Herbicide Screen for Melons

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Abstract

Seventeen herbicides recently gaining registrations in corn, soybeans, or other major crops were evaluated in screening tests for potential use in melons. In a preemergence herbicide screening test, flumioxazin, dimethenamid, halosulfuron, and s-metolachlor demonstrated melon crop safety at rates higher than rates for effective weed control. In a postemergence screening test, halosulfuron and rimsulfuron gave acceptable weed control with adequate crop safety. Flumetsulam and thifensulfuron appeared to offer some acceptable weed control with a very narrow margin of crop safety. Herbicides that did not offer adequate melon crop safety or acceptable weed control in the screening tests were carfentrazone, sulfentrazone, cloransulam, flumiclorac, fluthiamide/metribuzin, imazamox, isoxaflutole, triflusulfuron, primisulfuron/prosulfuron, and clomazone.

Introduction

Most herbicides are initially discovered, developed, and registered for use in the major crops such as corn, soybeans, small grains, cotton, and sugar beets. Very little, if any crop screening efforts are directed toward minor crops that include high value vegetable crops. In the desert southwest U.S., melons, lettuce, cole crops, onions, and carrots are produced with a limited number of herbicides and heavy reliance on mechanical tillage and cultivation and hand-hoeing. In the western U.S. where several minor crops are grown, a more cohesive research effort has been intensified in recent years to address the shortage of herbicides and to evaluate potential new herbicides. As part of the regional effort, these field tests were conducted to evaluate several newly introduced corn/soybean herbicides for potential use in minor crops.

Materials and Methods

Two small plot field tests were conducted at the University of Arizona, Maricopa Agricultural Center, Maricopa, AZ. Cantaloupe cv. Cruiser and watermelon cv. Calsweet were each planted in single rows on raised 40-inch beds for furrow irrigation. Herbicide treatments were applied as a single replicate on two beds measuring 180 ft in length. Immediately after planting on 06 July 1999, preemergence (PREE) herbicide treatments were applied on the soil surface of two adjacent beds (1 cantaloupe and 1 watermelon). Herbicides were applied using a hand-held boom equipped with four flat fan 8002 nozzle tips spaced 20 inches apart. The treatments were sprayed using a CO_2 backpack sprayer set up to deliver a constant dilution of the spray solution from a 0.5 L plastic bottle supplied with 2L of water. The sprays were applied in 24 gpa water pressurized to 30 psi. At the time of PREE applications, the weather was partly cloudy with air temperature at 110°F and a very slight breeze. The soil was dry and 104°F. The field was irrigated soon after herbicide applications on the same day. Postemergence (POST) herbicide applications were made

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on 19 July with the same equipment and delivery system and an adjuvant, Latron CS-7 at 0.25% v/v was added to all treatments. The cantaloupe and watermelon were at the 2-leaf stage of growth, Palmer amaranth (*Amaranthus palmeri*) was the predominant weed at the 3-4 leaf stage and few purple nutsedge (*Cyperus rotundus*) were present. The air temperature was 88°F, clear, and there was no wind during applications. Crop safety and weed control were evaluated visually at 4 weeks after treatment (WAT) for the PREE treatments and at 2 WAT for the POST treatments. Acceptable weed control was measured as better than 80% control and acceptable crop safety was measured as less than 30% injury.

Results and Discussion

In the PREE field test, flumioxazin, dimethenamid, halosulfuron, and *s*-metolachlor demonstrated melon crop safety at rates higher than rates for effective weed control (Table 1). Flumioxazin gave better than 80% control of weeds at 0.015 lb AI/A and was safe on cantaloupe at 0.035 lb AI/A and watermelon at <0.045 lb AI/A. Halosulfuron was effective for weed control at 0.018 lb AI/A and safe on cantaloupe and watermelon at 0.037 and 0.044 lb AI/A, respectively. The margin of crop safety to effective weed control was near twice the rates used for flumioxazin and halosulfuron. Dimethenamid and *s*-metolachlor were similar in giving weed control at 0.5 lb AI/A but crop safety was very marginal. Sulfentrazone, fluthiamide/metribuzin, imazamox, isoxaflutole, rimsulfuron, primisulfuron/prosulfuron, and clomazone gave varying degrees of acceptable weed control but there was no margin for acceptable crop safety. Carfentrazone, cloransulam, flumetsulam, flumiclorac, thifensulfuron, and triflusulfuron did not provide weed control at the highest rates tested for each herbicide.

