2008 Carrot Weed Control Trial

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Objective: To evaluate the safety and weed control of Caparol on carrots in anticipation of registration in 2009.

Summary: Caparol will provide an important new weed control tool for use on carrots. Preemergence applications of Caparol were safer than post emergence applications at the 4 pint rate/A. Post emergence applications of Caparol were less effective than preemergence applications. Preemergence applications of 4 pints/A of Caparol provided weed control comparable to a pre plus postemergence application of Lorox at 1.5 lb/A.

Methods: The trial was conducted in cooperation with Cliff Kirkpatrick of Bolthouse and Burt Silva of Bragga Farms in San Ardo. The trial was established on March 13. The soil type at the site was Garey sandy loam. Each plot was one 15 feet of bed long by one 40-inch bed wide and was replicated four times in a randomized complete block design. The preemergence applications were applied immediately following planting on March 13 and the post emergence application was made on April 25 when the carrots were at the 2-3 true leaf stage (Table 1). A second post emergence application was planned for treatments 5 and 7 (see table 1 below), but was discontinued based on the significant phytotoxicity observed from the first application. All treatments were applied with a CO_2 backpack sprayer applying the equivalent of 72 GPA with two passes of a one nozzle boom with an 8008E nozzle at 30 psi. See tables for evaluations and dates.

Results: The first two evaluation dates measured the impact of the preemergence applications. On the April 3 evaluation date preemergence application of Caparol at 4 pts/A provided the highest level of weed control followed by Lorox at 1.5 lb/A, Caparol at 2 pts/A and Norton at 48 ounces/A (Table 2). The same trend was observed on April 10 except that Caparol at 2 pints/A had declined to the lowest level of weed control (Table 3).

By May 8, the number of weeds in the untreated were increasing significantly and competition and mortality caused the total number of weeds to decline from the April 10 levels (Table 4). A preemergence application of Caparol at 4 pints/A with or without a follow up post emergence application of Caparol provided 100% weed control on this date; in addition, these applications had the lowest time to weed (Table 5). Post emergence applications of Caparol at 2 pints/A did not provide as good of weed control as a post emergence application of Caparol at 4 pints/A. In addition, the 4 pints/A post emergence rate of Caparol was more injurious to carrots as it caused yellowing and stunting of the plants (Table 5). Four pint/A rates of Caparol applied preemergence did not cause stunting of the carrots which indicates that preemergence applications of Caparol are safer than post emergence applications of Caparol on carrots; in addition, post emergent applications of Caparol alone were not as effective as preemergent applications. Pre followed by post emergence applications of Lorox provided 98.4% control of weeds and a preemergent application of Nortron followed by 2 pints of Caparol post emergence provided 100% control of weeds and low time to weed on May 8. Both of these treatments also had low phytotoxicity ratings. It is important to note that without the herbicide treatments carrots required 632 hours per acre to weed at this site. There were no statistical differences in yield between any of the treatments.

Table 1. Weed control materials, timing of application and rates.

No.	Treatment	Application Timing	Rates/A
1	Caparol 4L	Preemergence – March 13	2 pt
2	Caparol 4L	Preemergence – March 13	4 pt
3	Caparol 4L Caparol 4L	Preemergence – March 13 Post emergence – April 25*	2 pt 4 pt
4	Caparol 4L Caparol 4L	Preemergence – March 13 Post emergence – April 25	4 pt 4 pt
5	Caparol 4L Caparol 4L	Post emergence – April 25 2nd post emergence - discontinued	2 pt 2 pt
6	Caparol 4L	Post emergence – April 25	4 pt
7	Caparol 4L Caparol 4L	Post emergence – April 25 2nd post emergence - discontinued	4 pt 4 pt
8	Lorox 50WP Lorox 50WP	Preemergence – March 13 Post emergence – April 25	1.5 lb 1.5 lb
9	Nortron Caparol 4L	Preemergence – March 13 Post emergence – April 25	48 oz 2 pt
10	Untreated	----	-----

* 2-3 true leaves

Untreated foreground of middle row (with weeds); standard Lorox treatment behind

Untreated on left bed and Caparol at 4.0 pints/A on right bed

Table 2. Weed rating on April 3, 2008 (21 days after planting).
In each cell, upper number is percent control and lower number is number of weeds per 3 ft^2 (note that postemergence application was not applied until April 25).

