

# CHEMICAL WEED CONTROL IN PEPPERS

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**W**EEDES ARE A PROBLEM in both direct seeded and transplanted bell and chili peppers in California. Cool weather during the early planting season results in slow emergence of direct-seeded pepper seedlings. Grower practice for chilies is to place seed 2 to 4 inches into moist soil and push-hoe the soil from above the germinating seedlings prior to emergence, thus removing the first crop of weed seedlings. Weeds which develop after the last cultivation (lay-by) may also cause difficulties during harvest. The availability of promising chemicals for weed control in peppers prompted the series of studies reported here to evaluate herbicides for direct-seeded and transplanted peppers under both furrow and sprinkler irrigation.

## Direct-seeding under sprinklers

Diphenamid and Vegadex were tested in 1964, and Diphenamid, Benefin and Trifluralin were evaluated in 1965—at the U. C. South Coast Field Station, Irvine. Chili peppers were planted the first year with bell peppers included in the second year's trial. Seeds were planted approximately  $\frac{3}{4}$  inch deep with a Planet Jr. planter, in single rows on 30-inch beds. The chemicals were sprayed immediately after planting in 12-inch bands of liquid centered over the seeded row, and were incorporated into the soil by sprinkler irrigation.

Evaluation of herbicide effects was based on control of broadleaf and grass species and ratings of vigor of the pepper seedlings. The minimum acceptable level for weed control performance of the herbicides was arbitrarily set at 80 per cent, and the maximum allowable reduction in pepper stand or vigor at 20 per cent. Weed and plant counts, and plant vigor readings, were made six weeks after planting when the pepper seedlings were approximately 2 inches high. Weed populations were counted from two randomly

selected 6-inch by 2-ft row areas of each plot. Both broadleaf and grass species were evident in the weed population in 1964, whereas grasses were absent in the 1965 season. Broadleaf types included purslane, *Amaranthus* sp. and *Chenopodium* sp.

Diphenamid at 4 to 8 lbs per acre provided effective pre-emergence weed control during both seasons. Vegadex in 1964 and Benefin and Trifluralin at the lower concentrations during 1965 resulted in only partial weed control (tables 1 and 2). Pepper seedlings were not seriously affected by herbicide treatments, although some foliage yellowing and reduction in seedling size was evident. Emergence counts of pepper seedlings showed no significant differences due to herbicide treatments, and an acceptable number of plants was available at thinning. No carryover effects from herbicides were noticeable as the pepper plants began rapid development.

## Transplant furrows

Weeds, particularly purslane developed rapidly in transplanted bell and chili pepper acreage in furrows following irrigation on light sandy soils in San Diego County during 1965-66. Several herbicides were applied in the furrow area (after clean cultivation) during the period one to three months after transplanting. The herbicides were incorpo-

rated by flood-type furrow irrigation. Weed counts or ratings were taken at intervals after herbicide application (tables 3 and 4).

Each of the chemicals provided considerable initial reduction in weed populations compared with the control area, and most materials continued to reduce weed numbers. Weeds present later in

TABLE 1. SEEDLING VIGOR OF CHILI PEPPERS AND CHEMICAL WEED CONTROL UNDER SPRINKLER IRRIGATION (1964)

Herbicide	Rate lb/acre	Plant vigor rating*	Avg. weed count 2 sq. ft./plot		% Weed reduction from control	
			broadleaf	grass	broadleaf	grass
Diphenamid	4	9	5.0	0	84.8	100
	6	9	1.5	0	95.4	100
	8	8	0	0	100	100
Vegadex	4	8	6.5	30.8	80.2	19.0
Control	—	10	32.8	38.0	—	—

\* Values below 10 indicate reduced vigor due to chemical effect of seedlings, based on scale 1 to 10.

Control plot (left) and Diphenamid at 6 lbs per acre (right),



TABLE 2. HERBICIDE EFFECTIVENESS ON BROADLEAF WEEDS IN BELL AND CHILI PEPPERS UNDER SPRINKLER IRRIGATION (1965)

Herbicide	Rate (lb/A)	Average broadleaf weed count	Percent weed reduction
			from control
Diphenamid	4	3.0	93.3
	6	2.0	95.6
	8	3.8	91.6
Benefin	1	18.0	60.0
	2	10.0	77.8
	4	3.5	92.2
Trifluralin	0.5	11.8	73.8
	1	6.0	86.7
	2	1.8	96.0
Control	-	45.0	-

TABLE 3. AVERAGE WEED COUNTS IN FURROWS AFTER HERBICIDE TREATMENTS SPRAYED IN APRIL TO TRANSPLANTED BELL AND CHILI PEPPERS, SAN DIEGO COUNTY, 1965.

