

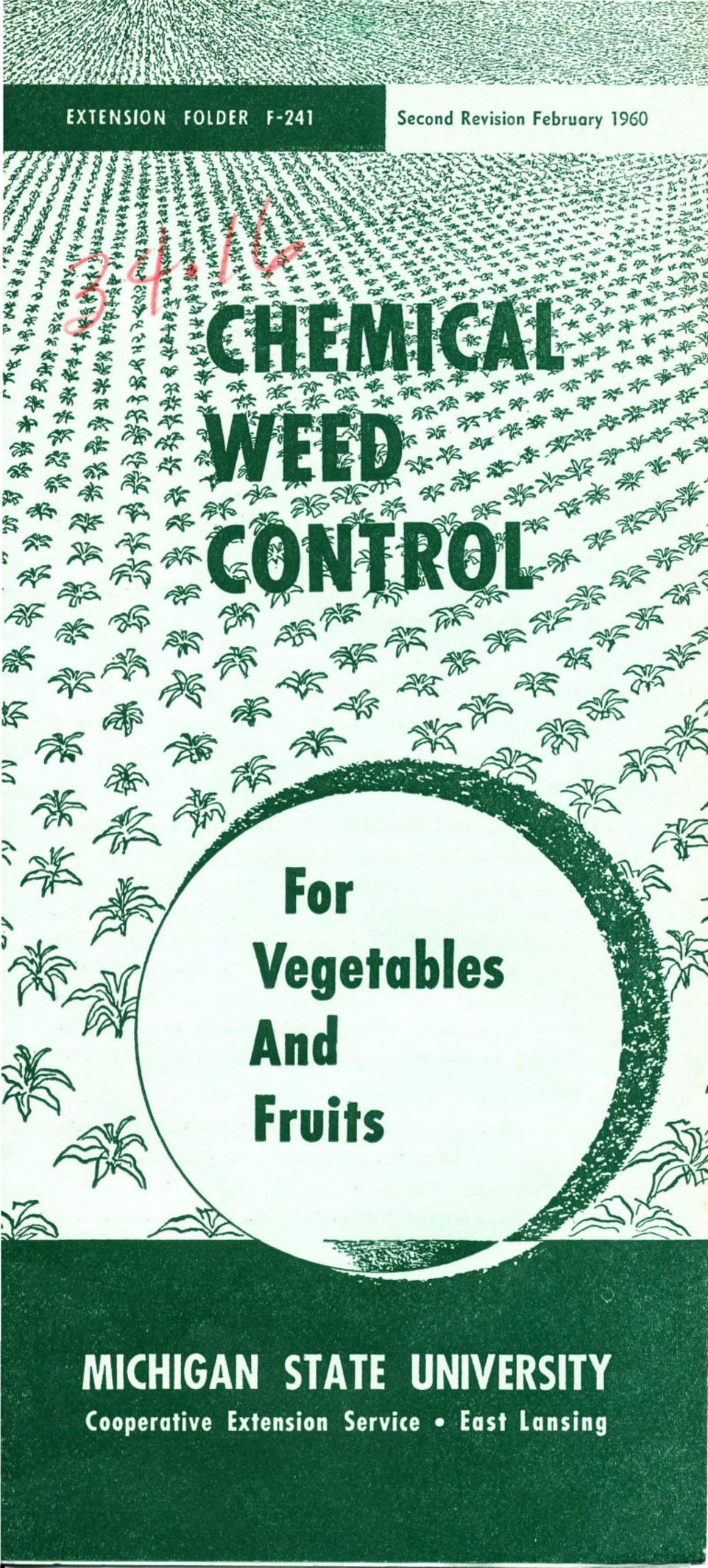
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Chemical Weed Control for Vegetables and Fruits
Michigan State University Cooperative Extension Service
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**CHEMICAL
WEED
CONTROL**

**For
Vegetables
And
Fruits**

MICHIGAN STATE UNIVERSITY

Cooperative Extension Service • East Lansing

CHEMICAL WEED CONTROL

For Vegetables and Fruits

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Weeds compete with your food crops for water, light, nutrients, and space. Weeds cut down yields and may cause a total loss of crop. Weeds harbor insects and diseases as well as damage the quality of the harvested product. Weeds reduce crop values for the United States an estimated 4 to 5 billion dollars each year; this loss is greater than that caused by diseases and insects combined.

