

## 2011 Onion Weed Control in Tulelake

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**Introduction:** High weed populations in processing onions decrease yield, reduce onion stand density, and cause problems at harvest. Over the last three years, onion weed control research at the Intermountain Research and Extension Center (IREC) concentrated on improving weed control in processing onions with herbicides. In 2009 and 2010, multiple trials evaluated the efficacy of herbicide chemigation applications using a small plot chemigation system. Data from these trials showed the highest weed control resulted from treatments that combined preemergence herbicides with postemergence applications of GoalTender applied at the 1.5 leaf growth stage followed by Goal + Buctril applied at the 2.5 leaf growth stage. In 2011, two trials were established to evaluate the efficacy and crop safety of preemergence herbicide tank-mix combinations applied at planting and the loop onion growth stage. Most preemergence treatments also included GoalTender applied at the 1.5 leaf stage followed by Goal + Buctril applied at the 2.5 leaf stage. 2011 treatments were broadcast applied on small plots in order to evaluate a larger number of preemergence herbicide tank-mix combinations than we were capable of evaluating in chemigation trials. Treatments were applied at two sites to compare herbicide efficacy and crop safety on different soil types. ***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  
**Irrigation:** Solid-set sprinklers  
**Plot Size:** 6 X 40 ft (IREC site); 6 X 30 ft (Grower site)  
**Row Spacing:** 36 inch beds with 4 seed-lines per bed  
**Trt Replication:** 6 replications

### **IREC Soil, Crop and Herbicide Application Information**

**Soil Type:** Tulebasin mucky silty clay loam 4.2% organic matter  
**Planting Date:** May 6<sup>th</sup>  
**Harvest Date:** October 4<sup>th</sup>

IREC Site Herbicide Treatment Timings				
	Post-Plant	Loop	1.5 Leaf	2.5 Leaf
Application dates:	5/6/11	5/27/11	6/20/11	6/27/10
Weed size at application:	Pre	Pre-Seedling	0.5-3"	1-5"

**Grower Site Soil, Crop and Herbicide Application Information**

**Soil Type:** Modoc fine sandy loam 1.5% organic matter

**Planting Date:** May 13<sup>th</sup>

**Harvest Date:** October 20<sup>th</sup>

Grower Site Herbicide Treatment Timings		
	Post Plant	Loop
Application dates:	5/17/2011	6/2/2011
Weed size at application:	Pre	Seedling to 1"

**Herbicide Application Methods:**

- All herbicides were broadcast applied with a CO<sub>2</sub> backpack sprayer at 18 GPA. The entire plot area was irrigated with a 0.5 inch of water within 24 hours of each herbicide application. Herbicides applied post-plant were applied on the soil surface immediately after the field was planted. At the grower site, Goal Tender at the 1.5 leaf stage and Goal + Prowl H2O at the 2.5 leaf stage was chemigated over the entire trial area as part of normal field operations.

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

- Weed density was estimated by counting the number of green weeds on top of both beds and in the center furrow in each plot. Percent weed control was also visually estimated in each plot.

**Hand Weeding:**

- The hand-weeded treatment at IREC was weeded as needed to prevent weed competition throughout the growing season. All treatments at IREC (except the untreated control) were hand-weeded on 8/30/2011. The intent was to simulate grower application practice because growers would not leave weed escapes for the entire season but would hand-rogue them. Weeding cost for each treatment was estimated by recording the amount of time it took for one person to weed each plot. Weeding costs are based on a \$10 per hour labor wage. All plots at the grower site were hand-weeded after the last herbicide application to prevent weed competition and weed escapes.

**Onion Stand Count and Onion Injury:**

- Onion stand was measured for the entire plot area. Onion injury (stunting, curling, and chlorosis) was visually evaluated for each plot using a 0 -10 scale with 10 = highest injury (plant death).

## **Results**

### ***Weed Control at IREC***

The predominant weeds at IREC in 2011 were redroot pigweed, kochia, common lambsquarter, and white clover. We evaluated several preemergence herbicides applied at planting or the loop growth stage in combination with Goal Tender applied at the 1.5 leaf stage and Goal + Buctril applied at the 2.5 leaf stage. A Goal Tender and Goal + Buctril treatment without preemergence herbicide (trt 3) was included in the treatment list as a control to assess the need for preemergence herbicide application.

