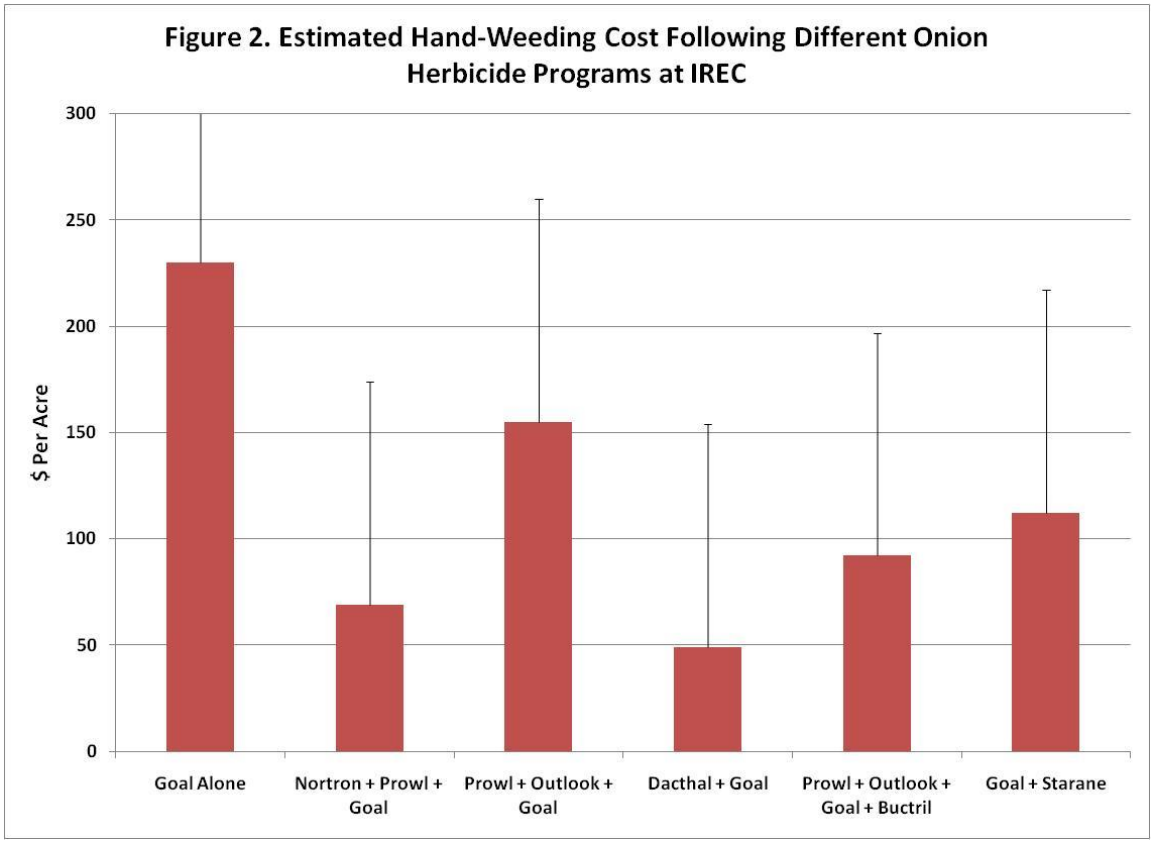


Figure 2. Estimated Hand-Weeding Cost Following Different Onion Herbicide Programs at IREC
$ Per Acre
300
250
200
150
100
50
0
Goal Alone
Nortron + Prowl + Goal
Prowl + Outlook + Goal
Dacthal + Goal
Prowl + Outlook + Goal + Buctril
Goal + Starane

Figure 3. Lambsquarter and Redstem Filaree Suppression from Pre-emergent Herbicides Applied to Onions Grown on Sandy loam Soil

(Grower Applied Goal Treatments starting at 1.5 leaf stage on 6/18/10)

