

CHEMICAL WEED CONTROL IN IRRIGATED VEGETABLES

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Suggested herbicides for weed control in vegetables grown in Texas' irrigated areas are based on the effectiveness of weed control and crop safety. Herbicides supplement good cultural practices, including proper seedbed preparation, use of weed-free vegetable seed, timely cultivations and weed control around irrigation canals and waste places in and near the fields.

HERBICIDE SAFE USE

Apply herbicides according to directions on the manufactures' USDA approved label, as to the crop, crop rotation, amount, times specified and precautions while handling.

Soil Residues

Residues of certain herbicides in the soil may injure particular crops planted too soon after application. Increasing the rate per acre or the depth of incorporation of certain herbicides will extend soil persistence. The weed control duration needed and the time interval between initial spraying and planting a susceptible crop often influences the rate of chemical. Keep accurate records on herbicide use to help in planning crop rotations and herbicides.

Spray Drift

Spray drift of herbicides is the major cause of adjacent crop contamination and damage to susceptible crops. Less drift occurs from ground application than aerial application.

Use a *wind-protector* on the boom when winds affect the spray. Varying the height or arrangement of the nozzles will change herbicide placement and minimize drift.

Cleaning Sprayer

Clean the sprayer immediately after spraying. A thorough cleaning with warm water and detergent removes most of the remaining herbicide. Run some of the detergent mixture through the spraying system and let a portion remain in the sprayer for at least 12 hours. Remove the detergent mixture and rinse equipment with water.

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Do not use equipment that has applied hormone-type herbicides.

SOIL PREPARATION, INCORPORATION

Use land preparation methods to provide a seedbed free of crop residues and weeds. The seedbed should be firm and smooth before application of the herbicides. Preplant or preemergence or postemergence incorporated herbicides control weeds best when thoroughly mixed into the soil with power driven tools. In furrow irrigated fields, thorough incorporation is a necessity.

IRRIGATION, HERBICIDE APPLICATION

Irrigation should follow herbicide application. Preemergence herbicides which are not incorporated should be sprayed after seeding the crop. Follow the spraying promptly with overhead irrigation.

Incorporated herbicides should be applied and incorporated either preplant, preemergence or post-emergence followed by furrow irrigation. Do not flood seedbeds with furrow irrigation, but apply enough water to provide a moist seedbed.

MIXING HERBICIDES

The product label states the amount of active ingredient in the formulation either as a percent by weight or as pounds acid equivalent per gallon liquid. The herbicide rates here are suggested as pounds of active ingredient per acre. Convert to product rates by use of the procedure listed below:

Example:

1. If 4 pounds of active ingredient is recommended per acre, and if an 80 percent wettable powder is purchased,

$$\frac{4 \text{ lb./acre} \times 100\%}{80\%} = 5 \text{ lb. of the 80 percent product is required.}$$

Mix the 5 lb. of 80 percent product in 30 to 40 gallons of water to spray 1 acre.

2. If 6 lb./acre active ingredient is recommended and if a 4 pound per gallon liquid is purchased,

$$\frac{6 \text{ lb./acre active ingredient}}{4 \text{ lb./gallon product}} = 1.5 \text{ gallons of product is required.}$$

Mix the 1.5 gallons of product in 30 to 40 gallons of water to spray 1 acre.

3. In some instances, only narrow bands are sprayed over the rows, leaving the furrows untreated. When this is done, treatment is in terms of the *area treated* and not in terms of *per acre of actual crop*.

In a vegetable crop with 40-inch rows, if a 10-inch band over the rows is treated at the same rate of active ingredient and the same product is purchased as in Example 2, the mixture of 1.5 gallons of product in 30 to 40 gallons of water will treat 4 acres of vegetables but one-fourth of each acre is sprayed. When purchasing herbicides, consider the exact area to be treated.

CALIBRATION OF GROUND SPRAYERS

A. Fill the tank with water to a predetermined level.

B. Drive in a straight line for 660 feet, operating at the same pressure and tractor speed planned for field use. Record the tractor throttle and gear settings. Pressure on the nozzle should not exceed 40 psi nor be less than 20 psi. Select nozzles which deliver the calculated volume at a pressure less than 40 psi. Use 80° or 95° nozzles which deliver a flat spray pattern for broadcast boom spraying and even flat spray pattern for band spraying of a strip on the row.

The manufacturers' agricultural spray nozzle catalogue gives details of nozzles. If the sprayer is already equipped and the nozzles will not deliver the gallons per acre in the desired time, a change in speed, GPA or change to a larger nozzle will allow a desired pressure. (A tractor travels slower in a soft field than on hard ground under the same settings.)