At the early 2- leaf stage, shortly after Goal Tender was applied at the 1.5 leaf stage, preemergence applications of Dacthal, Nortron, and Prowl H2O increased overall weed control compared to Goal Tender applied alone (Table 1). Tank-mix combinations that maximized total weed control included: Dacthal + Norton applied at planting, Nortron + Prowl H2O applied at the loop stage, or Dacthal applied at planting followed by Nortron + Prowl H2O applied at the loop stage (Table 1).

An evaluation at the 6-leaf onion growth stage (after Goal + Buctril was applied at the 2.5 leaf stage) indicated that preemergence applications of Dacthal, Nortron, and Prowl H2O maintained higher overall weed control compared to postemergence applications alone of Goal Tender followed by Goal + Buctril (Table 1). Treatments with the highest total weed control at the 6-leaf stage were Dacthal at 10 pt/A applied at planting (trt 6), Nortron at 32 fl. oz/A applied at planting (trt 8), both rates of Dacthal + Nortron applied at planting (trts 9 & 10), Nortron + Prowl H2O applied at the loop stage (trt 13), and Dacthal applied at planting followed by Prowl H2O applied at loop and Outlook applied at the 2.5 leaf stage (trt 16). These treatments had the lowest hand-weeding cost (Table 1). These treatments likely did not require hand-weeding to prevent weed competition because total weed control was greater than 97% (Table 1) and total weed density remained lower than 5 weeds per plot through the 13-leaf stage (Table 2).

The best treatments for kochia suppression included: all Dacthal rates applied at planting, the high rate of Nortron applied at planting, both rates of Dacthal + Nortron applied at planting, and all treatments that included Prowl H2O at loop (Table 2). These results agree with 2009 and 2010 IREC onion weed control trials, and they validate the assertion that combining a preemergence herbicide applied at planting or the loop growth stage with Goal + Buctril applied at the 2.5 leaf stage is important to maximize kochia control.

All herbicide treatments tested except Goal Tender followed by Starane (trt 17) provided excellent control of redroot pigweed and common lambsquarter (Table 2). Most herbicide treatments also provided excellent control of clover (Table 2).

Adding Nortron, Prowl H2O, Dacthal at rates higher than 2.5 pt/A, or Outlook with postemergence application of Goal Tender and Goal + Buctril maintained lower weed densities at the 13-leaf evaluation compared to the Goal and Buctril control (trt 3). For example, in the Goal Tender and Goal + Buctril control (trt 3), redroot pigweed density averaged 1 plant per plot at the 6-leaf stage, but redroot pigweed density rebounded to 20 plants per plot by the 13-leaf stage. The increase in redroot pigweed density was a result of weeds out-growing herbicide treatment and new seedling emergence (personal observation).

### ***Onion Injury, Stand, and Yield at IREC***

Onion injury, stand, and yield data for IREC are presented in Table 3. All herbicide treatments injured onion plants (stunting, curling, or chlorosis) at the 3-leaf and 6-leaf growth stages compared to the

untreated and hand-weeded controls. At the 3-leaf stage, treatments with higher injury compared to the Goal Tender and Goal + Buctril alone treatment (trt 3) included: Dacthal at 10 pt/A applied at planting, all Nortron and Nortron + Dacthal treatments applied at planting, all treatments that included Nortron applied at the loop stage, and all treatments that included Outlook or Starane applied at the 2.5 leaf stage (Table 3). At the 6-leaf stage, onion injury associated with these treatments dissipated and it was not significantly higher than the Goal + Buctril treatment (trt 3) with the exception of the high rate of Nortron applied at planting (trt 8) and both treatments that included Goal + Buctril + Outlook applied at the 2.5 leaf stage (trts 15 & 16). In previous IREC trials, Outlook + Goal without Buctril applied at the 2.5 leaf stage did not increase herbicide injury compared to Goal alone.

Most treatments except for Goal Tender and Goal + Buctril alone (trt 3), Dacthal at rates  $\leq$  5 pints/A applied at planting (trts 4 & 5), and the high rate of Nortron applied at planting (trts 8 and 10) reduced onion stand compared to hand-weeded control (Table 3). Onion stand in the untreated control was lower than the hand-weeded control due to weed competition. Nortron and Prowl H2O applied at the loop stage (trt 13) was the only herbicide treatment that reduced onion stand to a greater degree than the Goal Tender and Goal + Buctril control (trt 3).

