

California Pepper Commission – Complete Annual Report, 2011

Title: Preemergence Weed Control Trials in Peppers

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Timeline: March 1, 2011 to February 28, 2012

Objectives

- 1) Examine layby weed control strategies for late season weed control.
- 2) Conduct the above trials in the Coastal and Central Valley production districts.

CENTRAL COAST Summary: Two trials were conducted. In trial No. 1 Chateau was applied through the sprinklers in the hope that a rapid injection and washout period would afford safety to this material in layby applications. That was not the case and there was too much phytotoxicity to the pepper (see photos). In trial No. 2, a variety of herbicides were screened. All weed control materials provided improved weed control over the untreated plots on the first two weed control evaluation dates. Directed sprays of Zeus burned the foliage where the spray contacted the leaf tissue; however, Zeus was the only material that controlled malva. There were no differences in yield in any of the treatments in the number or weight of reds, greens, breakers or culled fruit.

CENTRAL VALLEY Summary: A field trial evaluated 8 preemergence herbicides applied as layby treatments on furrow irrigated bell peppers. The herbicides included Dual Magnum, Outlook, Prowl H₂O, Sandea, Sonalan, and Zeus (Spartan). These herbicides were applied at 1x and 2x rates, and a 4x rate of Outlook was also applied. Dacthal and Devrinol at the 1x rate were used as the standards and there was an untreated check plot. Although no reduction in crop stand was observed from the use of any herbicide at any rate, the trial did show differences in weed control, phytotoxicity, and yield performance. Outlook demonstrated superb weed control and excellent pepper yields with no crop phytotoxicity.

CENTRAL COAST Methods: These evaluations were conducted to find layby weed control materials that can provide late-season weed control in peppers. **Trial No. 1** was conducted with a cooperating grower in Soledad. Following layby weed control to remove existing weeds, Chateau at 4.0 material/A was injected into a sprinkler system. On July 8 the material was injected into two 30 foot long sections of sprinkler pipe with two sprinkler heads for 20 minutes and then the irrigation continued for an additional 60 minutes to clean out the system and wash the Chateau from the leaves. The next day, the plot was evaluated for phytotoxicity. However, the results were unambiguous, as the phytotoxicity was too

severe and the evaluation was discontinued (see photos below). The plot was examined several times following the application, and interestingly the plants recovered to some extent and yielded a much reduced amount of peppers. **Trial No. 2** was conducted in a commercial chili pepper field in Soledad. Materials were applied on July 7 to peppers following layby weeding to remove existing weeds. The field had been direct seeded in May with a proprietary dried chili pepper variety. The soil at the site was Chualar loam. See tables for evaluations and dates.

CENTRAL COAST Results: Trial No. 2 (Tables 1-3): There was a low weed population at the trial site. All weed control materials provided improved weed control over the untreated control on the first two weed control evaluation dates (Table 1). Zeus caused burning on the foliage where the spray contacted the leaf tissue, but it was the only material that controlled malva. By the third evaluation date five weeks after the layby application, weed pressure was still low, but it was still possible to see that all materials provided improved weed control over the untreated control (Table 2). Burn on the lower leaves from the Zeus application was still evident on this evaluation date. There were no differences in yield in any of the treatments in the number or weight of reds, greens, breakers or culled fruit (Table 3).

CENTRAL VALLEY Methods: A field trial investigating six preemergence herbicides at 1x and 2x rates were compared to an untreated check and two standard herbicide treatments in transplanted bell peppers. All applications were made at layby and the crop had no previous (at planting) herbicide applications. The herbicide trial was conducted at the UC West Side Research and Extension Center in Five Points in Fresno County. Soil type is a Panoche Clay Loam. On May 11, 2011 the bell pepper variety “Double Up” was transplanted in single rows into 40” beds using a commercial transplanter. Within row spacing was 10” between plants and stand establishment was very good. Weed pressure at planting was significant as there was no preemergence herbicide applied at planting.