Principles of Chemical Weed Control

Chemical weed control is not a gamble—it is a sound, economical practice. To get good control, follow these basic principles.

1. **Weeds are killed most easily when the weather favors weed-seed germination and rapid plant growth.** Crop plants are also most easily injured under these conditions. The chemicals recommended, however, are designed to kill weeds, but not crops, under conditions favorable for plant growth. Poor results from pre-emergence sprays often are due to the lack of enough soil moisture after spraying to activate the chemicals or to bring about weed-seed germination in the surface soil.

2. **Chemicals recommended for selective weed control kill best when weed seeds are germinating or when plants are young.** With the exception of 2,4-D, chemicals used at the recommended rates will not kill older plants.

3. **Use the recommended rate of application.** The selectivity of chemicals for crop plants (killing weeds and not the crop) occurs only when the amount of chemicals applied falls within certain ranges. The greater the range of tolerance of a crop plant, the better the chemical is for weed control, provided the

chemical will kill weeds throughout this range. No crop plant is completely resistant to injury from herbicides.

4. **Do not disturb the soil in the crop row after applying chemicals.** Cultivate the crop, but be careful not to throw soil into the row. If you disturb the area near the plants, you destroy the chemical layer. This may also bring weed seeds to the surface, where they germinate.

5. **Rates differ with soil type.** In general, use the lower recommended rates on light or sandy soils. Rates recommended for mineral soils may not be effective on muck soils. For instance, no practical concentration of NPA will effectively control weeds in cucumbers grown on muck soil.

6. **Know your weed species.** This is important because several chemicals are effective on certain species only. For instance, at the recommended rates, CIPC will kill purslane, chickweed, and smartweed, but it will not kill lambs quarter or pigweed. If these last two are the only species present, CIPC will appear ineffective.

7. **Know the chemical's limitations.** These appear on the product label. Read it carefully. Below is the type of information given on labels.

DNBP should not be used in sprayers which have contained copper unless the sprayer is thoroughly cleaned, because the copper will react with the DNBP to form a substance which will clog screens.

Monuron is sold as a wettable powder; the spray solution must be stirred constantly to be sure the chemical stays in suspension—evenly mixed in the water.

Sesone is effective only if it is applied before weed seedlings are more than one-fourth inch high.

8. **Be careful of wind drift and volatility.** Use only low-volatile forms of 2,4-D on vegetable and fruit farms. Be careful not to spray herbicides near sensitive crops such as grapes and tomatoes.

Weed Sprayers

You can use many types of sprayers to apply chemicals for weed control. You do not need to buy expensive, high-gallonage, high-pressure spray equip-

ment. A complete weed-control sprayer should have the following features:

1. A pump which is inexpensive and easily replaced, which wettable powders will not damage, and with a minimum capacity of 4 gallons per minute.

2. Solution agitation (stirring), either mechanical or by using a bypass from the pump. If a power-takeoff sprayer does not provide agitation, add a bypass to a galvanized tee between the pump and pressure gauge. In this case, a separate valve on the bypass line will regulate pressure. If the pump does not have enough capacity for agitation under specific spraying conditions, provide it by using both the next lower tractor gear and nozzle tips with a smaller orifice.

3. 50-mesh screens for suction line and nozzles. Wettable powders will not go through the 100-mesh screens which are sometimes provided.

4. A spray boom with nozzles which may be adjusted for distance between nozzles on the boom and for height above the ground. This is especially important for band spraying.