Multiple herbicide treatments reduced onion yield compared to the hand-weeded control in 2011 (Table 3). This result differed from IREC weed control trials conducted in 2009 and 2010 where the yield of herbicide-treated plots did not differ from the hand-weeded control. The reason for the yield reduction in 2011 was related to herbicide injury or a combination of herbicide injury and weed competition. The high rate of Dacthal applied at planting, Nortron + Prowl H2O applied at the loop stage (trts 13 & 14), and Goal + Buctril + Outlook applied at the 2.5 leaf stage (trt 16) were examples of yield reduction directly related to herbicide injury. These treatments reduced onion yield by more than 1.75 tons per acre compared to the hand-weeded control. The treatments provided excellent weed control, but they had the highest onion injury ratings at the 6-leaf stage and the lowest onion stand. Yield reductions associated with Dacthal at 5 pt/A applied at planting (trt 5) and Goal Tender and Goal + Buctril alone (trt 3) appeared to be related to weed competition and herbicide injury. These treatments injured onions, but the injury was much lower than other treatments suggesting weed competition contributed to yield loss. Average weed density for both treatments was higher than 5 plants per plot at the 6-leaf and 13-leaf evaluations.

#### ***Weed Control at the Grower Site***

Weed pressure was very low compared to IREC. The predominant weeds were redstem filaree and hairy vetch. All preemergence treatments that included Dacthal, Nortron, or Prowl H2O reduced redstem filaree density compared to the grower herbicide program which relied on Goal Tender and Prowl H2O applied at the 1.5 leaf stage followed by Goal at the 2.5 leaf stage (Table 4). Several Dacthal, Nortron, and Prowl H2O treatments numerically reduced hairy vetch density compared to the grower herbicide program, but the difference in weed density was not statistically different due to low hairy vetch density throughout the trial (Table 4).

#### ***Onion Injury, Stand, and Yield at the Grower Site***

Dacthal + Nortron applied at planting and all treatments with Nortron at 32 fl. oz/A applied at planting or the loop stage increased onion injury at the 2-leaf stage compared to the grower herbicide program (Table 4). Nortron at 16 fl. oz/A applied at planting, the high rate of Dacthal + Nortron applied at planting, and multiple treatments with Nortron applied at loop stage reduced onion stand compared to the grower herbicide program.

Several preemergence herbicide treatments reduced onion yield compared to the grower herbicide program (Table 4). The yield reduction was almost certainly related to herbicide injury as weed competition was minimal throughout the trial area. Treatments that reduced yield compared to the grower herbicide program included: Dacthal at 10 pt/A applied at planting, Nortron at both rates applied at planting, the high rate of Nortron + Dacthal applied at planting, and all treatments that included Nortron applied at the loop stage. Treatments that reduced onion yield at both sites included Dacthal at 10 pt/A and Nortron + Prowl H2O applied at the loop stage (Tables 3 & 4).

### **Summary**

It was previously believed that preemergence herbicides would not be effective in Tulelake clay loam soils due to the soils' relatively high organic matter content. However, these research trials demonstrated this not the case and preemergence herbicides have merit. Preemergence applications of Dacthal and/or Nortron applied at planting and Nortron and/or Prowl H2O applied at the loop stage improved weed control at both sites compared to Goal treatments. Several of these preemergence treatments provided near perfect (100%) weed control at both sites, and they reduced weed density low enough that hand-weeding was likely not needed to prevent weed competition. However, on the flip-side, several of the preemergence treatments caused significant herbicide injury, stand reduction, and yield reduction at both sites in 2011.

Preemergence herbicide treatments that increased weed control while minimizing onion injury and yield loss on both soil types included: Dacthal at 2.5 pt/A and 5.0 pt/A applied at planting, Dacthal at 2.5 pt/A + Nortron at 16 fl. oz/A applied at planting, and Prowl H2O at 1.5 pt/A applied at the loop stage. Nortron applied alone at planting and the loop stage increased weed control and did not decrease onion yield compared to the hand-weeded control at IREC, but it did decrease yield at the sandy loam grower site. Treatments that included preemergence application of Dacthal at 10 pt/A applied at planting, Nortron at 32 fl. oz/A + Prowl H2O at 1.5 pt/A applied at the loop stage, or Goal + Buctril + Outlook applied at the 2.5 leaf stage caused an unacceptable decrease in onion stand and onion yield compared to the control, although they provided excellent weed control.

