

TRIFLURALIN

for selective weed control in cotton

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These studies suggest that when trifluralin is applied as a directed spray in commercial cotton fields, care should be exercised to avoid spraying the herbicide on the terminal or lateral buds. In fields where the cotton plants vary in size, it may be advisable to delay directed-spray application to avoid plant injury.

POST-EMERGENCE, directed-spray applications of trifluralin are recommended for selective weed control in cotton. Applications are suggested when the cotton plants are three inches high or taller. In field experiments and in commercially treated fields in the San Joaquin Valley, growth of some of the cotton plants has been retarded following application of trifluralin. The internodes on the main stem were shortened and the plants had a bushy appearance. It was further observed that lateral branches developed normally later on, without any evidence of phytotoxicity or shortened internodes. In commercially treated

fields the number of plants affected did not exceed 10% of the total population. This type of injury was not observed where trifluralin was used as a pre-plant soil-incorporated herbicide.

Symptoms

When the symptoms were first reported, contamination of the spray rig with phenoxy herbicides was suggested as the cause. Later it was reported that the solvent used in the commercial formulation of trifluralin may have produced the symptoms. This report summarizes a glasshouse study to evaluate the effects of post-emergence applications of trifluralin on cotton.

Technical trifluralin produced the same degree of phytotoxicity as the commercially formulated trifluralin when sprayed on the cotton plant (left photo). Restricting the application of trifluralin to the leaves of cotton plants (right photo center plant) produced no phytotoxic symptoms. Plant on the right shows severe retardation occurred when trifluralin was applied to the growing point.





Leaves and lateral branches (left photo) removed from the main stem show the shortened internodes of cotton plants treated with—from right to left—0, .5, 1, and 2 lbs active ingredient per acre of trifluralin. Cotton plants (right photo) treated with trifluralin were retarded in development. Rates from left to right: 0, .5, 1, and 2 lbs active ingredient per acre.

The study was conducted by the author in the glasshouse at the C.S.I.R.O. Irrigation Research Laboratory, Griffith, Australia.

Procedure

Individual cotton plants growing in 8-inch plastic pots were sprayed with varying concentrations of trifluralin. Treflan, a commercial formulation, the technical trifluralin, and the solvent used in formulating the commercial product were used in these tests.

Each treatment was replicated four times and the experiment was conducted twice. Rates of trifluralin, methods of treatment and the stage of cotton development at time of treatment are listed below.

1. Trifluralin in 5 cc of water at concentrations of 0, 50, 100, 200 and 400 ppm was sprayed on young cotton plants having three true leaves. The spray application was made with a micro-plot sprayer. The commercial formulation of trifluralin was used, the concentration based on active ingredient.
2. Trifluralin at 0, .5, 1 and 2 lbs active ingredient per acre was applied on 15- to 18-inch cotton plants. The herbicide was applied in the equivalent of 40 gallons of water per acre with a knapsack sprayer.
3. Cotton plants were sprayed with: (1) technical (crystalline) trifluralin dissolved in ethyl alcohol and diluted with water, (2) commercial formulation of trifluralin and (3) 250/300 Esso solvent (solvent used in the formulation of the commercial product). Concentrations used were 0, 100, 200, 400 ppm. The plants were in the 3-leaf stage in one experiment. In a second experiment they were in the 6-leaf stage of growth.
4. The growing points of cotton plants 8- to 10-inches tall were treated with trifluralin, the leaves of other plants were dipped into the herbicide water emulsion. The concentration of trifluralin was 200 ppm. Absorbent cotton was wrapped around the petioles to prevent the solution from reaching the lateral buds.

Trifluralin caused retardation in cotton growth at spray concentrations of 200 ppm and above. Slight downward cupping of the leaves was also observed on most of the treated plants. Some of the leaves exhibited veinal distortion resembling the symptom caused by phenoxy herbicides. In one experiment 60 days following treatment, boll counts were made, the leaves and lateral branches were removed, and the internodes on the main stem were measured. Results are shown in the table below and photographs.

Trifluralin concentration (ppm)	Average length* of internodes (inches)	Statistical notation†	Average‡ boll set per plant	Statistical‡ notation
50	2.1	a	8.7	a
100	1.9	a	6.7	b
200	1.5	b	3.7	c
400	.9	c	3.3	c
0	2.3	a	9.0	a

* Internodes measured in top 10-inch length of stem—excluding the top two internodes.

† Means followed by the same letter are not significantly different from each other at the 5% level using Duncan's multiple range test.

‡ Boll counts made 60 days following treatment of cotton at 3-leaf stage of growth.

Trifluralin applied at .5, 1, and 2 lbs active ingredient per acre caused severe retardation in growth of the main stem (see photos). With the advance of time, lateral branches developed without evidence of phytotoxicity (shortening of internodes). Plants treated with .5 lb active ingredient per acre seemingly recovered but the internodes on the main stem were on the average shorter than the untreated.

Technical trifluralin caused the same degree of retardation as the commercial

formulation. The 250/300 Esso solvent alone did not produce any evidence of phytotoxicity. When the solvent was used at high concentration (1:40) it did burn the leaves of the cotton plant but caused no shortening of the internodes.

No retardation in growth was produced when trifluralin was applied only to the leaves of cotton plants. But when only the growing points were treated, retardation in growth and shortening of the internodes were severe. The symptoms were as pronounced as when the entire plant was treated.

Conclusions

Trifluralin applied on the entire foliage of the cotton plant severely retarded growth. The internodes were greatly shortened giving the plant a bushy appearance. Some of the leaves exhibited symptoms often associated with those produced by phenoxy herbicides.

When only the leaves of the cotton plants were treated with trifluralin no symptom was produced—strongly suggesting that trifluralin is active in the meristematic region. Translocation of trifluralin from the leaves to the meristematic region, if it occurs at all, was not sufficient to adversely affect normal development.

It was demonstrated that trifluralin, and not the solvent, causes retardation in growth.

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