C. Stop spraying at the 660 foot mark and measure the gallons of water needed for tank refill to predetermined level.

D. Measure the width of actual area sprayed. For band applications this equaled the sum of the width of all bands.

E. Calculate as follows:

$$\frac{\text{gallons used} \times 66}{\text{width of sprayed area in feet}} = \text{gallons per acre}$$

Then 7 gallons of water is required to refill tank to predetermined level.

$$\text{Example: } \frac{7 \text{ gallons} \times 66}{14 \text{ feet}} = 33 \text{ gallons per acre}$$

F. After calibrating the sprayer, add the correct amount of herbicide to the sprayer tank in the correct amount of carrier for the area to be sprayed. See examples under mixing herbicides on page 1.

G. Recalibrate the sprayer after each 10 hours of operation or anytime there is a change in the calibration variables. Recalibrate more often when using wettable powders than when liquid formulations are used. Wettable powders cause wear on pumps and nozzles made of soft metals.

H. The pump should have enough capacity to supply the requirements of each nozzle, plus 3 gallons per minute for hydraulic agitation of each 50 gallons of mixture. The agitation of suspended wettable powders and oil-water emulsions is necessary.

Pump capacity (PC) can be determined by the following formula:

$$\text{PC} = (3 \text{ GPM}/50 \text{ gallons mixture}) + (\text{GPM}/\text{nozzle} \times \text{number of nozzles})$$

Example: Agitate and spray from a tank of 100 gallon capacity ($100 \text{ gallons} \div 50 \text{ gallons} = 2$) with a sprayer with 10 nozzles each spraying 0.4 GPM.

$$\text{PC} = (3 \times 2) + (0.4 \times 10); \text{PC} = 10 \text{ GPM}$$

RECOMMENDED HERBICIDE TREATMENTS¹

The herbicides will control most annual broadleaves and grasses from seed. Postemergence treatments are effective on young annuals. A partial list of the weeds controlled is shown below.

Use the lower rate with overhead irrigation or on light soils.
Use 30 to 40 gallons of water per acre unless otherwise stated.

Crop	Herbicide	Rate/acre (active ingredient)	Time of application	Remarks
Beans	DCPA (Dacthal)	6-8 lb.	Preemergence	Incorporate 1 inch
	EPTC (Eptam)	4-6 lb.	Preplant	Incorporate 3 inches
	Trifluralin (Treflan)	¾-1 lb.	Preemergence	Incorporate 1 inch
Beets	Endothall	4-5 lb.	Preplant or pre-emergence	Incorporate 1 inch
	Pyrazon (Pyramin)	3-5 lb.	Preplant or post-emergence	As above
Broccoli, brussel sprouts, cauli- flower and cabbage	CDEC (Vege-dex)	2-6 lb.	Preplant	Incorporate ½ inch
	DCPA (Dacthal)	6-8 lb.	Preplant	Incorporate 1 inch
	Trifluralin (Treflan)	½-¾ lb.	Preplant or post-emergence after crop is established	As above before weeds emerge
Cantaloupe, cucumber	Bensulide (Betasan, Prefar, Pre San)	4-6 lb.	Preemergence	Incorporate 1 inch
	CDEC (Vege-dex)	2-6 lb.	As above	Incorporate ½ to 1 inch Plant below incorporation depth.
Carrots	Linuron (Lorox)	1-2 lb.	Postemergence	After carrots are 3 inches tall, do not use wetting agent.
	Trifluralin (Treflan)	½-¾ lb.	Preplant	Incorporate 1 inch
	Stoddard solvent (Varsol)	40-100 gal.	Preemergence to the crop	Apply to weeds 1 to 3 inches tall; best applied at night or when air movement is downward and relative humidity is high.
	Stoddard solvent (Varsol)	As above	Postemergence, after crop has two or three true leaves and before root is ¼ inch in diameter.	Will not control ragweed. Use fresh oil.
Greens (spinach, mustard greens, turnip greens)	CDEC (Vege-dex)	2-6 lb.	Preemergence or preplant.	Incorporate ¼ to ½ inch; plant below incorporation depth.
Lettuce	Benefin (Balan)	¾-1 ½ lb.	Preemergence	Incorporate 1 inch
	Bensulide (Betasan, Prefar, Pre San)	4-6 lb.	Preplant	As above
	CDEC (Vege-dex)	2-6 lb.	As above	Incorporate ¼ to ½ inch Stunting of crop may occur.
Okra	Trifluralin (Treflan)	¾-1 lb.	Preemergence	Incorporate 1 inch.
Onions	DCPA (Dacthal)	6-8 lb.	Preemergence	Injury may occur with incorporation.
	Stoddard solvent	40-80 gal.	Preemergence to the crop.	Apply to small weeds.
	Sulfuric acid	3-5 % solution in 100 gal. water	As above.	Apply to small weeds. CAUTION: Extremely corrosive to metal and will burn the skin.
		2-3 % solution in 100 gal. water	Postemergence, when first true leaves of onion is at least 2 inches long (loop stage).	Apply to small weeds.
		3-4 % solution in 100 gal. water	Postemergence, when onions are in five-leaf stage and after last cultivation when onions are laid by and are bulbing.	Apply to small weeds. Use basal spraying to avoid hitting tops of onion plants.