Additional research will be conducted in commercial onion fields in Tulelake in 2012 to test promising treatments on a larger scale and validate weed control and crop safety.

***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. Influence of Herbicides on Percent Weed Control and Hand Weeding Cost at IREC in 2011**

trt #	Herbicide Name	Herbicide Application Time				Total Weed Control Rating	Total Weed Control Rating	Total Weed Control Rating	Hand Weeding Cost <sup>2</sup>
		Post-Plant Product/A	Loop stage Product/A	1.5 leaf stage Product/A	2.5 leaf stage Product/A	2-leaf <sup>1</sup> %	3-leaf <sup>1</sup> %	6-leaf <sup>1</sup> %	\$/acre
1	Untreated Control					0	0	0	n/a
2	Hand-weeded Control					100	100	100	n/a
3	Goal + Buctril Only			Goal Tender <sup>3</sup>	Goal + Buctril <sup>4</sup>	76	83	85	58
4	Dacthal	2.5 pt/A		Goal Tender	Goal + Buctril	83	88	91	38
5	Dacthal	5 pt/A		Goal Tender	Goal + Buctril	91	94	96	29
6	Dacthal	10 pt/A		Goal Tender	Goal + Buctril	93	94	98	25
7	Nortron SC	16 fl. oz/A		Goal Tender	Goal + Buctril	91	92	96	28
8	Nortron SC	32 fl. oz/A		Goal Tender	Goal + Buctril	92	93	98	24
9	Dacthal Nortron SC	2.5 pt/A 16 fl. oz/A		Goal Tender	Goal + Buctril	94	95	98	23
10	Dacthal Nortron SC	5 pt/A 32 fl. oz/A		Goal Tender	Goal + Buctril	98	99	100	19
11	Nortron SC		32 fl. oz/A	Goal Tender	Goal + Buctril	90	92	94	30
12	Prowl H20		1.5 pt/A	Goal Tender	Goal + Buctril	89	92	94	32
13	Nortron SC Prowl H20		32 fl. oz/A 1.5 pt/A	Goal Tender	Goal + Buctril	98	97	99	19
14	Dacthal Nortron SC Prowl H20	2.5pt/A	32 fl. oz/A 1.5 pt/A	Goal Tender	Goal + Buctril	98	98	99	22
15	Prowl H20 Outlook		1.5 pt/A	Goal Tender	Goal + Buctril 14 fl. oz/A	88	89	95	33
16	Dacthal Prowl H20 Outlook	2.5 pt/A	1.5 pt/A	Goal Tender	Goal + Buctril 14 fl. oz/A	91	95	98	26
17	Starane			Goal Tender	8 fl. oz/A	78	82	76	68
18	Prowl H20 Nortron SC Starane		1.5 pt/A 32 fl. oz/A	Goal Tender	8 fl. oz/A	95	95	96	23
LSD Value						5	3	4	9

<sup>1</sup> Percent weed control was visually estimated over the entire plot area.

<sup>2</sup> Hand-weeding cost is based on \$10 per hour labor wage. It was estimated by recording the amount of time required by one person to hand-weed research plots.

<sup>3</sup> Goal Tender at 4 fl. oz/A was applied at the 1.5 leaf stage

<sup>4</sup> Goal 2XL at 4 fl. oz/A + Buctril 2EC at 16 fl. oz/A was applied at the 2.5 leaf stage

Table 2. Influence of Herbicides on Weed Density at IREC in 2011.

