WEED CONTROL STUDIES IN

H. AGAMALIAN • B. FISCHER • F. ASHTON • A. LANGE • E. STILWELL

H. COLLINS • R. KING • L. BUSCHMANN

THE DEVELOPMENT of selective herbicides has been basic to the profitable use of the mechanical tomato harvester. Weeds must be efficiently controlled if such machines are to operate effectively in California tomato fields. About 40% of California's tomatoes were treated with herbicides for annual preemergence weed control in 1965. Only five years later over twice this acreage was treated (87% in a 1970 survey). The most common weeds in tomato fields include barnyard grass, pigweed, nightshade, nutsedge, shepherd's purse, and many other broadleaf weeds and grasses.

The following is a brief summary of field trials conducted from 1968 through 1970 in the tomato-growing areas of California. Most trials were established in commercial fields, but a few were carried on at Agricultural Experiment Station field plots at Riverside and Five Points.

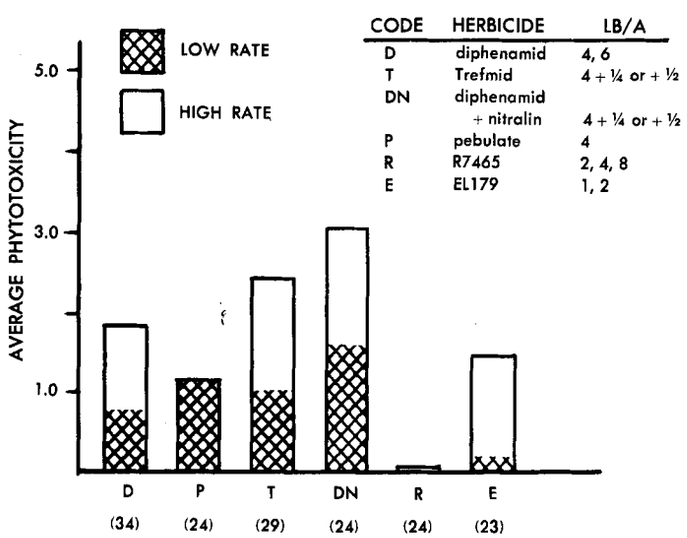
Commercially acceptable weed control was obtained from diphenamid (Enide or Dymid), pebulate (Tillam), Trefmid, combinations of diphenamid and nitralin (Planavin), and two new numbered herbicides, R7465 (Devrinol) and EL 179 (Parrlan) currently being further tested for market development. All of these and others (not included) were exceptionally good in some fields and exceptionally poor in others. However, on the average most of those listed here were acceptable.

Many factors can influence the effectiveness of an herbicide in the soil—such as loss at the time of spraying (or shortly after) because of wind, volatilization of the chemical from hot wet soils, leaching by sprinkler, breakdown by soil microorganisms, and adsorption by organic matter and clay in the soil. All these factors affect the herbicide molecule. To be effective, some of the herbicide must reach the root of the germinating weed seed. This usually happens before the chemical becomes inactive in most soils, and under most environmental conditions. Sometimes herbicides fail. Occasionally it is the fault of the chemical, but more often it is a matter of inability to understand how to best use the herbicide under field conditions.

The results suggest that diphenamid is as selective and effective under sprinkler irrigation as under furrow irrigation, while Trefmid and diphenamid plus nitralin may be more selective when mechanically incorporated and then furrow irrigated. Much more information is needed on methods of incorporation, including the proper amount and timing under sprinkler irrigation.

