

# Evaluation of New Preemergence Herbicides Alone and in Combinations for Weed Control in Melons

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## Abstract

*Azafenidin (Milestone®), Dupont) and flumioxazin (Valor®, Valent)) caused cantaloupe injury that was very marginal between acceptable (<15%) and unacceptable (>15%). Flufenacet (Bayer), isoxaben (Gallery, DowAgroSciences), and thifensulfuron (Harmony®, Dupont) at the rates tested caused severe crop injury. Isoxaben provided very good weed control (>90%), azafenidin provided acceptable control of only lambsquarters at 88% and less than acceptable (85%) control of pigweeds, purslane, and grasses, and flumioxazin at the higher rate of 0.05 lb AI/A tended to offer slightly better weed control than the lower rate but overall it was marginally acceptable. Bensulide (Prefar®) combined with flumioxazin caused negligible crop phytotoxicity and better than 93% control for purslane, pigweeds, lambsquarters, and grasses. Combinations of herbicides offered slightly improved weed control compared to herbicides applied alone. Crop injury increased for combinations with dimethenamid (Outlook®, Frontier®, BASF) and s-metolachlor (Dual Magnum®, Syngenta).*

## Introduction

Herbicide screening experiments were initiated in 1999 to evaluate newly commercialized corn, soybean, small grain, or cotton herbicides for potential use in vegetable crops. Cantaloupes and watermelons were included in the screening tests and initial results indicated that several herbicides offered acceptable weed control of typical summer annual weeds while demonstrating acceptable levels of crop safety. The tests conducted during two years of screening yielded products that appeared promising when applied to the soil surface as preemergence treatments. Secondary screening tests were warranted to confirm the initial discovery of the weed control efficacy and narrow margin of crop safety. In addition to secondary confirmation studies, the potential of these products to fit with currently used herbicides to create effective tank mixes may be an innovative approach to control a broader spectrum of weeds.

## Materials and Methods

Two field studies were conducted at the University of Arizona Maricopa Agricultural Center, Maricopa, AZ to investigate the potential use of new preemergence herbicides applied alone or in combinations for weed control in cantaloupes. Cantaloupe cv. Topmark was planted on raised and shaped 40-in beds in a single seedline per bed. Every other bed was planted and then treated on the soil surface with each of the preemergence herbicides and combinations. Each treatment replicate consisted of a single bed measuring 30 ft long and the tests were established in a randomized complete block design with four replicates. Both experiments were planted and sprayed on 20 April 2001 and then furrow irrigated immediately after spraying. The treatments were applied using a backpack CO<sub>2</sub> sprayer equipped with a hand-held boom consisting of four flat fan 8002 nozzle tips spaced 20-in apart. The sprays were delivered in 30 gpa

water pressurized to 30 psi. At the time of applications, the weather was clear with a slight wind at 5-10 mph and air temperature at 80EF and the dry soil surface was at 84EF. The effectiveness of the preemergence herbicide treatments to provide season-long weed control was evaluated at intervals during the growing season.

## Results and Discussion

In the secondary experiment to confirm initial findings for weed control efficacy and crop safety, none of the herbicides performed as well as the standard, bensulide (Table 1). At 7 weeks after treatment (WAT), azafenidin and flumioxazin caused cantaloupe injury that was very marginal between acceptable (<15%) and unacceptable (>15%). Flufenacet, isoxaben, and thifensulfuron at the rates tested caused severe crop injury. Isoxaben also provided very good weed control while causing the greatest melon injury at 84%. Azafenidin provided acceptable control of only lambsquarters at 88% and less than acceptable (85%) control of pigweeds, purslane, and grasses. Flumioxazin at the higher rate of 0.05 lb AI/A tended to offer slightly better weed control than the lower rate but overall it was marginally acceptable. The herbicides applied alone would not warrant further testing, however, combinations with other herbicides may reveal additive or synergistic activity on a broader spectrum of weeds or on difficult to control weeds.

Combinations of herbicides offered slightly improved weed control compared to herbicides applied alone. Crop injury increased for many combinations. Bensulide combined with flumioxazin caused negligible crop phytotoxicity (3%) similar to bensulide used alone but was not increased as compared to flumioxazin applied alone that caused marginally unacceptable injury at 18% (Table 2). The bensulide combined with flumioxazin improved the weed control compared to bensulide or flumioxazin applied alone at better than 93% for purslane, pigweeds, lambsquarters, and grasses. Dimethenamid applied alone was relatively safe on melons exhibiting 10% injury but weed control was not as effective as bensulide. Flumioxazin and *s*-metolachlor caused marginally unacceptable melon injury at 18 and 20%, respectively. Flumioxazin controlled most weeds at acceptable levels and *s*-metolachlor was comparable to dimethenamid. The combinations of bensulide with dimethenamid or *s*-metolachlor caused marginally unacceptable melon injury (18 and 20%, respectively) while improving control of pigweeds and lambsquarters compared to any of the herbicides applied alone. The addition of dimethenamid or *s*-metolachlor to flumioxazin did not significantly improve weed control as flumioxazin applied alone and caused significantly greater melon injury approaching 30%.