5. A gauge which measures pressure accurately up to 100 pounds per square inch.

6. Flat fan nozzles. The best nozzle size for general use is equivalent to an 8004 Teejet. For most work, a wide-angle nozzle—73 or 80 degrees—is best because the boom can be held close to the ground to reduce drift. This is most important when it is windy.

Sprayer Calibration

One of the most important factors in effective weed spraying is accurate calibration — determining the amount of spray material applied per acre. A range of 20 to 60 gallons per acre, at a pressure of 20 to 60 pounds per square inch, is satisfactory.

Adjust the boom height so that the spray overlaps about a third at ground level for pre-emergent spraying or at the top of the weeds for post-emergent spraying. For overall spraying, this places the nozzles about 18 to 20 inches apart on the boom and 18 to 20 inches

from the sprayed surface. A good way to calibrate a sprayer is to:

1. Fill the spray tank with water only.

2. Spray a measured area, in a field if possible, at a fixed tractor speed and pressure gauge setting. **Be sure to allow for partial coverage if bands are used.**

3. Measure the amount of water needed to refill the tank.

4. Divide this amount by the fraction of an acre sprayed to get the gallons applied per acre.

5. Mix the amount of chemical desired per acre with water to give this much spray material.

For example, if 10 gallons were applied on one-fourth acre, the volume of spray material applied would be 40 gallons per acre. If you change the tractor speed or gear, pressure setting, nozzle size, or number of nozzles, the amount of liquid applied per acre will be different and recalibration will be necessary.

Band Application

Since weeds in the crop row are usually the hardest to control, it may cost up to 80 percent less to spray herbicides in a band over the row rather than to cover the whole area.

If you use band applications, **adjust for the area actually sprayed and not for the total acres in the field.** For example, suppose the recommendation for a chemical is 4 pounds per acre, and 12-inch strips are sprayed over 36-inch rows. Only one-third of the ground area will be covered with spray material, so only $1\frac{1}{3}$ pounds of chemical (one-third of 4 pounds) will be required per acre. 4 pounds of chemical will then cover 3 acres of the crop.

To adjust the sprayer for band application, place the boom so that there is one nozzle over each row and plug the nozzles between rows. This is not always easy with standard booms, but you can buy adjustable booms or adapters.

Cleaning Weed Control Sprayers

It is important to keep weed control sprayers clean. This is especially true if you use them to spray more

than one crop or to apply fungicides and insecticides. Do not use a sprayer to apply insecticides and fungicides if the sprayer has contained 2,4-D.

In cleaning a sprayer, it is important that you thoroughly rinse the whole sprayer with water, inside and out, including boom, hoses and nozzles, both before and after cleaning. Partially fill the sprayer with water before you add the cleaning agent. Keep the pump running so that the cleaning solution will circulate throughout the sprayer. Corrosive cleaning agents should not stand in the tank or spray system for more than 2 hours.

When you are using only pre-emergence sprays, a good rinsing with water is enough. For other spraying purposes, remove weed-killers from sprayers by adding 1 gallon of household ammonia or 5 pounds of sal soda to 100 gallons of water. Allow this solution to stand in the sprayer for at least 2 hours. Drain it out through the boom and nozzles, and rinse the sprayer with water. Do not let spray solutions stand in the tank overnight.

Copper may interfere with the effectiveness of herbicides, especially DNBP. To remove copper residues from the tank, add 1 gallon of vinegar or commercial acetic acid to each 100 gallons of water; allow it to stand in the sprayer for 2 hours only. Drain the sprayer immediately and rinse thoroughly with water.

WARNING

Suggestions in this folder are based on data obtained from 2 or more years of trials. Use of these chemicals and methods, however, depends on registration of the products by the Food and Drug Administration. Growers are warned not to use a chemical on a food crop for which the compound is not registered; to do so will lead to confiscation of the crop if a residue is found on produce in either the fresh market or processed crop.

