# ANNUAL MORNINGGLORY CONTROL FOR TRANSGENIC COTTON IN THE SAN JOAQUIN VALLEY

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## Abstract

Field studies were conducted from 1997 to 2000 to evaluate weed control efficacy and the tolerance of bromoxynil resistant cotton to bromoxynil applied over the top of cotyledon to 2-4 leaf cotton and post directed at layby. Bromoxynil provided 95 to 100 percent control of most annual broadleaf weed tested including *Datura ferox*, *Solanum spp*., *Chenopodium album* L. and *Abutilan theophrast*. Best control was achieved with one application of bromoxynil at 1.12 kg ai/ha, but most weeds were also completely controlled with the 0.56 kg ai/ha rate. Control of *Amaranthus spp.* was erratic and poor to moderate at all rates tested. Control ranged from 15 to 80 percent, but when bromoxynil was tank mixed with any of the selective grass herbicides (clethodim, fluazifop-p or sethoxydim) control was reduced to a completely unacceptable level of 5 percent. There was no advantage in control of the above weed species when bromoxynil was applied in a tank mix with pyrithiobac-sodium or MSMA. Control of *Ipomea spp.* has been slightly more difficult. Bromoxynil applied over the top to *Ipomea spp.* provided acceptable control for 35 days when followed by a post directed treatment. Either a single over the top or single later post directed treatment provided unacceptable control. At 90 days after treatment, control was also unacceptable with an over the top followed by a post- directed treatment. Best control was achieved when bromoxynil was applied to *Ipomea spp.* with two or fewer leaves and control was enhanced when tank mixed with MSMA.

## Materials and Methods

Experiments were conducted at multiple locations in the San Joaquin Valley. All experiments were randomized complete block designs with three or four replications. Stoneville BXN 47 cotton was used in all tests. Herbicides were applied early over the top of cotyledon to 2-4 leaf cotton and at layby when cotton was 12 to 16 nodes. Weed species were from cotyledon to no more than 6-leaf stage at time of herbicide application. Herbicides were applied by either tractor mounted sprayer or $CO_2$ backpack sprayer in 190 l/ha water using 8002 flat fan nozzles at 2.11 kg/cm$^2$. Crop oil concentrate was applied with all treatments. Weed control efficacy and cotton tolerance were evaluated at various intervals. In-season and final plant mapping data was collected. Plots were machine harvested for yield and lint quality.

## Results

No visual phytotoxic symptoms were observed when bromoxynil was applied alone either over the top or post-directed at all rates testes. Plant mapping data did not reveal any differences in plant growth. Although yields were not significantly different, a trend for lower yield was observed where more plant injury occurred. Phytotoxic effects were greater in the treatments where MSMA or Pyrithiobac-Na were included.

Excellent weed control (95 to 100 percent) of *Datura ferox* (Chinese thornapple), *Solanum spp.* (black and hairy nightshade), and *Chenopodium album* L. (lambsquarter) was achieved with bromoxynil alone or tank mixed. Good control (80 to 90 percent) of *Amaranthus spp. (*pigweed) was only achieved with the higher rate of bromoxynil. Control of *Amaranthus spp.* at the low bromoxynil rate was unacceptable at 15 percent. The addition of a grass herbicide to the tank mix greatly reduced the effectiveness of bromoxynil to control *Amaranthus spp.*

Timing was extremely critical for the control of *Ipomea spp.* (annual morningglory). When *Ipomea spp*. plants were larger than two leaves (or had already started to form runners) control was completely unacceptable for any of the herbicides. If bromoxynil, MSMA or Pyrithiobac-Na applications were made when weeds were less than two leaves, control was excellent.

## Summary

If properly managed, bromoxynil applications to bromoxynil resistant cotton is a viable weed control system for California cotton growers. Most summer annual broadleaf weeds are effectively controlled. Tank mixing a grass herbicide reduced control of *Amaranthus spp. Ipomea spp*. can be control if applications are made before weeds are larger than the 2-leaf stage. The best season long control was achieved with bromoxynil/MSMA applied as a tank mix when *Ipomea spp*. were smaller than two leaves, followed by a bromoxynil application in early July. No phytotoxicity was observed from bromoxynil applications at any tested cotton growth stage.

Table 1. Herbicide Treatment Effects on Weed Control, Cotton Injury and Yield.

| Treatment | Rate | *Datura ferox* | *Solanum spp.* | *Chenopodium album* L. | *Amaranthus spp.* |
|---|---|---|---|---|---|
| | | % Control | | | |
| Bromoxynil | 0.56 | 100 | 99 | 100 | 15 |
| Bromoxynil | 1.12 | 100 | 99 | 100 | 80 |
| Bromoxynil | 1.12 | | | | |
| MSMA | 1.7 | 100 | 95 | 100 | 87 |
| MSMA | 1.7 | 20 | 16 | 10 | 30 |
| | 1.12 | | | | |
| Bromoxynil | | 100 | 100 | 97 | 78 |
| Pyrithiobac-NA | 0.07 | | | | |
| Pyrithiobac-Na | 0.07 | 32 | 38 | 15 | 63 |
| | 0.07 | | | | |
| Pyrithiobac-NA | | 31 | 39 | 15 | 70 |
| MSMA | 1.7 | | | | |
| Bromoxynil | 1.12 | | | | |
| Chethodim | 0.14 | | 95 | 100 | 18 |
| Bromoxynil | 1.12 | | | | |
| Fluazifop-p | 0.21 | | 100 | 100 | 28 |
| Bromoxynil | 1.12 | | | | |
| Sethoxydim | 0.21 | | 100 | 100 | 24 |
| $LSD_{0.05}$ | | 8 | 10 | 9 | 12 |

Table 1. (cont.) Herbicide Treatment Effects on Weed Control, Cotton Injury and Yield.

| Treatment | Rate | *Ipomea spp.* ≤1-leaf | *Ipomea spp* ≥2-leaf | Cotton Injury | Lint Yield |
|---|---|---|---|---|---|
| | | -- % Control -- | | -- % -- | -- kg/ha -- |
| Bromoxynil | 0.56 | 90 | 40 | 0 | 1428 |
| Bromoxynil | 1.12 | 100 | 50 | 0 | 1431 |
| Bromoxynil | 1.12 | | | | |
| MSMA | 1.7 | 100 | 60 | 20 | 1365 |
| MSMA | 1.7 | 97 | 20 | 15 | 1282 |
| | 1.12 | | | | |
| Bromoxynil | | 98 | 47 | 5 | 1327 |
| Pyrithiobac-NA | 0.07 | | | | |
| Pyrithiobac-Na | 0.07 | 93 | 27 | 39 | 1299 |
| | 0.07 | | | | |
| Pyrithiobac-NA | | 100 | 27 | 25 | 1205 |
| MSMA | 1.7 | | | | |
| $LSD_{0.05}$ | | 8 | 10 | 9 | 12 |

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