In the POST test, halosulfuron and rimsulfuron gave acceptable weed control with adequate crop safety (Table 2). Halosulfuron was effective against weeds at 0.016 lb AI/A and safe on cantaloupe at 0.06 lb AI/A and watermelon at 0.043 lb AI/A. Rimsulfuron controlled weeds at 0.003 lb AI/A and was safe on cantaloupe at 0.014 lb AI/A and watermelon at 0.008 lb AI/A. Flumetsulam and thifensulfuron appeared to offer some acceptable weed control with a very narrow margin of crop safety. Dimethenamid, triflusulfuron, and clomazone did not control weeds at the highest rates tested. Carfentrazone, sulfentrazone, cloransulam,, flumiclorac, flumioxazin, fluthiamide/metribuzin, imazamox, isoxaflutole, *s*-metolachlor, and primisulfuron/prosulfuron gave varying degrees of weed control without an acceptable margin of crop safety.

The preliminary screening tests indicate that four herbicides, flumioxazin, dimethenamid, halosulfuron, and s-metolachlor, warrant further evaluations in the field to determine PREE weed control efficacy against a broader spectrum of weeds and safety on cantaloupe and watermelon varieties. In the POST screening test, halosulfuron, rimsulfuron, flumetsulam, and thifensulfuron offered good weed control and acceptable crop safety to warrant further testing.

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Table 1. Herbicide Screen - Preemergence applications

Herbicide	Formulation	Rate	Safe Rate* (<30% injury) cantaloupe	watermelon	Weed Control* (>80%)
carfentrazone	40 DF	0.032 lb AI/A	0.0062	0.007	>0.032
sulfentrazone	4F	0.375 lb AI/A	0.15	0.125	>0.15
cloransulam	0.84 lb	0.039 lb AI/A	< 0.006	<0.006	>0.039
flumetsulam	0.8 lb	0.05 lb AI/A	0.008	<0.008	>0.05
flumiclorac	0.86 EC	0.05 lb AI/A	0.05	0.013	>0.05
flumioxazin	50 WDG	0.094 lb AI/A	0.035	<0.045	0.015
fluthiamide/metribuzin	0.68 lb	0.94 lb AI/A	<0.16	<0.16	0.16
dimethenamid	7.5 lb/gal	1.5 lb AI/A	0.54	0.54	0.5
halosulfuron	75 WDG	0.1 lb AI/A	0.037	0.044	0.018
imazamox	1 EC	0.04 lb AI/A	0.009	0.009	0.011
isoxaflutole	75 WDG	0.14 lb AI/A	<0.018	<0.018	0.06
s-metolachlor	7.62 lb/gal	2.0 lb AI/A	0.94	0.94	0.5
rimsulfuron	25 DF	0.031 lb AI/A	<0.015	<0.013	0.015
thifensulfuron	75 DF	0.004 lb AI/A	0.002	0.001	>0.004
triflusulfuron	50 DF	0.031 lb AI/A	0.008	0.009	>0.016
primisulfuron/prosulfuron	0.57	0.036 lb AI/A	0.006	<0.004	0.013
clomazone	3 ME	1.0 lb AI/A	0.47	0.222	0.47

*Safe rate and weed control rates in lb AI/A

Table 2. Herbicide Screen - Postemergence applications

Herbicide	Formulation	Rate	Safe Rate* (<30% injury) cantaloupe	Safe Rate* (<30% injury) watermelon	Weed Control* (>80%)
carfentrazone	40 DF	0.032 lb AI/A	<0.008	<0.008	0.01
sulfentrazone	4F	0.375 lb AI/A	<0.094	<0.094	0.067
cloransulam	0.84 lb	0.039 lb AI/A	0.014	0.009	0.027
flumetsulam	0.8 lb	0.05 lb AI/A	0.015	<0.013	0.012
flumiclorac	0.86 EC	0.05 lb AI/A	0.024	0.024	0.024
flumioxazin	50 WDG	0.094 lb AI/A	0.017	0.017	0.02
fluthiamide/metribuzin	0.68 lb	0.94 lb AI/A	0.12	<0.24	0.16
dimethenamid	7.5 lb/gal	1.5 lb AI/A	>1.5	>1.5	>1.5
halosulfuron	75 WDG	0.1 lb AI/A	0.06	0.043	0.016
imazamox	1 EC	0.04 lb AI/A	0.009	0.01	0.012
isoxaflutole	75 WDG	0.14 lb AI/A	<0.024	<0.024	0.02
s-metolachlor	7.62 lb/gal	2.0 lb AI/A	0.97	0.97	0.97
rimsulfuron	25 DF	0.031 lb AI/A	0.014	0.008	0.003
thifensulfuron	75 DF	0.004 lb AI/A	0.0009	0.0005	0.0003
triflusulfuron	50 DF	0.031 lb AI/A	0.003	0.002	>0.016
primisulfuron/prosulfuron	0.57	0.036 lb AI/A	<0.004	<0.004	0.005
clomazone	3 ME	1.0 lb AI/A	1.0	1.0	>1.0

*Safe rate and weed control rates in lb AI/A