¹Certain herbicide treatments were taken from the Suggested Guide for Weed Control, 1967. Agriculture Handbook No. 332. ARS-USDA.

Crop	Herbicide	Rate/acre (active ingredient)	Time of application	Remarks
Parsley	Stoddard solvent (Varsol)	40-100 gal. (No dilution with water)	Preemergence to the crop.	Apply to weeds 1 to 3 inches tall, best applied at night or when air move- ment is downward and relative humidity is high. Will not control ragweed. Use fresh oil.
	Stoddard solvent (Varsol)		Postemergence, after crop has two or three true leaves and before root is 1/4 inch in diameter.	
Peas, Southern	Trifluralin (Treflan)	1/2-3/4 lb.	Preemergence	Incorporate 1 inch.
Peppers	Diphenamid (Dymid, Enide)	6 lb.	Preemergence or pretransplant.	Incorporate 1 inch.
	Stoddard solvent	Undiluted	Preemergence to the crop.	Apply to small weeds.
	Trifluralin (Treflan)	1/2-3/4 lb.	Postemergence.	Incorporate 1 inch after blocking.
Potato, Irish and sweet	Diphenamid (Dymid, Enide)	4-6 lb.	Preemergence.	Incorporate 1 inch.
Potato, sweet	EPTC (Eptam)	3-4 lb.	Preplant or pre- transplant.	Incorporate with soil.
Squash	Bensulide (Betasan, Prefar, Pre San)	4-6 lb.	Preplant.	Incorporate 1 inch
	CDEC (Vege-dex)	2-6 lb.	Preemergence.	Incorporate 1/2 to 1 inch. Plant below incorporation.
Tomatoes	Diphenamid (Dymid, Enide)	6 lb.	Preemergence.	Incorporates 1 inch.
	PEBC (Tillam)	4-6 lb.	Preplant or pre- transplant.	Incorporate 2 to 3 inches.
	Trifluralin (Treflan)	1/2-3/4 lb.	Postemergence.	After blocking or before transplanting. Incorporate 1 inch.
Watermelons	Bensulide (Betasan, Prefar, Pre San)	3-6 lb.	Preplant	In sandy soils, plant below treated zone. Incorporate 1 inch. Plant labelled crops 18 months after treatment.

A Partial List of the Effect of Certain Herbicides on Specific Weeds

Weeds controlled by all herbicides listed	Herbicides— trade names	Weeds controlled by all herbicides listed	Herbicides— trade names
Barnyardgrass, careless- pigweed, crabgrass, foxtail junglerice, lambsquarters, purslane	Balan, Betasan, Dacthal, Dymid, Eptam, Karmex, Lorox, Prefar, Pre San, Pyramin, Tillam, Treflan, Vege-dex	Canarygrass, carpetweed mustard, nettle leaf, smart- weed sunflower	Karmex, Lorox
Barnyardgrass, barley- volunteer, blueweed-Texas, buckwheat-wild, burclover, carelessweed, carrotweed, cheatgrass, purslane, shep- ards purse, smartweed	Endothall	Chickweed	Eptam, Treflan, Vege-dex
Bluegrass-annual	Endothall, Eptam, Treflan, Vege-dex	Cornspurry, lovegrass, ryegrass	Eptam
Brachiaria, bromegrass, carpetweed, cheat, Russian thistle, sprangletop, stingingnettle, stinkgrass	Treflan	Goosegrass, goosefoot	Eptam, Karmex, Lorox, Treflan
Bullgrass	Endothall, Vege-dex	Grain sorghum, volunteer	Eptam, Treflan
Nettleleaf, nightshade nutsedge (purple and yellow) oats-wild	Eptam, Tillam	Henbit	Dymid, Endothall, Eptam, Pyra- nim, Tillam, Vege-dex
Ragweed	Endothall, Karmex, Lorox	Johnsongrass from seed	Balan, Dacthal, Dymid, Eptam, Treflan
		Kochia	Endothall, Treflan
		Londonrocket	Pyramin, Vege-dex
		Millet, sweetsusy	Tillam
		Sandbur	Balan, Dymid, Treflan
		Sowthistle	Karmex, Lorox, Pyramin, Treflan

Trade names are listed to help readers locate and identify the herbicides and do not imply endorsement.