At layby (June 15-16) the entire field was mechanically cultivated and hand weeded so that 6 preemergence herbicides (Dual Magnum, Outlook, Prowl H₂O, Sandea, Sonalan, Zeus) and 2 standard treatments (Dacthal and Devrinol) could be applied as layby treatments to weed free plots. Six of the herbicides were applied at a 2x rate, and one herbicide (Outlook) was applied at a 4x rate. The 16 treatments were replicated 4 times for a total of 64 plots. Plot size was one 40-inch bed wide by 70-feet of row length. The sprayer was a CO₂ backpack sprayer at 30 psi with a two nozzle wand outfitted with 2 XR Teejet nozzles 8003 evs and a water volume of 30 GPA. The herbicide application was aimed at the base of the plants (not over the top), but drop nozzles were not used for a directed spray. The layby treatments were applied on June 17, 2011 with weather conditions of 80° F average temperature, clear skies, and wind at 3-4 mph. The herbicides were set with sprinklers, but the trial was grown under furrow irrigation.

Initial weed populations were very high from planting to layby and included: nightshades (hairy, black, and groundcherry), pigweeds (prostrate, redroot, and tumble), lambsquarters, purslane, puncturevine, and jungle rice (very similar to barnyardgrass) as the main weeds. However, these weed populations were not high in the untreated check plots after layby

cultivations; so unlike most years weed pressure was relatively low in this field, even after several furrow irrigations. Crop stand was counted on June 22. Weed Control and Phytotoxicity ratings on a visual scale of 1-10 were taken on July 8, 21 days after the layby application. On August 9 (nine days before harvest) individual weeds were counted for the full length of the plot on the bed top and shoulders (70' L x 1.5' W = 105 ft²). On August 18, 99 days after transplanting, 15 feet of row was harvested from each plot and sorted by marketable yield and culls, and then weighed. Yields are reported in pounds per plot.

CENTRAL VALLEY Results (Tables 4 & 5)

Pepper stand counts ranged from 63 to 75 plants per plot and due to the variability of the field were not statistically different from each other. On July 8, 17 days after layby application there was still no sign of weed germination and all treatments showed 100% weed control. Junglerice, lambsquarters, shepherd's purse, and puncturevine weeds were so few and erratic that although they were counted on August 9 (48 days after application) they were not included in analysis and the data is not shown. There was no yellow nutsedge present either.

Total broadleaf weeds ranged from 1 - 23 weeds per 100 ft² (indicating fairly low weed pressure and excellent weed control) just 10 days before harvest. The trial showed that Prowl H₂O, Outlook, and Dual Magnum, provided excellent weed control as good as or better than the standard treatments. The treatments with the highest number of broadleaf weeds included the untreated plots, Sandea (1x), Sonalan (1x rate), and Zeus (1x and 2x rates). Sandea is weak on nightshades, Sonalan is a weaker dinitroaniline herbicide than Prowl and less effective on weeds in general, and Zeus was weak on purslane in this trial.

Yields ranged from 32-55 lbs/plot. Highest yields were obtained in plots treated with Outlook, Zeus, Dual Magnum at both the 1x and 2x rates and also the untreated check plots. There was not enough weed pressure in this field to compete with the crop for nutrients, water, light or space, so yields were virtually not affected by weeds in untreated plots. Some phytotoxicity and yield loss was observed on pepper plants treated with Prowl, Sandea, and Sonalan, especially at the 2x rate. Foliar symptoms were not real obvious on the Prowl and Sonalan peppers, but both of these dinitroaniline herbicides can affect crop root growth, and apparently yield was affected. Zeus showed temporary phytotoxicity in the form of leaf burning, but soon grew out of it and had excellent yield performance at the 1x and 2x rates. Dual Magnum and Outlook showed no phytotoxicity at the 1x or 2x rates, and only slight plant symptoms were noted in peppers treated with Outlook at a 4x rate.



Central Coast Trial No. 1: Pepper plants following sprinkler application of Chateau: individual plant (left) and plants in the foreground (right) and untreated plants in the background.



**Central Valley Trial 2011
at UC WSREC**

Layby herbicides were applied and sprinkler incorporated on June 17, 2011.



Central Valley Trial 2011
Approaching August 9, 2011
Low weed pressure.

