Onion Weed Control Trials 2006

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2006 ONION WEED CONTROL RESEARCH PROGRESS REPORT

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ACKNOWLEDGEMENTS

These trials could not have been conducted with out the cooperation and assistance of Ron and Dax Marchini (Joe Marchesotti Farms) and Tim Ustick (private consultant). Many thanks for their help.

This is a summary of onion weed control trials conducted in San Joaquin County. It should not be interpreted as a recommendation of the University of California. Trade names of herbicides, in addition to chemical names, are used in this report. No endorsement of products mentioned or criticism of similar products is intended.

Herbicides rates mentioned in this report are expressed as active ingredient (a.i.) of material per treated acre.

Chemical name	Trade name	Manufacturer	Registration status
bromoxynil	Buctril® (4E)	Bayer Crop Science	Registered for use in onions at 2 to 5 true leaves
flumioxazin	Chateau® (51WDG)	Valent	Not registered for onions in CA
oxyfluorfen	Goal 2XL®, GoalTender® (4F)	Dow AgroSciences	Registered for use in onions at 2nd true leaf or later
dimethenamid-P	Outlook® (6E)	BASF	Not registered for onions in CA
pendimethalin	Prowl H^2O® (3.8CS)	BASF	Registered for use in onions at 2 to 6 true leaves
sulfentrazone	Spartan® (75WG)	FMC	Not registered for onions

Nutsedge control in onions with Outlook (dimethenamid-P), 2006

Yellow nutsedge (*Cyperus esculentus*) is a weed problem that is on the increase in San Joaquin County, and there are currently no herbicides registered for use in onions that control it. However, the herbicide Outlook (dimethenamid-P) has a federal label for onions, and may be registered for use in California in the near future. This study was conducted to evaluate the efficacy and crop safety of this herbicide under local conditions.

Two nutsedge control trials with the herbicide Outlook were conducted in onions in San Joaquin County in 2006. Because many of the factors were the same in the two trials, these commonalities are mentioned here at the beginning, while the particulars of each trial follow below. In both locations, the trial was located within a commercial field and the trial area was managed by the grower. In addition to the experimental treatments, the trial areas were treated with Round-up (glyphosate) at planting and multiple sprays of Goal (oxyfluorfen) and Buctril (bromoxynil) when the onions were past the 2-leaf stage. Intermediate-type yellow onions were direct-seeded and sprinkler-irrigated. Bed width was 40", with four seed lines per bed. Individual plots were one bed by 33 feet long and each treatment was replicated four times. Experimental applications were made with a CO_2 backpack sprayer at 30 psi, using a boom equipped with two flat fan nozzles (TeeJet 8003VS). Spray volumes were equivalent to 30 gallons of water per acre. Applications were incorporated by rainfall or sprinkler irrigation within 3 days of treatment date. Note that rainfall was above average in March and April of 2006. Conditions were moderate at the times of application, with temperatures between 60° and 70° F and relative humidity ranging from 37% to 54%. Soil types at the trial sites were Jack Tone Clay (trial 1) and Stockton Clay (trial 2).

The first trial was located off Kaiser Rd. at Farmington Rd., near Stockton, CA. This trial compared a split application with a single full rate application or an untreated control. Application timings were February 23rd and March 23rd. On the first date, the majority of the onions had 2 to 5 leaves and 2 to 12 inches in height. The nutsedge measured ½ to 2 inches and there was a density of approximately one per five square feet (20 per plot). On the second date, the onions had 3 to 5 leaves and measured 10 to 15 inches in height. The nutsedge in the treated plots had been treated one month prior and two out of the four plots no longer had any nutsedge. In the other two, only a single nutsedge remained, each with only one green leaf.

On April 20th, no nutsedge was present in the Outlook-treated plots, while the non-treated plots had an average of 5 nutsedge per ft^2 (Figure 1). By May 17th, the number of nutsedge in the non-treated plots had increased to an average of 14 per ft^2, while the treated plots had an average of 0.1 per ft^2 (split application) or 0.2 nutsedge per ft^2 (single application).

Growth reduction in the onions was visually estimated on both April 13th and 20th, based on the height of the majority of the onions in the plot relative to untreated onions. Growth reduction on the 20th was estimated to be 11% in the split application and 9% in the single application.

The plots were hand harvested on June 8th at the same timing as the commercial harvest of the field. The full plot length of 33 ft was harvested, graded by USDA size standards, and weighed. The variation in yield (table 1a) was not significant between treatments (analysis of variance, $P = 0.62$), nor was the onion size distribution significantly different (Pearson chi-square, d.f. = 6, $\chi^2 = 6.126$, $P = 0.41$).