Treatment	Application timing	Rates/A	Lambs-quarter	Malva	Night-shade	Pig-weed	Sow thistle	Others weeds	Total Weeds
Caparol 4L	Preemergence	2pt	38.1	68.8	50.0	44.5	75.0	40.0	43.4
			15.3	0.5	2.3	6.0	0.3	2.0	26.3
Caparol 4L	Preemergence	4pt	59.4	68.8	88.8	60.0	100.0	85.0	64.9
			8.8	0.5	0.5	1.0	0.0	0.8	11.5
Caparol 4L	Preemergence	2pt	15.8	12.5	31.3	9.8	75.0	25.0	10.9
Caparol 4L	Post emergence	4pt	19.5	1.5	2.5	14.0	0.3	1.5	39.3
Caparol 4L	Preemergence	4pt	74.5	62.5	75.0	57.4	75.0	70.0	67.5
	Post emergence	4pt	3.8	0.8	1.8	4.3	0.3	0.5	11.3
Caparol 4L	Post emergence	2pt	----	----	----	----	----	----	----
	Post emergence	2pt[1]	----	----	----	----	----	----	----
Caparol 4L	Post emergence	4pt	----	----	----	----	----	----	----
	Post emergence		----	----	----	----	----	----	----
Caparol 4L	Post emergence	4pt	----	----	----	----	----	----	----
	Post emergence	4pt[1]	----	----	----	----	----	----	----
Lorox 50WP	Preemergence	1.5lb	42.8	75.0	63.8	59.5	100.0	50.0	43.6
Lorox 50WP	Post emergence	1.5lb	15.5	0.3	1.0	3.3	0.0	1.3	21.3
Nortron	Preemergence	48oz	30.4	68.8	28.8	63.4	75.0	25.0	41.1
Caparol 4L	Post emergence	2pt	9.0	0.5	1.8	2.8	0.3	1.8	16.0
Untreated			0.0	0.0	0.0	0.0	0.0	0.0	0.0
			14.3	1.3	2.8	15.0	0.3	2.8	36.3
LSD 0.05 - % control	----	----	35.679	50.807	43.916	37.795	46.722	53.323	37.999
Pr>F 0.05 - % control	----	----	<0.0001	0.0028	0.0003	<0.0001	0.0043	0.0025	<0.0001
LSD - counts	----	----	12.990	NS	NS	10.340	NS	NS	21.318
Pr>F - counts	----	----	0.0218	0.0638	0.2462	0.0345	0.8326	0.0912	0.0029

1 - second postemergence application discontinued

Table3. Weed rating on April 10 (31 days after planting).
In each cell, upper number is percent control and lower number is number of weeds per 3 ft^2 (note that postemergence application was not applied until April 25).

Treatment	Application timing	Rates/A	Lambs-quarter	Night-shade	Pig weed	Sow thistle	Other weeds	Total Weeds
Caparol 4L	Preemergence	2pt	21.6	5.0	49.6	37.5	25.0	36.4
			23.0	2.3	5.3	0.8	1.3	32.5
Caparol 4L	Preemergence	4pt	66.0	62.5	72.2	62.5	75.0	70.6
			9.8	1.3	1.3	0.5	1.0	13.8
Caparol 4L	Preemergence	2pt	19.2	50.0	15.5	62.5	0.0	8.6
Caparol 4L	Post emergence	4pt	24.0	1.8	20.3	0.3	3.0	49.3
Caparol 4L	Preemergence	4pt	63.7	37.5	43.2	87.5	62.5	67.0
Caparol 4L	Post emergence	4pt	8.8	1.3	6.3	0.3	0.5	17.0
Caparol 4L	Post emergence	2pt	----	----	----	----	----	----
	Post emergence	2pt[1]	----	----	----	----	----	----
Caparol 4L	Post emergence	4pt	----	----	----	----	----	----
	Post emergence		----	----	----	----	----	----
Caparol 4L	Post emergence	4pt	----	----	----	----	----	----
	Post emergence	4pt[1]	----	----	----	----	----	----
Lorox 50WP	Preemergence	1.5lb	45.7	66.7	24.6	75.0	50.0	46.6
Lorox 50WP	Post emergence	1.5lb	9.8	0.5	1.8	0.0	0.5	12.5
Nortron	Preemergence	48oz	25.9	27.5	66.7	62.5	0.0	49.2
Caparol 4L	Post emergence	2pt	12.8	1.5	1.0	0.3	1.8	17.3
Untreated	----	----	0.0	0.0	0.0	0.0	0.0	0.0
			22.0	3.0	18.3	1.3	1.8	46.3
LSD 0.05 - % control	----	----	40.315	48.703	48.786	47.292	44.751	39.153
Pr>F 0.05 - % control	----	----	<0.0001	0.0005	0.0007	0.0032	<0.0001	<0.0001
LSD – counts	----	----	13.906	NS	14.754	0.699	NS	22.824
Pr>F - counts	----	----	0.0028	0.0720	0.0499	0.0160	0.0938	0.0003

1 - second postemergence application discontinued

Table 4. Weed rating on May 8 (56 days after planting).
In each cell, upper number is percent control and lower number is number of weeds per 3 ft^2.

