Trifluralin's Effect On Secondary Roots of Cotton Seedlings

By L. R. Vannoorbeeck and K. C. Hamilton

The chemical trifluralin, trade name "Treflan," has proven an effective herbicide for controlling annual weeds in irrigated cotton. Applied to the soil and incorporated before the preplanting irrigation, it has given season-long control of grasses and certain broadleaved weeds. However, temporary stunting of cotton seedlings following preplanting applications of trifluralin has caused concern to many cotton growers.

During 1964 the effects of trifluralin on cotton seedlings were studied in a U of A greenhouse at Tucson. Trifluralin at the rate of one pound per acre was mixed into the surface 1, 2, 3, or 4 inches of a sandy loam soil. Cotton seeds were planted and the pots subirrigated. At intervals cotton plants were harvested to weigh the plants and determine the number and position of secondary roots. Some of the data from these experiments are summarized in the accompanying table.

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Affected Root Growth

Incorporation of trifluralin below the cottonseed affected the number and distribution of secondary roots on cotton. The primary root penetrated trifluralin-treated soil but produced no or few secondary roots until reaching soil free of herbicide. Cotton seedlings partially compensated for the lack of secondary roots on the upper portions of the roots by producing more roots than normal below the trifluralin layer. Later a few abnormally thick secondary roots developed in the trifluralin-treated soil.

Trifluralin also decreased the weight of cotton seedlings. The reduced root system was accompanied by a visible reduction in top growth. Incorporation of trifluralin in the top four inches had a greater effect than incorporation into the surface two inches. The response of cotton seedling roots to trifluralin incorporation to different depths is illustrated in the photograph on this page.

This response of cotton seedlings to trifluralin, observed in the greenhouse, also occurred in the field. Cotton seedlings were temporarily stunted when growing in trifluralin-treated soil. Their susceptibility to seedling disease was also increased. When the surface soil dried rapidly, the reduced root system of cotton seedlings necessitated earlier irrigation.

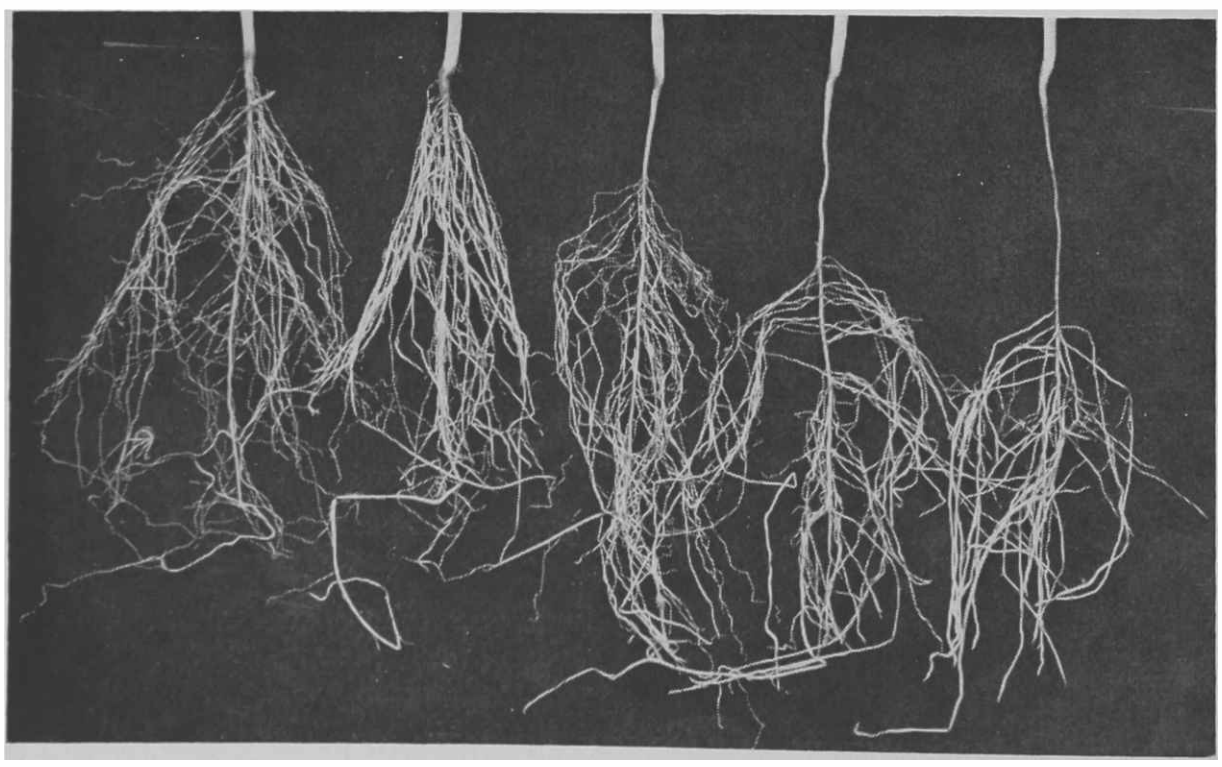
Keep It Near Surface

Effects of commercial applications of trifluralin on cotton seedlings can be minimized by restricting the depth of incorporation of preplant treatments. When trifluralin was incorporated by furrowing only, there was less effect on cotton than when trifluralin was incorporated by disking or harrowing in addition to furrowing. Trifluralin incorporated by furrowing only has given excellent weed control. Movement of the soil during furrowing and subsequent seedbed preparations has provided adequate incorporation to obtain weed control.

In summary, preplanting applications of trifluralin have given season-long control of many annual weeds. It is presently the best herbicide available for the selective control of annual grasses in cotton. Growers can expect temporary reduction of the secondary roots of cotton plants in the layer of soil treated with trifluralin. This effect of trifluralin can be minimized if the herbicide is incorporated no deeper than actually needed to control weeds.

Weight and Root Distribution of 12-day-old Cotton Seedlings in Soil Treated with Trifluralin.

Depth of incorporation of 1 lb/A of trifluralin	*Weight of seedlings in grams*	*Number of secondary roots Portion of primary root by inches*				*Total roots in top 5 inches*
		2nd	*3rd*	*4th*	*5th*	
Untreated	31	22	18	11	8	59
2 inches	29	0	19	16	11	46
4 inches	28	6	0	0	15	21



TRIFLURALIN EFFECT on roots of 10-day-old cotton seedlings grown in soil treated with the herbicide is shown at left. Left to right — untreated, trifluralin in the top inch, two inches, three inches and four inches. No secondary roots developed in the layer of soil containing trifluralin.