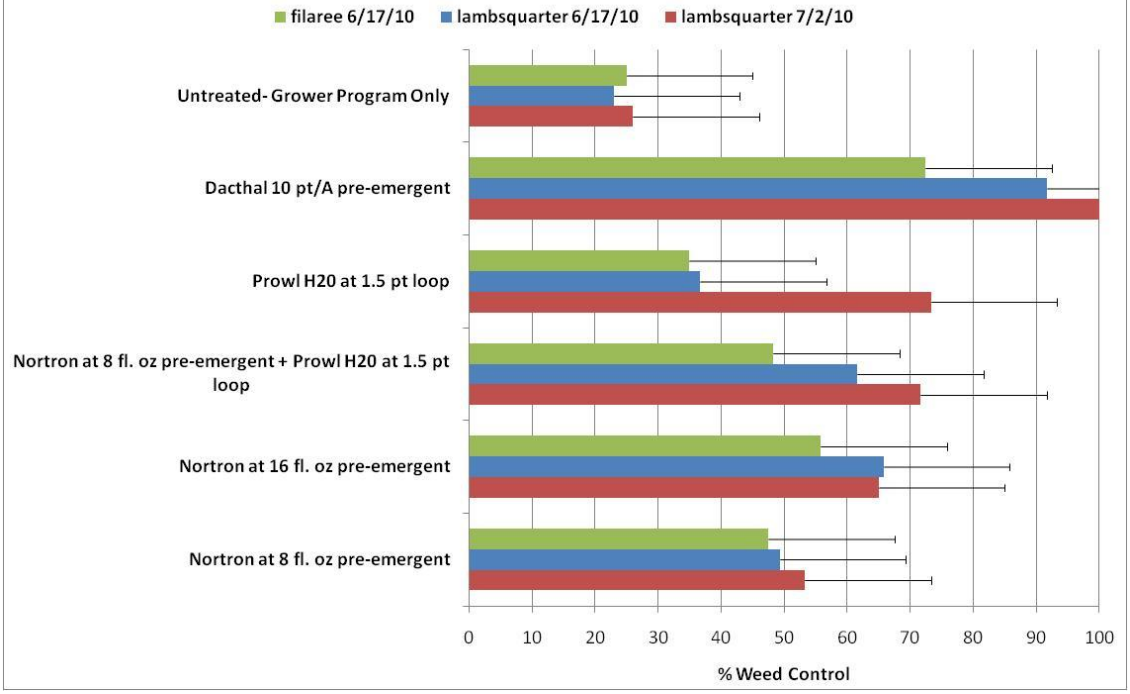
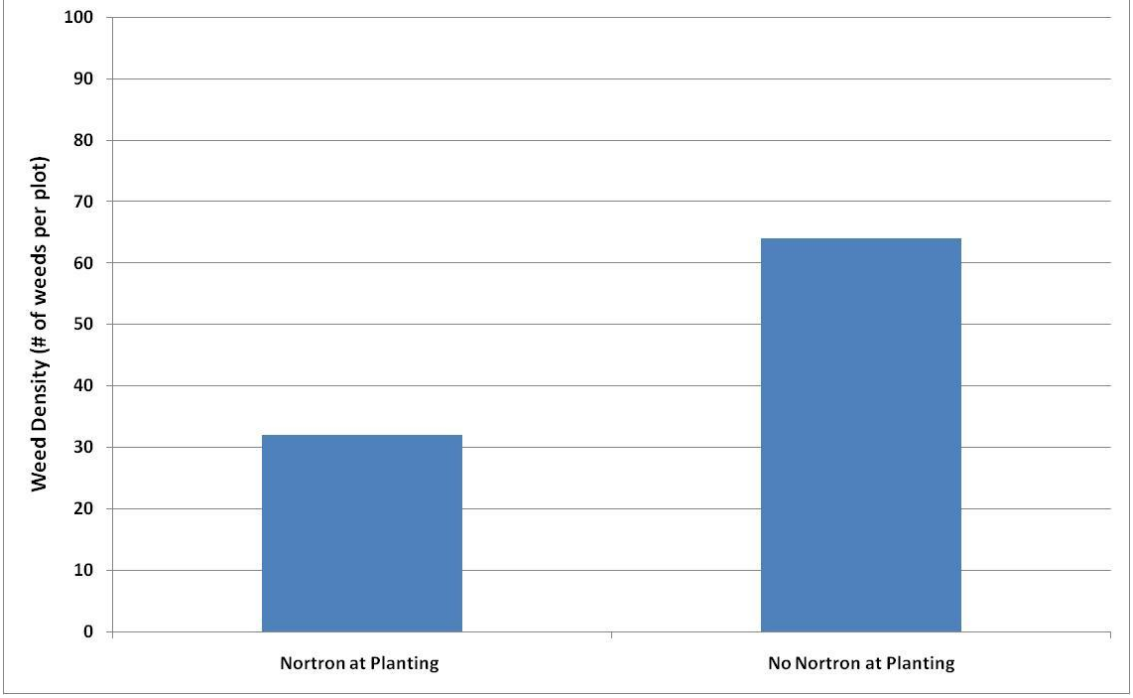