Treatment	Application timing	Rates/A	Lambs-quarter	Night-shade	Pig weed	Sow thistle	Other weeds	Total Weeds
Caparol 4L	Preemergence	2pt	54.6 7.5	75.0 0.3	57.8 3.0	75.0 0.3	33.3 1.5	53.7 12.5
Caparol 4L	Preemergence	4pt	100.0 0.0	100.0 0.0	100.0 0.0	100.0 0.0	100.0 0.0	100.0 0.0
Caparol 4L Caparol 4L	Preemergence Post emergence	2pt 4pt	100.0 0.0	100.0 0.0	100.0 0.0	100.0 0.0	75.0 0.3	96.6 0.3
Caparol 4L	Preemergence Post emergence	4pt 4pt	100.0 0.0	100.0 0.0	100.0 0.0	100.0 0.0	100.0 0.0	100.0 0.0
Caparol 4L	Post emergence Post emergence	2pt 2pt[1]	100.0 0.0	100.0 0.0	95.3 0.8	100.0 0.0	50.0 2.0	89.6 2.8
Caparol 4L	Post emergence Post emergence	4pt	100.0 0.0	100.0 0.0	100.0 0.0	100.0 0.0	62.5 0.8	95.3 0.8
Caparol 4L	Post emergence Post emergence	4pt 4pt[1]	100.0 0.0	100.0 0.0	96.9 0.3	100.0 0.0	29.2 1.8	90.6 2.0
Lorox 50WP Lorox 50WP	Preemergence Post emergence	1.5lb 1.5lb	100.0 0.0	100.0 0.0	100.0 0.0	100.0 0.0	87.5 0.3	98.4 0.3
Nortron Caparol 4L	Preemergence Post emergence	48oz 2pt	100.0 0.0	100.0 0.0	100.0 0.0	100.0 0.0	100.0 0.0	100.0 0.0
Untreated	----	----	0.0 16.0	0.0 0.8	0.0 6.0	0.0 0.3	0.0 2.3	0.0 25.3
LSD 0.05 - % control	----	----	19.365	22.940	20.863	22.940	46.950	20.136
Pr>F 0.05 - % control	----	----	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001
LSD – counts	----	----	3.612	NS	3.637	NS	1.654	7.574
Pr>F - counts	----	----	<0.0001	0.0938	0.0306	0.4635	0.0349	<0.0001

1 - second postemergence application discontinued

Table 5. Phytotoxicity rating, weeding time on May 8 (56 days after planting) and yield on July 28.

Treatment	Application timing	Rates/A	Phyto[1]	Weeding Time Hrs/A	Yield (T/A)	1000's/A	Mean carrot wt grams
Caparol 4L	Preemergence	2pt	0.0	71.8	47.357	1,065.04	40.4
Caparol 4L	Preemergence	4pt	0.0	6.5	44.842	1,146.71	36.5
Caparol 4L Caparol 4L	Preemergence Post emergence	2pt 4pt	1.8	8.3	49.596	1,148.89	39.5
Caparol 4L	Preemergence Post emergence	4pt 4pt	3.0	7.0	44.823	986.63	42.0
Caparol 4L	Post emergence Post emergence	2pt 2pt[2]	1.3	26.3	-----	-----	-----
Caparol 4L	Post emergence Post emergence	4pt	3.5	14.3	46.882	1,082.46	40.0
Caparol 4L	Post emergence Post emergence	4pt 4pt[2]	3.5	14.8	-----	-----	-----
Lorox 50WP Lorox 50WP	Preemergence Post emergence	1.5lb 1.5lb	0.0	8.0	47.693	1,179.38	37.6
Nortron Caparol 4L	Preemergence Post emergence	48oz 2pt	1.3	7.5	43.491	1,057.41	37.7
Untreated	----	----	0.0	632.3	50.184	1,082.46	43.2
Pr>F	----	----	<0.0001	0.0001	0.7992	0.8323	0.948
LSD 0.05	----	----	0.9261	59.161	NS	NS	NS

1 – Phytotoxicity scale: 0 = no crop damage to 10 crop dead.
2 - second postemergence application discontinued