The Evaluation of Carfentrazone in Salinas Valley Lettuce

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Introduction

Weeds can have a detrimental effect on the yield and quality of lettuce. Before the development of effective herbicides such as pronamide, severe weed infestations sometimes resulted in complete crop losses (Harry Agamalian[1] personal communication). The current weed management systems used in California lettuce production include an effective combination of mechanical tillage, herbicides, cultivation, and hand weeding. The cost of Pronamide, cultivation, and hand weeding represents a significant portion of the total production cost per acre of lettuce (1). However, factors are in motion that may force changes in current weed management systems. The provisions of the Food Quality Protection Act (FQPA) of 1996 require the US Environmental Protection Agency (EPA) to reassess all pesticide tolerances by the year 2006. During the first phase of the tolerance reassessment, the EPA plans to review the tolerances of pesticides classified as carcinogens. Pronamide and bensulide are used on 79% and 5% of the California iceberg lettuce acreage respectively, and will be reviewed during the first round of tolerance reassessments by the EPA (2,3). The loss of pronamide and bensulide would leave benefin as the only soil-applied herbicide for lettuce (4). Benefin must be incorporated in the soil with power incorporation equipment, which would lengthen the time required to establish a lettuce crop and increase costs. Furthermore, benefin is not active on many of the weeds that commonly infest lettuce plantings such as burning nettle (*Urtica urens*), hairy nightshade (*Solanum sarrachoides*) and shepherdspurse (*Capsella bursa-pastoris*), whereas pronamide controls all of these weeds. The loss of pronamide and bensulide would likely increase the cost of lettuce production since producers would be more dependent upon hand weeding. FQPA transition strategies include the use of new low-rate herbicides. Previous studies have found that lettuce was tolerant to carfentrazone (Fennimore and Richard 1999). The objective of this study was to further evaluate the tolerance of lettuce to carfentrazone as well as the weed control activity.

Materials and methods

Field plots were established on August 12, 1998 at the USDA/ARS Hartnell Farm near Salinas, CA. Two lettuce varieties included in the study, 'Salinas' and 'Medallion', were iceberg and romaine types, respectively. The plot sizes were four 40-inch beds wide by 40 feet long arranged in a randomized complete block with 3 replications. One line of each variety was planted per bed, i.e., two seed lines were planted per bed. Treatments included carfentrazone at 0.05, 0.075 and 0.1 lb ai/A, pronamide at 1.5 lb ai/A and the untreated check. All herbicides

[1] Farm Advisor Emeritus, Monterey County UCCE

were applied preemergence and incorporated with sprinkler irrigation. Assessments taken were: stand counts, crop biomass and weed densities. Mean separation was performed using Fisher's protected LSD at $\alpha = 0.05$.

Table 1. **Lettuce stand counts in iceberg and romaine lettuce** [a]

		No. plants / m	
Treatment	**Rate lb ai/A**	**Iceberg**	**Romaine**
Carfentrazone	0.050	24.3	20.3
Carfentrazone	0.075	23.7	26.7
Carfentrazone	0.100	21.7	25.7
Pronamide	1.500	29.3	27.0
Untreated check	--	20.0	22.3
LSD	$\alpha = 0.05$	6.1	ns

[a] Data taken August 31, 1998

Table 2. **Lettuce biomass yields for iceberg and romaine lettuce** [a]

		Fresh weight / head (g)	
Treatment	**Rate lb ai/A**	**Iceberg**	**Romaine**
Carfentrazone	0.050	110	266
Carfentrazone	0.075	171	241
Carfentrazone	0.100	146	238
Pronamide	1.500	159	298
Untreated check	--	190	158
LSD	$\alpha = 0.05$	ns	ns

[a] Data taken October 23, 1998

Table 3. Number of burning nettle and shepherdspurse plants per meter of row [a, b]

		No. plants / m	
Treatment	**Rate lb ai/A**	**Burning nettle**	**Shepherdspurse**
Carfentrazone	0.050	5.7	6.2
Carfentrazone	0.075	6.7	1.7
Carfentrazone	0.100	4.8	2.2
Pronamide	1.500	2.3	8.3
Untreated check	--	10.5	23.2
LSD	$\alpha = 0.05$	5.6	15.5

[a] Data taken August 27, 1998
[b] Number of plants in a band 5 in. wide by 1 m (39.4 in.) long

Results and discussion

Relative to pronamide at 1.5 lb ai/A, carfentrazone at 0.05 and 0.075 lb ai/A did not reduce iceberg lettuce stand, but carfentrazone at 0.1 lb ai/A did result in a slight stand reduction (Table 1). None of the treatments affected romaine stand. None of the treatments affected lettuce head weights in either variety (Table 2). Carfentrazone at 0.1 lb ai/A reduced burning nettle density relative to the untreated check as did pronamide at 1.5 lb ai/A (Table 3). All carfentrazone rates reduced shepherdspurse densities relative to the untreated check, but pronamide at 1.5 lb ai/A did not reduce weed densities compared to the untreated check.

Literature cited

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