The second trial was located off Farmington Road, near Stockton, CA. This trial compared two different split applications to a single full rate application or an untreated control. Treatment dates were March 30th and April 20th. On the first date, most of the onions were at 3rd leaf emergence and measured 3 to 5" in height. The nutsedge were well-emerged, having four to eight leaves and measuring up to 4". At the second date, most of the onions were at the 4-leaf stage and the nutsedge treated on March 30th was visibly damaged.

In addition to high nutsedge pressure, this field also had a high population of other weeds which were not adequately controlled. These weeds likely interfered, to some degree, with the Outlook sprays reaching the ground, as well as interfering with the growth of the onions.

On May 17th, growth reduction in the onions was visually estimated relative to the non-treated plots and surrounding onions. Growth reduction was estimated at 9% (treatment 1), 4% (treatment 2) and 5% (treatment 3). Such small reductions would likely be outgrown by harvest time.

Nutsedge control was evaluated on May 17th and June 19th. On May 17th, the non-treated plots had an average of 8 nutsedge per ft^2, while treatments 1, 2, and 3 had an average of 1.8, 0.3, and 0.6 nutsedge per ft^2, respectively. Nutsedge in Outlook-treated plots were significantly stunted compared to non-treated nutsedge.

Conclusions:

Outlook (dimethenamid-P) was very effective in controlling nutsedge in onion, even exhibiting significant activity on emerged nutsedge in trial 2. The slight onion growth reduction observed in trial 1 may have been due to the combination of dimethenamid with the grower-applied sprays of Goal (oxyfluorfen) and Buctril (bromoxynil). In future work, treatments of Outlook with and without Goal and/or Buctril should be evaluated.

Table 1. Effect of Outlook on onion growth and nutsedge control, Trial 1 (a) and Trial 2 (b). Values are means of four replications.

(a)

Trial 1		**Yellow nutsedge populations**		**Onion growth and yield**	
	Active ingredient	4/20/06	5/17/06	4/20/06	6/8/06
Treatments	**per acre**	# / ft2	# / ft2	Growth reduction	Tons/Acre*
1. Split appl. ⅔ - ⅓	0.66 lb + 0.33 lb	0	0.14	11.25 %	18.58
2. Full rate	0.98 lb	0	0.24	8.75 %	18.96
3. Non-treated	---	4.6	13.5	1.25 %	19.65

* Differences in yield were not statistically significant (at 5% significance level)

(b)

Trial 2		**Yellow nutsedge**		**Onion**
	Active ingredient	5/17/06	6/19/06	5/17/06
Treatments	**per acre**	# / ft2	Percent control	Growth reduction
1. Full rate	0.98 lb	1.87	90 %	8.75 %
2. Split ½ - ½	0.49 lb + 0.49 lb	0.29	97 %	3.75 %
3. Split ⅔ - ⅓	0.66 lb + 0.33 lb	0.64	96 %	5.0 %
4. Non-treated	---	7.94	0%	0%

Figure 1. Nutsedge control trial, located near Stockton, CA. In the right is an untreated plot, while on the left is an Outlook-treated plot. Photo taken April 25th, two months after the application was made.

Weed control in direct-seeded onions, San Joaquin County, 2006

All currently registered herbicides for control of broad-leaved weeds in onions must be applied either prior to crop emergence or after the two true leaf stage. Therefore, there is a period during early growth during which no herbicides can be used. By the time the onions have reached the 2nd leaf stage, many weeds have germinated and/or are too large to be effectively controlled without harming the crop. Research in other California production areas has begun looking at the safety of earlier applications of both pre-emergent and post-emergent herbicides in onions. This trial was conducted to evaluate such earlier timings, as well as later applications of various combinations of herbicides. The trial was conducted within a commercial onion (cv. Cimarron) field located on Austin Road north of French Camp Road, near Stockton, CA. The field was established January 10, 2006 by sowing pelleted seed at depths of ¼ to 1 inch in four lines on 40" beds. The field was treated with glyphosate on January 20th and 24th to control established weeds (mustard, chickweed, nettle and sowthistle). Established weeds not controlled by this spray were subsequently hand-weeded.

Experimental treatments were applied according to the stage of crop growth as outlined below. Details of each treatment are in table 1. Treatments were applied to single bed plots measuring 30" by 33 feet long and each treatment was replicated three times.