Table 1. Trial No. 2 - Weed counts (25 ft²) and phytotoxicity evaluation on two dates in Central Coast Trial

Treatment	Material/A	July 25					August 4				
		Phyto ¹	Shepherd's purse	grass	malva	Total weeds	Phyto ¹	Shepherd's purse	malva	Sow thistle	Total weeds
Outlook 6.0	14 oz	0.0	0.0	0.0	0.7	0.7	0.0	0.3	1.0	0.0	1.3
Dual Magnum 7.63	1.5 pint	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	0.0	1.7
Prowl H2O	2.0 pint	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.7	1.0
Dual Magnum 7.63 Prowl H2O	1.5 pint 2.0 pint	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	1.3
Zeus 4.0	4.8 oz	3.3	0.0	0.0	0.3	0.3	4.0	0.0	0.0	0.0	0.0
Untreated	---	0.0	1.0	0.3	1.0	2.3	0.0	1.7	4.3	0.0	6.0
	Pr>trt	NA	NA	NA	0.707	0.220	NA	0.088	0.102	NA	0.079
	Pr>block	NA	NA	NA	0.834	0.623	NA	0.724	0.171	NA	0.188
	LSD(0.05)	NA	NA	NA	NS	NS	NA	NS	NS	NA	NS

1 – Scale: 0 = no crop damage to 10 = crop dead

Table 2. Trial No. 2 - Weed counts (25 ft²) and phytotoxicity evaluation on August 11

Treatment	Material/A	Phyto ¹	Shepherd's purse	malva	Sow thistle	Total weeds
Outlook 6.0	14 oz	0.0	0.0	1.0	0.3	1.3
Dual Magnum 7.63	1.5 pint	0.0	0.0	1.3	0.0	1.3
Prowl H2O	2.0 pint	0.0	0.0	0.0	0.0	0.0
Dual Magnum 7.63 Prowl H2O	1.5 pint 2.0 pint	0.0	0.0	0.0	0.0	0.0
Zeus 4.0	4.8 oz	3.0	0.3	1.0	0.0	1.3
Untreated	---	0.0	2.7	4.0	1.0	7.7
	Pr>trt	NA	0.050	0.033	0.002	0.001
	Pr>block	NA	0.280	0.606	0.402	0.376
	LSD (0.05)	NA	1.9	2.4	0.4	2.9

1 – Scale: 0 = no crop damage to 10 = crop dead

Table 4. Phytotoxicity, Weed Control, and Weed Counts in San Joaquin Valley Trial - 2011

Code	Herbicide	Rate/Acre		June 22	July 8		August 9					Total Brdlvs
				Stand #	Ratings (1-10)*		Weed Counts (~100 ft 2)					
					Phyto	Weed	PIGs	Night	Groundcherry	Purslane	Lambs	
1	Untreated			67.3	0.1	10	0.3	7.5	7.8 a	5.5 b	0.5	21.5 a
2	Dual Magnum 7.63	1x	1.5 pts	72.3	0.1	10	0.3	6.3	0.0 c	0.8 bc	0.3	7.5 bcd
3	Outlook 6.0	1x	10.7 ozs	68.8	0.1	10	0.3	4.3	0.3 c	1.5 bc	1.0	7.3 bcd
4	Prowl H2O 3.8 EC	1x	3 pts	68.5	0.9	10	0.0	4.5	0.0 c	1.0 bc	0.5	6.0 cd
5	Sandea 75%	1x	1.0 oz	73.8	0.8	10	0.0	12.5	0.3 c	3.0 bc	0.0	15.8 abc
6	Sonalan HFX	1x	3.7 pts	65.5	0.5	10	0.0	10.0	3.5 b	2.5 bc	0.3	16.3 ab
7	Zeus 4F	1x	3.2 ozs	68.5	2.0	10	0.0	7.8	3.0 bc	11.5 a	0.8	23.0 a
8	Dual Magnum 7.63	2x	3.0 pts	75.0	0.2	10	0.0	5.8	0.0 c	0.5 bc	0.5	6.8 bcd
9	Outlook 6.0	2x	21.4 ozs	71.3	0.1	10	0.3	4.8	0.3 c	1.8 bc	0.5	7.5 bcd
10	Prowl H2O 3.8 EC	2x	6 pts	70.5	1.6	10	0.3	0.5	0.0 c	0.0 c	0.3	1.0 d
11	Sandea 75%	2x	2 ozs	71.8	0.7	10	0.3	6.8	0.5 bc	1.3 bc	1.3	10.0 bcd
12	Sonalan HFX	2x	7.4 pts	72.8	2.0	10	0.5	4.8	0.8 bc	1.3 bc	0.8	8.0 bcd
13	Zeus 4F	2x	6.4 ozs	73.5	2.0	10	0.0	4.3	3.0 bc	5.0 bc	0.8	13.0 abc
14	Dacthal 75WP	1x	9.3 lbs	67.3	0.5	10	0.8	5.3	1.5 bc	1.0 bc	0.3	8.8 bcd
15	Devrinol 50DF	1x	4 lb	73.8	0.1	10	0.0	4.3	2.5 bc	3.0 bc	0.3	10.0 bcd
16	Outlook 6.0	4x	42.8 ozs	63.3	0.5	10	0.0	6.3	0.3 c	0.5 bc	0.5	7.5 bcd
Average				70.2	0.7	10.0	0.2	6.0	1.5	2.5	0.5	10.6
LSD (.05)				NS	0.4	NS	NS	NS	3.1	5.3	NS	10.1
Pr>Treat				0.79	0.00		0.29	0.63	0.00	0.01	0.93	0.00
Pr>Block				0.67	0.18		0.07	0.49	0.31	0.18	0.55	0.72
CV%				11.6	37.6		230.8	98.8	146.3	150.1	178.1	67.1

