

Herbicide Screen for Melons

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Abstract

In the preemergence test, azafenidin, flufenacet, thiazopyr, isoxaben, dithiopyr, and thifensulfuron exhibited safety on cantaloupes and watermelon at rates higher than rates required for effective weed control. In the postemergence test, the margin of selectivity for melon safety and weed control was narrow for MKH-6561, flufenacet, and thifensulfuron. MKH-6561 and CGA-362622 applied preemergence did not offer any acceptable crop safety relative to the weed control that was observed. Azafenidin, thiazopyr, isoxaben, and pyriithiobac did not demonstrate adequate melon safety compared to providing good weed control.

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. The tests described are a continuation of a project initiated in 1999.

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 31 May 2000, 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 CO₂ 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 clear with air temperature at 94EF and a very slight breeze. The soil was dry and 88EF. The field was irrigated soon after herbicide applications on the same day. Postemergence (POST) herbicide applications were made on 15 June 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 1- to early 2-leaf stage of growth, Palmer amaranth (*Amaranthus palmeri*) was the predominant weed at the 4-5 leaf stage. The air temperature was 94EF, clear, and there was no wind during applications.

Crop safety and weed control were evaluated visually at 2 weeks after treatment (WAT) for the PREE treatments and at 1 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 test, azafenidin, flufenacet, thiazopyr, isoxaben, dithiopyr, and thifensulfuron exhibited safety on cantaloupes and watermelon at rates higher than rates required for effective weed control (Table 1). Azafenidin was safe on melons at 0.025 lb AI/A and controlled weeds at 0.012 lb AI/A. Flufenacet was safe at 0.25 lb AI/A and weed control was effective at less than 0.06 lb AI/A. Isoxaben was safe on cantaloupes at 0.79 lb AI/A and 0.84 lb AI/A on watermelons while controlling weeds at 0.4 lb AI/A. Thiazopyr, dithiopyr, and thifensulfuron exhibited less than a two times margin of safety for the melons versus weed control. MKH-6561 and CGA-362622 did not offer any acceptable crop safety relative to the weed control that was observed.

In the POST test, the margin of selectivity for melon safety and weed control was narrow for MKH-6561, flufenacet, and thifensulfuron (Table 2). MKH-6561 was safe on cantaloupes at 0.008 lb AI/A and controlled weeds at 0.004 lb AI/A. Flufenacet was safe also only on cantaloupes at 0.5 lb AI/A and controlled weeds at 0.4 lb AI/A. Thifensulfuron was safe on both melons at 0.002 lb AI/A and controlled weeds at 0.017 lb AI/A. Azafenidin, thiazopyr, isoxaben, and pyriithiobac did not demonstrate adequate melon safety compared to providing good weed control. CGA-362622 showed decreasing crop injury and effective weed control at 0.003 lb AI/A.

These preliminary screening tests indicated that azafenidin, flufenacet, thiazopyr, isoxaben, dithiopyr, and thifensulfuron warrant further evaluations in PREE applications on melons. For POST applications, MKH-6561, flufenacet, and thifensulfuron warrant more testing in cantaloupes to define the margin of selectivity between crop and weed control. CGA-362622 should be further evaluated at rates lower than 0.003 lb AI/A POST on the melons. The further testing should confirm melon crop safety and efficacy of the compounds on a broader spectrum of weeds.

Acknowledgments

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Table 1. Preemergence Herbicide Screen in Melons

Herbicide	Start Rate (lb AI/A)	Safe Rate		Weed Control lb AI/A
		Cantaloupe	Watermelon	
azafenidin	0.05	0.025	0.025	0.012
MKH-6561	0.04	0.009	0.009	0.03
flufenacet	0.6	0.25	0.25	<0.06
thiazopyr	1.0	0.25	0.22	0.14
CGA-362622	0.03	<0.003	<0.003	0.004
isoxaben	1.0	0.79	0.84	0.4
dithiopyr	0.25	0.07	0.07	0.05
thifensulfuron	0.002	0.002	0.002	0.0017

Start rate is label rate for currently registered crops.

Safe rate equivalent to less than 30% injury.

Weed control equivalent to 80% weed control.

Table 2. Postemergence Herbicide Screen in Melons

Herbicide	Start Rate (lb AI/A)	Safe Rate		Weed Control lb AI/A
		Cantaloupe	Watermelon	
azafenidin	0.05	0.005	0.009	0.01
MKH-6561	0.04	0.008	0.004	0.004
flufenacet	0.6	0.5	0.19	0.4
thiazopyr	1.0	0.37	0.25	0.76
CGA-362622	0.03	<0.003	<0.003	<0.003
isoxaben	1.0	0.46	0.46	0.83
thifensulfuron	0.002	0.0005	0.0005	0.0003
pyrithiobac	0.094	<0.01	<0.01	0.017

Start rate is label rate for currently registered crops.

Safe rate equivalent to less than 30% injury.

Weed control equivalent to 80% weed control.