Labels of registered compounds will show the amount of residue, if any, permitted by current regulations on specific crops. Do not use any herbicide unless the label states that the chemical may be used on the specific crop to be sprayed.

READ THE LABEL

Common Equivalents

- 1 acre = 43,560 square feet or 160 square rods
- 1 square rod = 272 square feet
- 1 cup = 16 tablespoons
- 1 tablespoon = 3 teaspoons

Common Names and Trade Names

amitrol	Amino Triazole, Weedazol
atrazine	Atrazine
CDA	Radox
CDEC	Vegelex
CIPC	Chloro IPC
dalapon	Dowpon
diuron	Karmex DW
DNBP	Sinox PE, Premerge
erbon	Baron, Novon
EXD	Herbisan 5
monuron	Karmex W, Telvar
NPA	Alanap-3
sesone	Crag Herbicide 1
Simazin	Simazine
TCA	TCA-Several companies

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1960 SUGGESTIONS FOR CHEMICAL WEED CONTROL IN VEGETABLES AND FRUITS

ALWAYS READ THE LABEL ON THE CONTAINER

Rates Given Are for Pounds of Active Ingredients per Acre Actually Covered with Spray Material

Vegetables

	Chemical	Rate per acre actually sprayed	Time of application (In relation to crops)	Weeds controlled	Remarks and limitations	Tolerance ¹ (parts per million)
Asparagus	Monuron	1-3 lbs.	1 to 1½ lbs. after discing in the spring and again after the cutting season.	Annuals	Total amount not to exceed six pounds per year. Don't spray within 7 days of harvest.	7
	Dalapon	10-20lbs.	In or at the end of the cutting season.	Quackgrass	Sprays made during the cutting season should be made immediately after cutting.	30
Beans (Snap and Lima)	DNBP	3-4 lbs.	Just before emergence to crook stage of beans.	Annuals	Apply no later than crook stage.	N R ¹
Beets	CDEC	4 lbs.	At planting.	Annuals	Pre-emergence only. Do not apply when temperature is above 80°F.	N R
Cabbage, Broccoli and Cauliflower	CDEC	4 lbs.	At planting or immediately after transplanting.	Annuals	Do not apply when temperature is above 80°F. If post-emergence direct the spray at base of plant.	N R
Carrots	CIPC	4 lbs.	At planting.	Annuals	Pre-emergence only, will not control ragweed.	N R
Carrots, Parsnips and Dill	Stoddard Solvent	40-75 gal.	After two true leaves have formed.	Annuals except Ragweed	Spray when weeds are not more than two inches high. Carrots should not be thicker than a lead pencil. Spray on cloudy days or in evening before dew formation. Don't spray within 42 days of harvest.	Exempt
Celery	Stoddard Solvent	40-75 gal.	In plant bed.	Annuals	In seed bed only.	Exempt
	CDEC	4 lbs.	2 to 4 days after transplanting.	Annuals	Apply as a directed spray no later than 4 days from transplanting.	N R
Lettuce	CDEC	4 lbs.	At planting.	Annuals	Pre-emergence only. Do not apply when temperature is above 80°F.	N R
Mint	DNBP	3-6 lbs.	Just before come-up.	Annuals	Use lower rate on row mint.	N R
Onions (seeded)	EXD	5-10 lbs.	Before come-up.	Annuals	Pre-emergence only.	N R
	CIPC	4-8 lbs.	Before come-up.	Annuals	Pre-emergence only. Use lower rate when temperature is below 60°F.	N R
	CIPC	8 lbs.	After onions have 3 to 4 true leaves.	Annuals	Post-emergence not later than 30 days before harvest.	N R
	CDA	6 lbs.	At planting time.	Annuals	Pre-emergence. Use on onions intended	N R