Herbicide	Rate (lb/A)	Avg. weed count 16 days	Avg. weed count 29 days	
			Purslane	Other
Benefin	1	4.0	7.0	0.5
	2	4.3	6.5	1.8
Diphenamid	4	6.8	7.5	1.2
	6	0	13.2	2.0
Treflan	0.5	3.8	6.5	0.5
	1	2.8	3.0	1.8
Vegadex	4	7.0	6.0	2.0
	6	1.5	0	0.8
Vegiben (Granules)	2	0	5.8	0.2
	4	0	7.5	1.5
Control	-	18.0	21.2	1.5

the season, however, were generally large and vigorous enough to interfere with harvesting operations. Diphenamid caused severe stunting of the weeds soon after germination causing them to either die or not develop extensively. The furrow areas in the Diphenamid plots remained free of large weeds throughout the summer harvest period (see photo).

), applied for furrow weed control in peppers.



TABLE 4. AVERAGE WEED COUNTS AND WEED CONTROL RATINGS FROM HERBICIDE TREATMENTS IN THE FURROW APPLIED IN MID JUNE, 1965, SAN DIEGO COUNTY. HARVEST BEGAN EARLY JULY.

Herbicide	Rate (lb/A)	Avg. total plot weed count 17 days	Avg. visual rating* of weed control	
			32 days	47 days
Benefin	2	25.2	2.8	7.0
CIPC	3	22.2	2.8	6.8
	6	20.5	2.0	3.0
	6	55.5	1.6	1.8
Diphenamid	6	55.5	1.6	1.8
Treflan	1	38.8	2.1	3.0
Vegadex	6	10.2	2.0	3.8
Control	-	192.0	10.0	10.0

\* Visual ratings: 1, death of weeds or crop; 10, no crop damage or no herbicide effect on weeds.

TABLE 5. PEPPER VIGOR AND WEED CONTROL RATINGS FROM TWO HERBICIDES UNDER FURROW AND SPRINKLER IRRIGATION, MORENO, RIVERSIDE COUNTY, 1968.

Type of irrigation	Herbicide	Rate (lb/A)	Pepper vigor* reading	Weed control rating* of	
				grass	broadleaf
Furrow	Diphenamid	2	-	8.5	9.0
		4	-	9.0	8.0
		8	-	6.0	7.0
		8	-	6.0	7.0
	R 7465	1	-	1.0	2.0
		2	7	1.0	2.0
		4	5	1.0	2.0
		8	5	1.0	1.5
Control	-	8	10.0	10.0	
	-	8	10.0	10.0	
Sprinkler	Diphenamid	1	8	1.5	4.0
		2	6.5	1.0	2.0
	R 7465	4	6	1.0	1.0
		1	-	1.5	3.0
	Control	2	-	1.0	2.0
		4	8	1.0	1.0
	Control	8	3	1.0	1.0
		-	9	10.0	10.0

\* Visual rating: 1, death of weeds or crop; 10, no crop damage or no herbicide effect on weeds.

Screening trials conducted at the UC Experimental Farm, Moreno, in the spring and summer of 1968 compared weed control in peppers under furrow and sprinkler irrigations. Six chemicals were screened, with Diphenamid and experimental compound R 7465 (Stauffer Chemical Co.) showing the most promise. In the sprinkler plots, herbicides were sprayed over the direct seeded pepper rows and were incorporated by sprinkler irrigation. Herbicides were applied preplant and mechanically incorporated in the furrow-irrigated plots.

### Both species

Effective weed control of both broadleaf and grass species was achieved under sprinkler irrigation with Diphenamid at rates of 2 and 4 lbs per acre. (table 5). However, some injury was recorded on the pepper seedlings at these rates. Salt accumulation from furrow-applied water severely reduced pepper stands, and invalidated vigor ratings for seedlings in the furrow irrigated plots. Also, weed control was not adequate under furrow irrigation in this particular trial.

Compound R 7465 gave good weed control of both broadleaf and grass type weeds, but injury to pepper seedlings was noticeable under both irrigation methods (table 5).

### No recommendations

The University of California does not have recommendations for herbicides in peppers at this time. However, Federal registration is available for CIPC and Diphenamid as pre-emergence applications to direct seeded crops, or Planavin and Treflan as pretransplant treatments with soil incorporation. Paraquat can be used as a contact weed killer applied preplant or pre-emergent on emerged weeds.

### Registration

Registrations for post-emergent or post-transplant chemicals include Dacthal 75-W Diphenamid, Eptam, Planavin and Vegiben.

From the results of these trials in southern California, Diphenamid appears to be a promising herbicide for either pre-emergence or post-emergence weed control over a wide range of conditions. Possible use of Diphenamid as a lay-by herbicide to control late emerging weeds (thus reducing weed size and numbers during harvest) is particularly promising. Good incorporation of the chemical into the soil, either mechanically or by sprinkler irrigation is important to its effectiveness in weed control.

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