

# Safety of New Preemergence Herbicides on Lettuce and Broccoli

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## ***Abstract***

*Carfentrazone at 0.0125 and 0.025 lb AI/A was safe on all three lettuce cultivars. No stand reduction was observed. Sulfentrazone confirmed the initial screening test rate range of 0.05 to 0.1 lb AI/A for demonstrating marginal lettuce safety. Flumetsulam and thifensulfuron showed greater selectivity only in head lettuce while severely injuring romaine and red leaf lettuce. Rimsulfuron caused considerable stand reduction of all three lettuce cultivars. Sulfentrazone, fluroxypyr, and thifensulfuron exhibited good tolerance on broccoli as no stunting or stand reduction was observed at maturity.*

## **Introduction**

In order to find new herbicides for use in vegetable crops, a series of herbicide screening experiments were initiated in 1999. The experiments were designed to identify preemergence and postemergence herbicides in vegetable crops such as lettuce and broccoli. The first series of tests included screening eighteen products and results indicated that five preemergence compounds exhibited some degree of weed control with a margin of lettuce or broccoli tolerance. This experiment was conducted to further evaluate and confirm the initial results of herbicides for potential use in lettuce and broccoli.

## **Materials and Methods**

Two small plot field experiments were conducted at the University of Arizona Maricopa Agricultural Center, Maricopa, AZ. Lettuce cultivars and broccoli cv. Liberty were planted on 40-inch raised beds with two seedlines per bed on 16 October 2000. Each plot consisted of two beds, for lettuce, one bed planted to romaine lettuce cv. Parris Island in both seedlines and one bed planted to head lettuce cv. Del Oro on one seedline and the other seedline planted to red lettuce cv. Red Line. Each treatment replicate of two beds measured 35 ft in length. The experiment was established with three replicates in a randomized complete design. Preemergence (PREE) herbicide treatments were applied using a backpack CO<sub>2</sub> sprayer equipped with a hand-held boom with four flat fan 8002 nozzle tips. The sprays were applied in 20 gpa water pressurized to 30 psi. Immediately after planting, the PREE herbicide treatments were applied when the temperature was 80F, clear sky, and no wind. The lettuce and broccoli were furrow irrigated on the following day until the soil was completely saturated across the beds. The lettuce and broccoli were furrow irrigated during the entire season as necessary. Visual observations for crop injury including stand reduction were conducted as the crop matured. No typical weeds appeared in the test site for evaluation. Volunteer wheat emerged during the season and was not evaluated.

## Results and Discussion

**Lettuce test.** Carfentrazone at 0.0125 and 0.025 lb AI/A was safe on all three lettuce cultivars (Table). No stand reduction was observed. Sulfentrazone at 0.05 lb AI/A was marginally safe on all three lettuce cultivars with injury at less than 15%. At 0.1 lb AI/A, sulfentrazone exhibited slightly more unacceptable injury. Flumetsulam at both rates was safe on head lettuce but severe stand reduction occurred in romaine and red leaf lettuce at 0.02 lb AI/A. Rimsulfuron caused considerable stand reduction of all three lettuce cultivars at both rates that were tested. Thifensulfuron appeared to be safe on head lettuce but caused unacceptable stand reduction of romaine and red leaf lettuce.

No weeds were present during the lettuce crop establishment period, therefore, no weed control efficacy was evaluated

In the original herbicide screening test, carfentrazone exhibited lettuce safety at 0.01 to 0.015 lb AI/A at 50 DAT and it appears that rates selected in this test substantiate the initial findings plus a small degree of additional safety at up to 0.025 lb AI/A. Initial weed control efficacy was demonstrated at as low as 0.008 lb AI/A. Further weed control efficacy and crop safety evaluations appear to be warranted for carfentrazone.

Sulfentrazone confirmed the initial screening test rate range of 0.05 to 0.1 lb AI/A for demonstrating marginal lettuce safety. Weed control with sulfentrazone was at 0.047 lb AI/A which does not offer an adequate margin of safety. Flumetsulam and thifensulfuron showed greater selectivity only in head lettuce while severely injuring romaine and red leaf lettuce. In initial screening, flumetsulam and thifensulfuron appeared to be safer on the leaf lettuces, however, the secondary test results contrarily indicate any potential for broad use in lettuces. Rimsulfuron in initial screening showed lettuce safety at 0.008 to 0.014 lb AI/A, however, the secondary tests showed the lettuces to be more susceptible and exhibiting greater injury.

**Broccoli test.** Sulfentrazone at 0.05 and 0.1 lb AI/A, fluroxypyr at 0.07 and 0.1 lb AI/A, and thifensulfuron at 0.003 and 0.004 lb AI/A did not cause any broccoli stand reduction. None of the treatments caused obvious crop stunting as the crop approached maturity. No weeds were present during the broccoli crop establishment period, therefore, no weed control efficacy was evaluated. The three herbicides should be tested again to evaluate weed control efficacy at the selected rates since crop tolerance was confirmed.

## References

Umeda, Kai. 2000. Screening new herbicides for weed control in head and leaf lettuces and broccoli. D.N. Byrne and P. Baciewicz, eds. 2000 Vegetable Report, University of Arizona, College and Agriculture and Life Sciences, AZ 1177, August 2000.

Table. Screening new herbicides for safety in lettuce and broccoli.

Treatment	Rate (lb AI/A)	Lettuce injury (%)			Broccoli injury (%)
		romaine	head	red	
untreated check		0	0	0	0
carfentrazone	0.0125	7	0	0	-
carfentrazone	0.025	0	0	0	-
sulfentrazone	0.05	15	7	15	0
sulfentrazone	0.1	23	23	27	0
flumetsulam	0.02	40	0	55	-
flumetsulam	0.04	58	7	72	-
rimsulfuron	0.0075	90	80	90	-
rimsulfuron	0.01	90	83	90	-
thifensulfuron	0.003	-	-	-	0
thifensulfuron	0.004	45	3	40	0
fluroxypyr	0.07	-	-	-	0
fluroxypyr	0.1	-	-	-	0
LSD (p=0.05)		26.6	16.7	22.6	

Lettuce and broccoli planted and treated preemergence on 16 October 2000.

Lettuce and broccoli injury rated 4 months after treatment.