California Melon Board Report – Dec 1, 2011

I. Project Title: Melon tolerance and weed control with new herbicides

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1) **IV. Project Objectives:** Weed control in melons is difficult due to the limited availability of registered herbicides. The objectives of this study were to evaluate honeydew and cantaloupe melon tolerance and weed control efficacy with several new herbicides. Possible "new" herbicides for melons include linuron (Lorox), metolachlor (Dual Magnum), flumioxazin (Chateau), sulfentrazone (Spartan), pendimethalin (Prowl H_2O), clomazone (Cerano) and fomesafen (Reflex).

V. Summary of Research Results: Weed control in melons is difficult due to the limited availability of registered herbicides. Field trials in 2011 included Lorox, Dual Magnum, Château, Prowl H_2O, Spartan (new name is Zeus), and Reflex. Two cantaloupe varieties, and a honeydew and a watermelon variety were tested for tolerance and weed control with these herbicides. Applications of Lorox, Dual Magnum, Prowl H_2O, and Spartan were made after planting, but prior to crop emergence and mechanically incorporated the herbicides. Chateau and Reflex were surface applied after the mechanical incorporation to avoid moving these herbicides out of the surface layer. In general, cantaloupe was tolerant Chateau, Prowl H_2O, Spartan, Dual Magnum and Reflex but injured slightly in the early season by Cerano and severely injured by Lorox. Lorox was the best in terms of broadleaf weed control, with weed control lasting through harvest. Dual Magnum, Cerano and Prowl H_2O, were the best materials for grass control. Dual Magnum provided fair nutsedge control. Cantaloupe yields were highest with Spartan or Dual Magnum, in spite of mediocre weed control, indicating that early season weed control was important in terms of yield. Honeydew melon yields were also highest in the Spartan, Dual Magnum or Reflex plots. Watermelon was more tolerant to the herbicides in this trial than were cantaloupe or honeydew melon.

VI. Research Procedures: On June 10, 2011, melon seed of four varieties (Cantaloupe – Oro Rico and Esteem; Honeydew melon – Saturno; Watermelon-Paradise) was planted into 60-inch beds. Every other bed was planted, thus allowing 120 inches between seed lines. Only one variety was planted per 200 ft long bed. Individual herbicide plots were 25 ft by 40 ft (across all four varieties) and were replicated four times. Herbicide treatments (Table 1) except for Chateau and Reflex, were applied on June 10 following melon seeding, and on the same day, the entire plot area was lightly cultivated to incorporate the herbicides. Chateau and Reflex were applied following mechanical incorporation. The experiment used a randomized complete block design with 4 replications. Each plot was 8 beds (2 – 60" beds per melon variety) and 25 feet long.

Melon injury was determined on July 4, July 20, August 2 and August 10, 2011, by visually assessing melon growth in each plot, noting chlorosis, leaf abnormalities, and any reduction in stand, growth or vigor. Weed control by species was visually assessed on July 4, July 20, August 2, August 10 and August 16, 2011. Melons were harvested in August and early September – eight harvests for cantaloupe, two for watermelon and two harvests for honeydew melon. Mature marketable fruit were counted and weighed for each plot.

Results

Melon injury varied considerably among treatments (Table 1). Lorox severely injured all the melons. In 2011, we doubled the rate of Lorox from 1 lb ai/a to 2 lb ai/a to see if we could increase weed control without injury to the melons. We learned that 2 lb ai/a was too much and lower rates would be needed for crop safety. Cerano also caused significant injury. In previous years, Command or Cerano had been applied at 0.25 or 0.5 lbs/a rate, but in 2011, we increased the rate to 1.25 lbs/a attempting to improve weed control. Weed control improved but early season crop injury was evident in all plots. In general, cantaloupe was the most sensitive to herbicides, honeydew intermediate in sensitivity, and watermelon the most tolerant.

Grass weed pressure was very high in the 2011 trial area. The main species was stinkgrass (*Eragrostis cilianensis*), with some barnyardgrass. Among the treatments, Cerano and Prowl H_2O were the most effective against the grasses (Table 2). Dual Magnum also provided some level of control, while Chateau, Spartan and Reflex were not effective. If these herbicides were used for weed control in melons, a grass herbicide would likely be needed if grass pressure were high.

Purslane control was good to excellent with most of the treatments, with Spartan, Lorox and Cerano providing almost complete control (Table 3). Dual Magnum was the least effective treatment in controlling purslane. However, Dual Magnum was the one bright spot in controlling yellow nutsedge (Table 4). Other treatments provided initial suppression of yellow nutsedge, but by early August, nutsedge had re-appeared in most plots.