trt #	Herbicide Name	Herbicide Application Time				Kochia Density <sup>1</sup>		Lambsquarter Density <sup>1</sup>		Redroot Pigweed Density <sup>1</sup>		Clover Density <sup>1</sup>		Total Weed Density <sup>1</sup>	
		Post-Plant Product/A	Loop stage Product/A	1.5 leaf stage Product/A	2.5 leaf stage Product/A	6-leaf plants/plot	13-leaf plants/plot	6-leaf plants/plot	13-leaf plants/plot	6-leaf plants/plot	13-leaf plants/plot	6-leaf plants/plot	13-leaf plants/plot	6-leaf plants/plot	13-leaf plants/plot
1	Untreated Control					14	14	19	19	130	130	12	12	175	175
2	Hand-weeded Control					0	0	0	0	0	0	0	0	0	0
3	Goal + Buctril Only			Goal Tender <sup>2</sup>	Goal + Buctril <sup>3</sup>	9	0	1	3	1	20	4	0	15	24
4	Dacthal	2.5 pt/A		Goal Tender	Goal + Buctril	3	0	0	1	4	12	4	1	11	15
5	Dacthal	5 pt/A		Goal Tender	Goal + Buctril	2	0	0	0	2	6	2	0	7	7
6	Dacthal	10 pt/A		Goal Tender	Goal + Buctril	2	0	0	0	1	2	2	1	4	3
7	Nortron SC	16 fl. oz/A		Goal Tender	Goal + Buctril	5	0	0	0	0	3	1	0	6	4
8	Nortron SC	32 fl. oz/A		Goal Tender	Goal + Buctril	3	0	1	2	0	2	0	0	4	3
9	Dacthal Nortron SC	2.5 pt/A 16 fl. oz/A		Goal Tender	Goal + Buctril	3	0	1	1	0	4	0	0	4	5
10	Dacthal Nortron SC	5 pt/A 32 fl. oz/A		Goal Tender	Goal + Buctril	1	0	0	0	0	2	0	0	1	3
11	Nortron SC		32 fl. oz/A	Goal Tender	Goal + Buctril	6	0	1	1	0	2	0	1	7	3
12	Prowl H20		1.5 pt/A	Goal Tender	Goal + Buctril	2	1	0	1	1	5	4	0	8	6
13	Nortron SC Prowl H20		32 fl. oz/A 1.5 pt/A	Goal Tender	Goal + Buctril	2	0	0	0	0	1	0	1	2	2
14	Dacthal Nortron SC Prowl H20	2.5pt/A	32 fl. oz/A 1.5 pt/A	Goal Tender	Goal + Buctril	1	0	0	0	0	0	0	0	2	1
15	Prowl H20 Outlook		1.5 pt/A	Goal Tender	Goal + Buctril 14 fl. oz/A	3	0	0	0	4	3	2	0	8	3
16	Dacthal Prowl H20 Outlook	2.5 pt/A	1.5 pt/A	Goal Tender	Goal + Buctril 14 fl. oz/A	1	0	0	0	1	2	2	0	4	2
17	Starane			Goal Tender	8 fl. oz/A	6	0	22	5	10	16	5	3	43	24
18	Prowl H20 Nortron SC Starane		1.5 pt/A 32 fl. oz/A	Goal Tender	8 fl. oz/A	3	0	1	0	4	2	0	1	7	2
LSD Value						2	1	4	3	12	13	3	2	10	10

<sup>1</sup>Weed density equals the average number of weeds found on the tops of both onion beds and weeds found in the center furrow in each plot.

<sup>2</sup>Goal Tender at 4 fl. oz/A was applied at the 1.5 leaf stage

<sup>3</sup>Goal 2XL at 4 fl. oz/A + Buctril 2EC at 16 fl. oz/A was applied at the 2.5 leaf stage