Timeline

January 10th – planting – treatments 1, 2, 3, 4 applied
February 10th – loop stage – treatment 5 applied
March 4th – first true leaf stage – treatments 6, 7, 8 applied
March 23rd – second true leaf stage – treatments 9, 10, 11 applied

Conditions were moderate at the time of the treatments, with air temperatures in the vicinity of 60° F, soil temperatures of 56 to 62° F at a 2" depth, and relative humidity between 60% and 66%. Applications were made with a CO^2 backpack sprayer at 30 psi, using a boom equipped with two flat fan nozzles (TeeJet 8003VS). Spray volumes were equivalent to 30 gallons of water per acre. Applications were incorporated by rainfall or sprinkler irrigation within 3 days of treatment date. There was a higher than average amount of rainfall during the spring of 2006 (March-April). The field was irrigated by sprinklers when rainfall was not sufficient for crop needs. The soil type at this location is Jack Tone Clay.

Crop safety

Onion growth and/or stand establishment was assessed on four occasions; February 21, March 23, April 24, and May 17. The most dramatic phytotoxicity was caused by Spartan (sulfentrazone) applied at planting, which reduced the onion stand by 95 to 99%. The only other noteable stand loss was in a single plot treated with 0.75 lbs a.i. Prowl H_2O (pendimethalin) at planting, which had a 25% stand loss. No stand loss was observed in the other two plots receiving the same treatment. Thus, we cannot be certain of the cause of the stand reduction in this plot. In general, growth reduction or stunting of the onions was difficult to assess, due to the great variability in onion height across the field due to patchy garden centipede damage. However, it did appear that three treatments reduced onion growth somewhat; the higher rate of Prowl H_20 applied at planting (0.75 lbs a.i. per acre), Chateau (flumioxazin) applied at planting, and Goal 2XL (oxyfluorfen) applied at the first true leaf stage. However, it should be noted that the rate of Goal 2XL was applied at the maximum label rate. By the end of the season, stunting in these treatments was no longer apparent. No yield data was taken.

Weed control

Weed pressure was low and variable across the trial, making quantitative assessments of control difficult. The earliest emerging weeds (first 2 weeks of trial) were sprayed with glyphosate by the grower. However, we were able to make evaluations of the control of burning nettle (*Urtica urens*) and nightshade (hairy nightshade *Solanum nigrum* and cutleaf nightshade *Solanum triflorum*) – see table 1.

Conclusions

All but one of the treatments applied at planting had some effect on onion survival or growth, the exception being Prowl H_20 at 0.5 lbs a.i. per acre, which had no effect on the onions. Treatments applied later in crop development were generally safe, with the exception of Goal 2XL applied at the first true leaf stage, which caused some slight stunting.

The only meaningful assessments of weed control that we were able to make were on weeds that appeared in the spring, 3 to 5 months after planting. At this point, the pre-emergent treatments made in January were no longer very effective, although they did reduce somewhat the number of nettle and nightshade observed during the period March to May. The greatest reductions in nettle and nightshade observed in this period were achieved by treatments 6 through 11, which were applied at the first and second true leaf stages.

Table 1. Effect of selected herbicide treatments on onion survival, growth and control of selected weeds.

					Onion phytotoxicity		Weed control	
	Product	Chemical name	Application rate (lbs a.i. per acre)	Onion growth stage at application	Growth reduction	Stand loss	Burning Nettle (Mar/Apr)	Nightshade (Apr-May)
1	Prowl H2O	pendimethalin	0.5	at planting	none	none	partial	none
2	Prowl H2O	pendimethalin	0.75	at planting	15 - 20%	25% in one plot*	partial	partial
3	Chateau	flumioxazin	0.008	at planting	5 - 20%	none	partial	partial
4	Spartan	sulfentrazone	0.08	at planting	severe	95-99%	partial	partial
5	GoalTender + Prowl H2O	oxyfluorfen + pendimethalin	0.25 + 1.0	loop	slight	none	good	good
6	Goal 2XL	oxyfluorfen	0.25	1st true leaf	10 - 20%	none	very good	good
7	GoalTender	oxyfluorfen	0.25	1st true leaf	none	none	very good	good
8	GoalTender + Prowl H_2O	oxyfluorfen + pendimethalin	0.25 + 1.0	1st true leaf	none	none	very good	good
9	GoalTender + Prowl H_2O	oxyfluorfen + pendimethalin	0.25 + 1.0	2nd true leaf	none	none	very good	good
10	GoalTender + Buctril	oxyfluorfen + bromoxynil	0.25 + 0.25	2nd true leaf	none	none	very good	very good
11	GoalTender + Outlook	oxyfluorfen + dimethenamid-P	0.25 + 0.66	2nd true leaf	none	none	very good	very good
12	untreated control	---	---	---	none	none	none	none

* no stand loss was observed in two other plots with the same treatment

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Cooperative Extension Work in Agriculture and Home Economics, U.S. Department of Agriculture, University of California and San Joaquin County Cooperating