Pigweed (primarily *Amaranthus blitoides*) control was excellent with Lorox, but only fair with other treatments by late season (Table 5). Normally, the other treatments have provided good pigweed control, but perhaps the rainfall that occurred in late June may have benefitted the pigweed. Black nightshade control was excellent with Lorox and Chateau, but fair to poor with the other treatments by late season (Table 6). Most treatments provided about 6 weeks of nightshade control, but again, the rains in late June may have may have reduced their effectiveness late season by diluting them. Lambsquarters control also varied among treatments (Table 7). Lorox and Cerano were the best treatments for lambsquarters control through the August 16th evaluation, but Spartan and Prowl H_2O were also providing good control. Reflex and Chateau were less effective than other treatments against lambsquarters.

Oro Rico cantaloupe yield was highest in the Dual Magnum and Spartan plots (Table 8). Both Dual Magnum and Spartan were effective at controlling many of the weeds and also appeared safe to the cantaloupe. The remaining treatments all had lower yields of Oro Rico than the untreated plots which indicate some injury from the treatment and/or poor weed control. Esteem cantaloupe yield in Dual Magnun, Chateau, Reflex, and

Spartan plots was similar to the untreated plots (Table 8). Lorox and Cerano plots both had yields lower than untreated plots, due to stand reduction and herbicide injury.

Saturno honeydew melon yield was best in the Dual Magnum, Spartan or Reflex plots (Table 9). Lower honeydew yields in the Lorox and Cerano plots was due to stand reduction, however, the lower yield in the Prowl H_2O and Chateau plots was due to poor weed control. Watermelon yields were similar in all plots except the Lorox plot which yielded about one-third of the other plots (Table 9). Fruit size of the cantaloupe and honeydew melons was similar among treatments, although fruit size was always greatest in the Spartan plots.

In conclusion, Spartan (Zeus) appears to be the best herbicide in the trials conducted this season. It provided good weed control, and corresponding good yields. It is weak on grasses and nutsedge and would appear to need a follow-up or tank mix treatment to control these weeds. Spartan is an "A" priority of the IR-4 program for cantaloupe, honeydew melon and watermelon. Additionally, we are in the process of completing a plantback study with this herbicide (at the request of FMC) in anticipation of labeling. Dual Magnum also appears relatively safe on melons and could be a valuable tool to control nutsedge.

Table 1. Melon vigor (1 to 10 scale, with 10 = no injury, 1=total death of crop) in relation to treatment.

		Melon Vigor (0 to 10 scale)						
					Aug. 10			
Treatment	Rate	Jul 4	Jul 20	Aug 2	Oro Rico	Esteem	Saturno	Paradise
Lorox	2.0 lb ai/a	0.0	0.0	0.0	0.0	0.0	0.0	4.5
Dual Magnum	1.25 lb ai/a	8.8	6.8	9.8	10.0	10.0	10.0	10.0
Chateau	1.5 oz ai/a	8.5	6.1	8.2	7.2	9.2	8.8	10.0
Prowl H_2O	1.40 lb ai/a	8.5	6.5	8.0	8.2	8.5	8.8	9.5
Spartan	0.075 lb ai/a	8.8	8.1	9.6	9.8	10.0	10.0	10.0
Reflex	0.15 lb ai/a	9.0	6.9	9.1	8.8	9.5	10.0	9.8
Cerano	1.25 lb ai/a	4.2	4.4	7.6	7.8	8.5	9.8	9.5
Untreated		9.8	8.0	9.9	9.8	10.0	10.0	9.8
LSD .05		1.0	1.5	1.0	2.1	1.4	1.1	1.6

Table 2. Barnyardgrass and stinkgrass control (%) in relation to treatment on July 4, 20, August 2 and 16, 2011.

		------Grass control (%)---------			
		Jul 4	Jul 20	Aug 2	Aug 16
Lorox	2.0 lb ai/a	68	65	41	25
Dual Magnum	1.25 lb ai/a	55	65	51	40
Chateau	1.5 oz ai/a	30	64	30	0
Prowl H_2O	1.40 lb ai/a	51	81	62	51
Spartan	0.075 lb ai/a	22	38	18	19
Reflex	0.15 lb ai/a	26	52	12	5
Cerano	1.25 lb ai/a	51	96	94	66
Untreated		12	0	0	0
LSD .05		31	30	42	43

Table 3. Purslane control (%) in relation to treatment on July 4 and 20, and August 2 and 16, 2011.

		Purslane control (%)			
		Jul 4	Jul20	Aug2	Aug 16
Lorox	2.0 lb ai/a	100	98	92	95
Dual Magnum	1.25 lb ai/a	30	36	50	54
Chateau	1.5 oz ai/a	22	51	65	76
Prowl H_2O	1.40 lb ai/a	29	50	52	71
Spartan	0.075 lb ai/a	78	85	89	98
Reflex	0.15 lb ai/a	36	44	75	84
Cerano	1.25 lb ai/a	59	91	92	96
Untreated		2	0	0	0
LSD .05		35	25	33	19

Table 4. Yellow nutsedge control (%) in relation to treatment on July 20, and August 2 and 16, 2011.