**Table 3. Influence of Herbicides on Onion Stand, Onion Growth, and Onion Yield at IREC in 2011.**

trt #	Herbicide Name	Herbicide Application Time				Onion Injury Rating @ 3-leaf 1-10 scale <sup>1</sup>	Onion Injury Rating @ 6-leaf 1-10 scale <sup>1</sup>	Onion Stand 6-leaf stage plants/plot	Onion Yield 10/20/2011 tons/acre
		Post-Plant Product/A	Loop stage Product/A	1.5 leaf stage Product/A	2.5 leaf stage Product/A				
1	Untreated Control					0.7	1.0	820	3.4
2	Hand-weeded Control					0.7	0.9	968	16.8
3	Goal + Buctril Only			Goal Tender <sup>2</sup>	Goal + Buctril <sup>3</sup>	1.6	1.5	891	15.3
4	Dacthal	2.5 pt/A		Goal Tender	Goal + Buctril	1.8	1.5	913	16.0
5	Dacthal	5 pt/A		Goal Tender	Goal + Buctril	1.7	1.5	905	15.3
6	Dacthal	10 pt/A		Goal Tender	Goal + Buctril	2.7	1.7	833	15.0
7	Nortron SC	16 fl. oz/A		Goal Tender	Goal + Buctril	2.2	1.6	814	15.5
8	Nortron SC	32 fl. oz/A		Goal Tender	Goal + Buctril	2.5	1.7	910	16.0
9	Dacthal Nortron SC	2.5 pt/A 16 fl. oz/A		Goal Tender	Goal + Buctril	2.1	1.7	842	15.5
10	Dacthal Nortron SC	5 pt/A 32 fl. oz/A		Goal Tender	Goal + Buctril	2.2	1.5	914	15.8
11	Nortron SC		32 fl. oz/A	Goal Tender	Goal + Buctril	2.1	1.6	826	16.1
12	Prowl H20		1.5 pt/A	Goal Tender	Goal + Buctril	1.7	1.4	842	15.6
13	Nortron SC Prowl H20		32 fl. oz/A 1.5 pt/A	Goal Tender	Goal + Buctril	1.6	1.7	666	14.3
14	Dacthal Nortron SC Prowl H20	2.5pt/A	32 fl. oz/A 1.5 pt/A	Goal Tender	Goal + Buctril	2.4	1.6	784	14.5
15	Prowl H20 Outlook		1.5 pt/A	Goal Tender	Goal + Buctril 14 fl. oz/A	2.3	1.8	861	15.3
16	Dacthal Prowl H20 Outlook	2.5 pt/A	1.5 pt/A	Goal Tender	Goal + Buctril 14 fl. oz/A	3.1	2.0	816	14.9
17	Starane			Goal Tender	8 fl. oz/A	4.2	1.4	856	16.6
18	Prowl H20 Nortron SC Starane		1.5 pt/A 32 fl. oz/A	Goal Tender	8 fl. oz/A	3.5	1.6	782	15.5
LSD Value						0.3	0.2	110	1.5

<sup>1</sup> Onion Injury Rating was visually estimated (stunting, curling, and chlorosis) using a 1 to 10 scale; 10 = highest injury (plant death)

<sup>2</sup> Goal Tender at 4 fl. oz/A was applied at the 1.5 leaf stage

<sup>3</sup> Goal 2XL at 4 fl. oz/A + Buctril 2EC at 16 fl. oz/A was applied at the 2.5 leaf stage

**Table 4. Influence of Herbicides on Onion Stand, Onion Vigor, Weed Control, and Onion Yield at the Grower Sandy Loam Trial Site in 2011<sup>1</sup>.**

trt #	Herbicide Name	Herbicide Application Time		Onion Stand 2-leaf stage plants/plot	Onion Injury Rating 2-leaf stage 1-10 scale <sup>2</sup>	Redstem Filaree Density 2-leaf stage plants/plot	Hairy Vetch Density 2-leaf stage plants/plot	Onion Yield 10/20/2011 tons/Acre
		Post-Plant Product/A	Loop Product/A					
1	Grower Herbicide Program (Control)			1191	0.5	12.8	0.5	23.2
2	Dacthal	2.5 pt/A		1159	0.5	3.2*	0.67	23.1
3	Dacthal	5 pt/A		1178	0.8	2.8*	0.33	23.5
4	Dacthal	10 pt/A		1212	0.4	0.2*	0.17	21.9*
5	Nortron SC	16 fl. oz/A		1124* <sup>3</sup>	0.8	0*	0	21.7*
6	Nortron SC	32 fl. oz/A		1155	1.2*	0*	0	22.1*
7	Dacthal Nortron SC	2.5 pt/A 16 fl. oz/A		1145	1.2*	0*	0	22.4
8	Dacthal Nortron SC	5 pt/A 32 fl. oz/A		1102*	1.3*	0*	0	22.0*
9	Nortron SC		32 fl. oz/A	1102*	1.2*	0*	0.5	22.0*
10	Prowl H20		1.5 pt/A	1184	0.2	0*	0.5	23.1
11	Nortron SC Prowl H20		32 fl. oz/A 1.5 pt/A	1148	1.3*	0*	0	21.7*
12	Dacthal Nortron SC Prowl H20	2.5pt/A	32 fl. oz/A 1.5 pt/A	1134*	1.5*	0*	0	21.3*
LSD Value				49	0.5	3.8	NS	1.0

<sup>1</sup>Trial was conducted in a commercial onion field. The grower chemigated GoalTender at the 1.5 leaf stage and Goal + Prowl H20 at the 2.5 leaf stage over the entire trial area. The entire trial area was hand-weeded to prevent weed competition starting at the 3-leaf stage.

<sup>2</sup>Onion Injury Rating was visually estimated (stunting, curling, and chlorosis) using a 1 to 10 scale; 10 = highest injury (plant death)

<sup>3</sup>\* Represents treatment means that were significantly different from the control.