## References

- Umeda, Kai. 2001. Herbicide Screen for Melons. D.N. Byrne and P. Baciewicz, eds. 2001 Vegetable Report, University of Arizona, College of Agriculture and Life Sciences, AZ 1252, August 2001.
- Umeda, K and N. Lund. 2001. Preemergence Herbicides for Weed Control in Melons. D.N. Byrne and P. Baciewicz, eds. 2001 Vegetable Report, University of Arizona, College of Agriculture and Life Sciences, AZ 1252, August 2001.
- Umeda, K., D. MacNeil, D. Roberts, and N. Lund. 2000. Herbicide Screen for Melons. D.N. Byrne and P. Baciewicz, eds. 2000 Vegetable Report, University of Arizona, College of Agriculture and Life Sciences, AZ 1177, August 2000.

Table 1. Secondary evaluation of preemergence herbicides for weed control in melons

| Treatment       | Rate<br>(lb AI/A) | Crop Injury<br>(%) | Weed Control (%) |       |       |       | Grasses |
|-----------------|-------------------|--------------------|------------------|-------|-------|-------|---------|
|                 |                   |                    | AMABL            | AMAAL | POROL | CHEAL |         |
| Untreated check |                   | 0                  | 0                | 0     | 0     | 0     | 0       |
| Azafenidin      | 0.025             | 15                 | 60               | 45    | 59    | 88    | 79      |
| Flufenacet      | 0.25              | 41                 | 64               | 66    | 91    | 85    | 90      |
| Isoxaben        | 0.75              | 84                 | 95               | 97    | 98    | 97    | 90      |
| Thifensulfuron  | 0.002             | 34                 | 81               | 86    | 91    | 81    | 84      |
| Flumioxazin     | 0.03              | 21                 | 83               | 75    | 90    | 73    | 85      |
| Flumioxazin     | 0.05              | 18                 | 80               | 86    | 91    | 84    | 86      |
| Bensulide       | 6.0               | 6                  | 88               | 94    | 94    | 94    | 91      |
| LSD (p=0.05)    |                   | 20.8               | 28.8             | 34.0  | 23.1  | 11.1  | 11.8    |

Cantaloupe planted and treated on 20 April 2001, rated on 08 June (7 WAT).

AMABL = *Amaranthus blitoides* (prostrate pigweed), AMAAL = *A. albus* (tumble pigweed),  
 POROL = *Portulaca oleracea* (purslane), CHEAL = *Chenopodium album* (lambsquarters),  
 Grasses = mix of *Echinochloa crus-galli* (watergrass) and *Leptochloa* sp. (sprangletop)

Table 2. Preemergence herbicide combinations for weed control in melons

| Treatment                      | Rate<br>(lb AI/A) | Crop injury<br>(%) | Weed Control (%) |       |       |       | Grasses |
|--------------------------------|-------------------|--------------------|------------------|-------|-------|-------|---------|
|                                |                   |                    | POROL            | AMABL | AMAAL | CHEAL |         |
| Untreated check                |                   | 0                  | 0                | 0     | 0     | 0     | 0       |
| Bensulide                      | 6.0               | 3                  | 95               | 79    | 86    | 90    | 93      |
| Dimethenamid                   | 0.5               | 10                 | 90               | 76    | 85    | 83    | 89      |
| s-metolachlor                  | 0.5               | 20                 | 89               | 81    | 93    | 86    | 91      |
| Flumioxazin                    | 0.05              | 18                 | 93               | 91    | 94    | 88    | 91      |
| Bensulide +<br>Dimethenamid    | 6.0 +<br>0.5      | 18                 | 94               | 90    | 96    | 94    | 90      |
| Bensulide +<br>s-metolachlor   | 6.0 +<br>0.5      | 20                 | 94               | 88    | 94    | 94    | 91      |
| Bensulide +<br>Flumioxazin     | 6.0 +<br>0.05     | 3                  | 96               | 93    | 95    | 94    | 94      |
| Dimethenamid +<br>Flumioxazin  | 0.5 +<br>0.05     | 29                 | 94               | 93    | 95    | 93    | 93      |
| s-metolachlor +<br>Flumioxazin | 0.5 +<br>0.05     | 26                 | 95               | 94    | 94    | 93    | 93      |
| LSD (p=0.05)                   |                   | 18.2               | 5.2              | 5.1   | 7.0   | 6.2   | 5.9     |

Cantaloupe planted and treated on 20 April 2001, rated on 08 June (7 WAT).

AMABL = *Amaranthus blitoides* (prostrate pigweed), AMAAL = *A. albus* (tumble pigweed),  
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