		(2 times)			for dry bulbs only. Heavy rains after planting may cause a reduction in stand.	
	CDA A	6 lbs.	Between 3 true leaves and 45 days of harvest.	Annuals	Postemergence. Use not later than 45 days before harvest. Direct spray toward the base of the plant.	N R
Peas	DNBP	1-2 lbs.	2-4 leaf stage.	Annuals	Use 1 pound when temperature 80°F, 1½ pounds when temperature 70°F and 2 pounds when temperature 60°F. Do not apply after peas 6 inches high.	N R
Potatoes	DNBP Dalapon	3-6 lbs. 5 lbs.	Just before come-up. Just before emergence.	Annuals Quackgrass and Annual grasses	Pre-emergence on muck or mineral soil. Must apply before potatoes emerge.	N R 10
Spinach	CDEC	4 lbs.	At planting.	Annuals	Do not apply if temperatures are above 80°F.	N R
	CIPC	1-2 lbs.	At planting on mineral soils.	Annuals	Use 1 pound if temperature below 60°F, 2 pounds if temperature above 60°F.	N R
Squash and Pumpkins					No Chemicals Suggested for Use.	
Sweet Corn	Simazin	2-4 lbs.	At planting.	Annuals	Pre-emergence only. At higher rate other crops cannot be grown same season.	N R
	Atrazine	2-4 lbs.	At planting.	Annuals	Same as Simazin.	N R
	DNBP	4 lbs.	Just before emergence.	Annuals	Pre-emergence only.	N R
	2,4-D	0.5-1 lb.	From emergence to spike stage (1 inch high).	Annuals	May not control grasses. Do not use on early varieties such as North Star.	N R
Tomatoes					No Chemicals Suggested for Use.	
Vine Crops Cucumbers Muskmelons Watermelons	NPA	3-5 lbs.	At planting.	Annuals	Effective only if soil moist at time of planting, or soon after. Clean spray tank carefully after using.	N R

Fruits

Apples	Dalapon	8-10 lbs.	Apply when quackgrass 4 to 6 inches high in spring, and/or after harvest in the fall.	Quackgrass	Do not apply on trees younger than four years. Do not graze meat or dairy animals on treated areas.	3
Brambles	DNBP	3 lbs.	Before weeds appear in spring.	Annuals	Apply in early spring or after harvest. Do not apply in fall when tip layering.	N R ¹
Grapes	CIPC	4-6 lbs.	Before weeds appear.	Annuals	Dormant and early spring application only.	N R
	Diuron	2-4 lbs.	In spring.	Annuals	Band treatment use lower rates on lighter soils.	1
Strawberries (new planting)	Sesone	3-3.5 lbs.	2 to 3 weeks after planting and after a few runners are well established.	Annuals	Apply to moist soil. Don't spray within 7 days of harvest.	2
Strawberries (established planting)	2,4-D	0.5-1 lb.	Apply immediately after last picking and before runners appear.	Annuals	After picking only. Renovate immediately after harvest and then spray with 2,4-D (amine formulation) or Sesone.	N R

¹N R indicates that there will be no residue if used precisely as directed.

Quackgrass Control Before Growing Crop

	Dalapon	10-20 lbs.	Sept. to Nov. 15.	Quackgrass	Apply when grass is at least 4 inches high. If quackgrass is low in vigor, apply nitrogen to stimulate growth 2 weeks before spraying.
	Dalapon	10 lbs.	Spring when grass is at least 4 inches high.	Quackgrass	Wait at least five weeks before planting. Wait at least eight weeks if soil is dry or weather is cold. Do not use in the spring before planting strawberries.

Poison Ivy, Canada Thistle, and Horse Nettle Control on Non-Crop Areas

	Amitrol	4 lbs.	Spring or summer during active growth.		Apply when weeds are in full leaf but before flowers appear.
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For Elimination of All Herbaceous Vegetation

	Monuron	20-40 lbs.	Any time.	All vegetation	Will last more than 2 years.
	Erbon	120-160 lbs.	In spring.	All vegetation	Will last more than 2 years.
	Simazin	10-15 lbs.	Any time.	All vegetation	Will last more than 2 years.