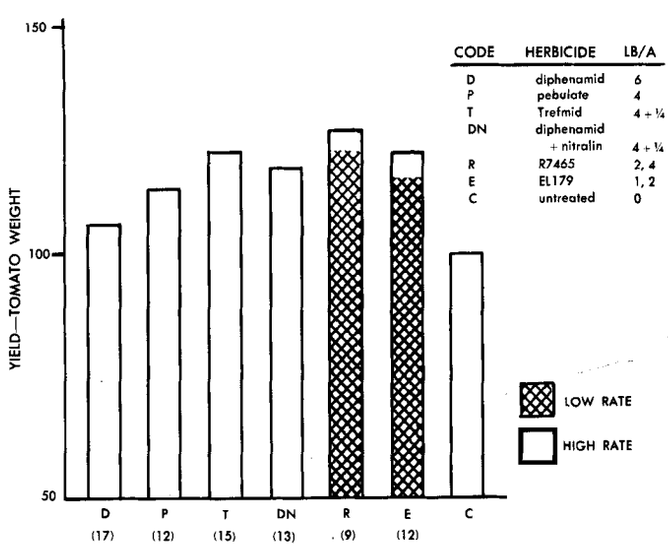
The data summarized here from a large number of trials showed some herbicide failures and also showed that in some cases herbicides have damaged early plant growth to an observable degree (see graph 1). However, the injury to the crop was less than from weed competition, even after most of the weeds had been cultivated out (graph 2). All herbicide treatments out-yielded the untreated check plots. The increase in yield

Graph 1. A comparison of relative phytotoxicity of six herbicide treatments to field-grown tomato plants.



The number of observations for each chemical is shown in parentheses below the code letter for each chemical.

Graph 2. A comparision of tomato yields resulting from five herbicides in commercially weeded plots.



The number of trials summarized for each chemical is in parentheses just below the code. Increase over the untreated plot (C) is due to weed competition.

TOMATOES, 1968-70

R. BRENDLER • H. KEMPEN • V. SCHWEERS

J. ORR

RATING COMPARISON (AVERAGES)* OF THREE HERBICIDE TREATMENTS UNDER SPRINKLER AND FURROW IRRIGATION (MECHANICALLY INCORPORATED).

Herbicide	lb/A	Weed Control Sprinkler		Weed Control Furrow		Phytotoxicity Sprinkler		Phytotoxicity Furrow	
Diphenamid	4 – 8	7.5	(17)	7.4	(9)	0.8	(17)	1.4	(13)
Trefmid†	4 + ¼	8.3	(11)	9.1	(6)	1.4	(11)	1.1	(7)
Diphenamid + nitralin	4 + ¼	8.1	(9)	9.3	(5)	1.8	(9)	1.1	(6)

* Average rating of 3 to 4 replications per treatment times the number of summarized trials (in parenthesis to the right of each number); 0 = no weed control or no effect on tomato plants, 10 = complete weed control or kill of tomato plants.

† Trefmid is combination of diphenamid and trifluralin. It was applied at the rate of 4 lbs of diphenamid plus ¼ lb of trifluralin.

would be much greater if weeds had been allowed to grow in the "unweeded" check plots. Actually in most trials (except at the Field Stations) the plots were weeded commercially either by crews or cultivation equipment or both, after data were recorded.

There is a need to constantly test and improve herbicides and to develop even more selective herbicides offering greater safety for the crop as well as better weed control. Herbicides are needed with shorter residual life in the soil. We also need to learn to "farm" the herbicides out of the soil, by using improved cultural techniques and resistant crops in rotation. We need herbicides that are particularly effective against weeds in the mustard family, the tomato family itself, and herbicides effective against nutsedge. This is a progress report and is not intended to be a recommendation of the University of California Agricultural Experiment Station.

Weed control in tomatoes with diphenamid applications at 5 lbs per acre—pre-emergence surface applications (photo above) showing good weed control in rows to right as compared with weedy control rows to left; and preplant incorporated applications in photos below showing good weed control in treated rows to left as compared with weedy control rows to right.

H. Agamalian and B. Fischer are Farm Advisors in Monterey and Fresno counties, respectively. F. Ashton is Professor, Department of Agricultural Botany, University of California, Davis; and A. Lange is Extension Weed Control Specialist, San Joaquin Valley Agricultural Research and Extension Center. E. Stillwell was formerly Specialist, University of California, Riverside. R. Brendler, H. Kempen, V. Schweers, H. Collins, R. King, L. Buschmann, and J. Orr are Farm Advisors in Ventura, Kern, Tulare, San Benito, San Joaquin, Sutter, and Sacramento counties, respectively. *Support was provided by the Stauffer Chemical Company, Eli Lilly Chemical Company, the Shell Development Company, and Upjohn Chemical Company. The staff of the West Side Field Station and the Moreno Field Station and cooperating tomato growers in several counties assisted in this study.*