

## 2013 Processing Onion Weed Control Trial

*Rob Wilson, Center Director/Farm Advisor; Steve Orloff, Siskiyou County Director/Farm Advisor; Darrin Culp, Superintendent of Agriculture; Kevin Nicholson, Staff Research Associate; Matt Barber, Intern. University of California Intermountain Research & Extension Center, 2816 Havlina Rd. Tulelake, CA. 96134 Phone: 530/667-2719 Fax: 530/667-5265 Email: [rgwilson@ucdavis.edu](mailto:rgwilson@ucdavis.edu)*

**Introduction:** Onions are one of the more difficult crops for achieving satisfactory weed control. They are slow to emerge and grow and require frequent irrigation during establishment. These conditions create optimal conditions for weed establishment and early season weed competition. Herbicides and hand-weeding are the primary weed control methods used in onions grown in Tulelake. A weed control study was conducted at the Intermountain Research and Extension Center (IREC) in 2013 to evaluate rates of DCPA (Dacthal) alone and combined with pendamethalin (Prowl H20) applied at loop stage for control of kochia in onions grown on silty clay soil with high organic matter. Sulfentrazone (Zeus) was tested at various rates as a preemergence and postemergence herbicide on the same soil type. Prowl H20 application timing was also evaluated by comparing applications immediately after planting and at the loop stage. ***Sulfentrazone (ZEUS) is not labeled for use in onions. Please consult herbicide labels for use instructions.***

### IREC Trial Site and Herbicide Application Information

**Location:** Tulelake, CA  
**Irrigation:** Solid-set sprinklers  
**Plot Size:** 6 X 25 ft (IREC site);  
**Row Spacing:** 36 inches; 4 seed-lines spaced 6 inches apart per bed  
**Trt Replication:** 5 replications in a RCB design  
**Soil Type:** Tulebasin mucky silty clay loam  
**Planting Date:** 4/22/13  
**Harvest Date:** 10/14/13

IREC Site Herbicide Application Times				
	Post-Plant	Loop	1.5 Leaf	2.5 Leaf
<b>Onion Growth Stage</b>				
<b>Application Date</b>	4/22/13	5/10/13	5/31/13	6/4/13
<b>Weed Size at Application</b>	Pre	Pre- to seedling	0.5-3"	1-5"

**Herbicide Application Methods:**

Herbicides applied post-plant and at the loop stage were broadcast at 45 GPA and then incorporated via irrigation within 24 hours after application. Herbicides applied after the 1-leaf stage were chemigated using solid-set sprinklers, except for the 3-leaf application of Zeus in treatment 18 which was broadcast at 45 GPA. Herbicide chemigation consisted of applying 0.32 inches water before injection, 0.16 inches water during herbicide injection (1hour set), and 0.32 inches water after injection.

**Weed Density Counts and % Control Rating:**

Weed density was calculated by counting the number of live weeds growing on the bed top of the middle two beds in each plot. Percent weed control was visually estimated over the entire plot area.

**Onion Stand, Onion Injury, and Yield:**

Onion stand was measured by counting the number of onions in the two center seed lines on the two center beds in each plot. Onion injury (stunting, curling, and chlorosis) was visually evaluated in each plot using a 0 -10 scale with 10 = highest injury (plant death). Onions were harvested and weighed from the two center beds in each plot for the entire plot length to calculate yield.

**Results**

Weed control, crop injury, and onion yield results from 2013 are presented in the Table. Treatments highlighted in green provided the best control of kochia. Treatments highlighted in red caused unacceptable crop injury as determined by reductions in onion stand, visual crop injury, and/or decreased yield. Dacthal provided the best control of kochia when combined with Prowl H<sub>2</sub>O at loop stage. Dacthal at rates  $\geq 4$  pt/A reduced kochia density by more 85% when combined with Prowl H<sub>2</sub>O, while Dacthal applied alone at all rates up to 8 pints/A failed to reduce kochia density more than 60%. Prowl H<sub>2</sub>O worked best applied post-plant before the 1<sup>st</sup> irrigation compared to application at the loop stage. Prowl H<sub>2</sub>O applied post-plant provided over 96% kochia control, while Prowl H<sub>2</sub>O applied at the loop stage provided 60% kochia control. Prowl H<sub>2</sub>O applied post-plant did not reduce onion stand and this application timing had the highest yield in the trial.

Sulfentrazone has potential as both a postemergence and preemergence herbicide in onions, but choosing the proper herbicide rate is critical to assure crop safety. Zeus (sulfentrazone) applied at 3 fl. oz/A post-plant and at the 3-4 leaf stage gave great kochia control and acceptable crop safety. Zeus at 1 and 2 fl. oz/A applied post-plant was safe on onions, but the low rates provided mediocre weed control. Conversely, Zeus at 4 fl. oz/A applied post-plant gave great weed control, but it caused unacceptable crop injury and onion stand loss. Zeus applied at the loop stage at 2 fl. oz/A caused unacceptable crop injury.