		---------Nutsedge control (%)----------		
		Jul 20	Aug 2	Aug 16
Lorox	2.0 lb ai/a	50	11	0
Dual Magnum	1.25 lb ai/a	86	72	64
Chateau	1.5 oz ai/a	39	11	0
Prowl H_2O	1.40 lb ai/a	46	12	0
Spartan	0.075 lb ai/a	52	18	0
Reflex	0.15 lb ai/a	58	21	20
Cerano	1.25 lb ai/a	31	0	0
Untreated		0	0	0
LSD .05		29	27	15

Table 5. Pigweed control (%) in relation to treatment on July 4 and 20, and August 10 and 16, 2011.

		----Pigweed control (%)-----			
		Jul 4	Jul 20	Aug10	Aug 16
Lorox	2.0 lb ai/a	100	100	94	79
Dual Magnum	1.25 lb ai/a	35	66	58	36
Chateau	1.5 oz ai/a	35	36	40	32
Prowl H_2O	1.40 lb ai/a	52	56	58	55
Spartan	0.075 lb ai/a	51	45	35	22
Reflex	0.15 lb ai/a	56	56	54	48
Cerano	1.25 lb ai/a	35	71	55	30
Untreated		5	0	0	0
LSD .05		26	22	25	41

Table 6. Black nightshade control (%) in relation to treatment on July 4 and 20, and August 2 and 16, 2011.

		----Nightshade control (%)----			
		Jul 4	Jul20	Aug 2	Aug16
Lorox	2.0 lb ai/a	100	98	88	88
Dual Magnum	1.25 lb ai/a	18	85	24	22
Chateau	1.5 oz ai/a	75	100	96	94
Prowl H_2O	1.40 lb ai/a	40	89	49	39
Spartan	0.075 lb ai/a	38	78	15	22
Reflex	0.15 lb ai/a	42	71	20	22
Cerano	1.25 lb ai/a	71	98	64	44
Untreated		0	0	0	0
LSD .05		21	18	45	41

Table 7. Lambsquarters control (%) in relation to treatment on July 4 and 20, and August 2, 10, and 16, 2011.

		-------Lambsquarters control (%)------				
		Jul 4	Jul20	Aug 2	Aug10	Aug 16
Lorox	2.0 lb ai/a	100	100	98	100	96
Dual Magnum	1.25 lb ai/a	30	68	51	65	75
Chateau	1.5 oz ai/a	38	32	28	36	50
Prowl H_2O	1.40 lb ai/a	52	74	64	79	85
Spartan	0.075 lb ai/a	55	64	59	80	88
Reflex	0.15 lb ai/a	38	65	55	69	59
Cerano	1.25 lb ai/a	84	100	100	100	99
Untreated		0	0	0	0	0
LSD .05		24	31	30	29	28

Table 8. Cantaloupe yield (total number/plot) and total fruit weight (lbs/plot) for eight harvests, in relation to treatment.

		-------Oro Rico---------		---------Esteem---------	
		#/25ft	lbs/25ft	#/25ft	lbs/25ft
Lorox	2.0 lb ai/a	0	0.0	1	1.9
Dual Magnum	1.25 lb ai/a	62	135.8	54	143.0
Chateau	1.5 oz ai/a	44	101.5	53	154.7
Prowl H_2O	1.40 lb ai/a	36	81.8	43	119.0
Spartan	0.075 lb ai/a	56	137.6	52	152.7
Reflex	0.15 lb ai/a	37	80.1	50	140.8
Cerano	1.25 lb ai/a	34	70.3	36	92.6
Untreated		47	107.2	53	152.2
LSD .05		26	65.7	22	64.7

Table 9. Watermelon and honeydew melon yield (total number/plot) and total fruit weight (lbs/plot) for two harvests, in relation to treatment.

		-------Honeydew--------		------Watermelon------	
		#/25ft	lbs/25ft	#/25ft	lbs/25ft
Lorox	2.0 lb ai/a	1	2.2	11	122.6
Dual Magnum	1.25 lb ai/a	40	178.0	31	347.2
Chateau	1.5 oz ai/a	23	102.3	26	315.0
Prowl H_2O	1.40 lb ai/a	18	73.8	24	242.9
Spartan	0.075 lb ai/a	41	207.4	29	326.2
Reflex	0.15 lb ai/a	44	198.4	30	359.9
Cerano	1.25 lb ai/a	32	140.0	30	289.0
Untreated		32	150.1	31	338.0
LSD .05		15	67.8	8	115.0