* One mechanical cultivation & hand in-row weeding on June 15-16, 2011.
Phytotoxicity (1-10): 0=No crop damage; 10=dead.

No herbicides applied until layby on June 17, 2011. Counts=70' row x 18" wide
Weed ratings (1-10): 1=No weed control; 10=100% weed control.

Table 5. Bell Pepper Yields and Crop Phytotoxicity at Harvest in San Joaquin Valley Trial*

			August 18, 2011			
			Pepper Yield (lbs/plot)			Ratings (1-10)*
Code	Herbicide	Rate/Acre	Marketable	Culls	TOTAL	Phytotoxicity
1	Untreated		41.3 bcd	9.2 a	50.6 abc	0.0
2	Dual Magnum 7.63	1x 1.5 pts	46.4 abc	4.9 bcd	51.4 ab	0.0
3	Outlook 6.0	1x 10.7 ozs	46.8 ab	5.6 bcd	52.4 ab	0.0
4	Prowl H2O 3.8 EC	1x 3 pts	31.2 fgh	5.0 bcd	36.2 fgh	0.9
5	Sandea 75%	1x 1.0 oz	37.7 defg	4.1 cd	41.8 defg	0.8
6	Sonalan HFX	1x 3.7 pts	38.6 bcdef	4.5 bcd	43.0 cdef	0.5
7	Zeus 4F	1x 3.2 ozs	43.1 abcd	9.5 a	52.5 ab	1.5
8	Dual Magnum 7.63	2x 3.0 pts	44.0 abcd	5.9 abcd	50.0 abcd	0.2
9	Outlook 6.0	2x 21.4 ozs	50.7 a	4.5 bcd	55.2 a	0.1
10	Prowl H2O 3.8 EC	2x 6 pts	29.0 h	4.7 bcd	33.7 gh	1.6
11	Sandea 75%	2x 2 ozs	32.1 efgh	6.3 abc	38.4 efgh	0.7
12	Sonalan HFX	2x 7.4 pts	29.3 gh	2.6 d	31.9 h	2.0
13	Zeus 4F	2x 6.4 ozs	44.0 abcd	6.9 abc	50.9 abc	1.5
14	Dacthal 75WP	1x 9.3 lbs	42.4 abcd	7.2 abc	49.7 abcd	0.0
15	Devrinol 50DF	1x 4 lbs	40.2 bcde	7.6 abc	47.8 abcd	0.0
16	Outlook 6.0	4x 42.8 ozs	38.0 cdef	7.8 ab	45.8 bcde	0.5
Average			39.7	6.0	45.7	0.6
LSD (.05)			8.6	3.6	8.2	0.4
Pr>Treat			0.00	0.00	0.00	0.00
Pr>Block			0.49	0.28	0.65	0.19
CV%			15.3	42.1	12.6	35.7

* "Double Up" Peppers transplanted May 11, 2011. Phytotoxicity (1-10): 0=No crop damage; 10=dead.