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**Influence of Herbicides on Processing Onion Performance and Kochia Density at IREC in 2013.**

trt #	Herbicide Application Time					1-leaf	4-leaf	7-leaf	1-leaf	4-leaf	10/15/2013	1-leaf	4-leaf	4-leaf
	Post-Plant Product/A	Loop stage Product	1.5 leaf stage Product	2.5 leaf stage Product	3-4 leaf stage Product	Onion Injury	Onion Injury	Onion Injury	Onion Stand	Onion Stand	Onion Yield	Kochia Density	Kochia Density	Total Weed Density
Goal Tender and Goal 2XL + Buctril applied via chemigation						%	%	%	plants per 25 ft row	ton/acre	plants per 50 ft row			
1	Untreated	No Herbicide	No Herbicide	No Herbicide	No Herbicide	5	2	1	544	549	27.12	132	112	113
2		Prowl H <sub>2</sub> O <sup>2</sup>	Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		10	1	0	527	566	29.20	73	44	45
3	Dacthal 2.5 pt/A		Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		8	0	0	546	566	28.88	157	78	79
4	Dacthal 4 pt/A		Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		6	2	0	572	581	28.35	185	102	104
5	Dacthal 6 pt/A		Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		8	1	0	558	595	28.51	118	72	72
6	Dacthal 8 pt/A		Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		10	3	0	540	544	30.69	85	44	45
7	Dacthal 2.5 pt/A	Prowl H <sub>2</sub> O <sup>2</sup>	Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		10	2	0	578	589	31.02	42	19	21
8	Dacthal 4 pt/A	Prowl H <sub>2</sub> O <sup>2</sup>	Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		10	2	0	554	569	27.90	34	15	16
9	Dacthal 6 pt/A	Prowl H <sub>2</sub> O <sup>2</sup>	Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		10	2	0	539	566	28.97	17	7	7
10	Dacthal 8 pt/A	Prowl H <sub>2</sub> O <sup>2</sup>	Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		10	6	0	543	559	29.85	19	9	11
11	Zeus 1 fl oz/A		Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		12	4	0	547	561	29.04	63	52	54
12	Zeus 2 fl oz/A		Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		11	4	0	552	560	29.62	49	36	37
13	Zeus 3 fl oz/A		Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		14	8	0	535	547	29.29	21	13	13
14	Zeus 4 fl oz/A		Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		17	16	4	507	513	28.87	10	11	12
15	Zeus 2 fl oz/A	Prowl H <sub>2</sub> O <sup>2</sup>	Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		12	8	0	560	550	29.05	8	7	8
16	Zeus 2 fl oz/A	Zeus 2 fl oz/A	Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		30	29	15	398	397	25.46	9	5	7
17		Zeus 2 fl oz/A	Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		30	21	15	458	458	28.16	13	8	9
18		Prowl H <sub>2</sub> O <sup>2</sup>	Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>	Zeus 3 fl oz/A	8	4	0	549	598	29.85	69	10	12
1a		Prowl H <sub>2</sub> O <sup>2</sup>	Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		10	0	0	571	592	29.58	90	63	64
2a	Prowl H <sub>2</sub> O 1.5 pt/A	Prowl H <sub>2</sub> O <sup>2</sup>	Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		11	1	0	570	597	30.87	11	4	4
3a	Prowl H <sub>2</sub> O 3 pt/A	Prowl H <sub>2</sub> O <sup>2</sup>	Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		14	6	0	567	584	30.75	1	0	0
4a	Prowl H <sub>2</sub> O 1.5 pt/A Dacthal 2.5 pt/A	Prowl H <sub>2</sub> O <sup>2</sup>	Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>		13	0	0	583	593	31.44	5	1	1
LSD (P-value = 0.05)						2	5	1	27	34	1.65	25	19	19

- Untreated
- Prowl H2O at Loop
- Dacthal Post-Plant
- Zeus
- Prowl H2O Post-Plant
- GoalTender 1.5 leaf
- Goal + Buctril 2.5 leaf
  
- Herbicide treatments that provided the best control of kochia
  
- Herbicide treatments that caused unacceptable crop injury, stand loss, and yield reduction

<sup>1</sup> Dacthal, Zeus, and Prowl H2O treatments applied post-plant were broadcast applied at 45 GPA immediately after planting and incorporated with 0.64 inches of water

<sup>2</sup> Prowl H<sub>2</sub>O applied at 1.5 pt/A at Loop (broadcast applied at 45 GPA)

<sup>3</sup> GoalTender at 4 fl oz/A (chemigation: 0.32 inches water pre-herbicide injection; 0.16 inches water during injection; and 0.16 inch water post-injection flush)

<sup>4</sup> Goal 2XL at 4 fl oz/A + Buctril 2EC at 8 fl oz/A (chemigation: 0.32 inches water pre-herbicide injection; 0.16 inches water during injection; and 0.16 inch water post-injection flush)

Plot size: 4 rows (12ft) by 25ft; Five reps per treatment

Planted 4/22/2013; Harvested 10/15/2013

Onions were grown on 28 inch wide beds with four seedlines per bed; seed spacing was 2 inches.

All plots were hand-weeded at the 5-leaf stage to prevent excessive weed competition with onions.