Figure 4. Kochia Density Comparison between Adding Nortron at Planting versus No Nortron at Planting (averaged across all Prowl + Goal treatments) at IREC in 2009 & 2010



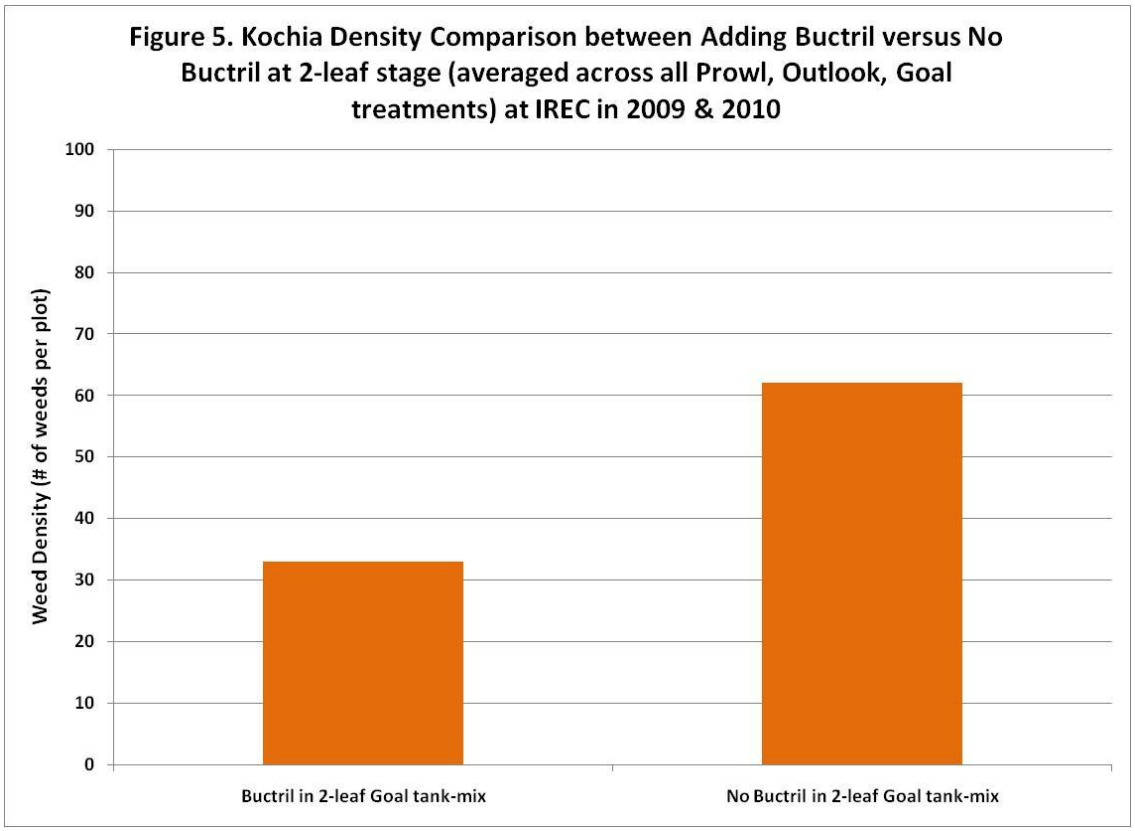


Figure 5. Kochia Density Comparison between Adding Buctril versus No Buctril at 2-leaf stage (averaged across all Prowl, Outlook, Goal treatments) at IREC in 2009 & 2010
Weed Density (# of weeds per plot)
100
90
80
70
60
50
40
30
20
10
0
Buctril in 2-leaf Goal tank-mix
No Buctril in 2-leaf Goal tank-mix