

# CHEMICAL WEED CONTROL

## for Horticultural Crops

**COOPERATIVE EXTENSION SERVICE • MICHIGAN STATE UNIVERSITY**

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WEEDS REDUCE CROP VALUES for the United States an estimated 4 to 5 billion dollars each year. This is greater than the losses caused by diseases and insects combined. Weeds compete with crop plants for water, nutrients and light. They also harbor insects and diseases, and generally reduce yields and crop quality.

### Some Basic Principles

Weeds are killed most easily when conditions favor germination of weed-seed and rapid plant growth. Under these conditions, crop plants are also most easily injured. The chemicals recommended, however, are designed to kill weeds without serious injury to the crop (*selective weed control*), 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.

Chemicals recommended for selective weed control kill best when weed seeds are germinating or when plants are young. With a few exceptions, chemicals used at the recommended rates will not kill older plants.

**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 not lambsquarter or pigweed. If only these last two are present, CIPC will appear ineffective.

### Use Chemicals Safely

**Handle herbicides carefully.** Herbicides, like other pesticides should be handled with extreme caution. Many pesticide accidents occur when the operator is filling the spray tank. Although the greatest health hazard is considered to be ingestion of these chemicals by mouth, there is also danger of irritation to skin and eyes. Rubber gloves and goggles should be worn when handling herbicides. Avoid breathing vapors of these chemicals. Weed killers and fumigants in this bulletin which require considerable caution in handling are:

- AMS (Ammate-X)
- CDA A (Randox)
- DNBP (Sinox PE, Premerge)
- Methyl Bromide + Chloropicrin (MC-33)
- Mylone
- Paraquat (Dual Paraquat or Paraquat CL)
- Propachlor (Ramrod)
- Vapam (VPM)

In case of accidental exposure to these chemicals, consult a physician immediately, and if possible, bring a label which identifies the chemical you are using.



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 herbicide injury.

Rates differ with soil type. In general, use the lower recommended rates on light or sandy soils and higher rates on silt and clay loams or heavier soils.

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.**

**Simazine 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.**

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. Spray with 2,4-D only on quiet days to avoid drift onto sensitive crops. Use low pressure (20 psi or less) and keep nozzles as close to soil level as possible.

### Possible Problems or "Side Effects"

Annual Crops (vegetables and flowers)

If the suggested weed control practices are not followed carefully, there is the possibility of chemical residues causing damage to crops planted the next year. This may occur even if no injury occurred to the crop being treated.

Perennial Crops (fruits and ornamentals)

Several years' tests indicate there is no danger of an excessive build-up in the soil of the chemicals suggested for use. However, when the perennial crop is removed, and an annual crop follows, care must be taken that a tolerant species is planted.

Carefully read the label for further details on these problems for individual chemicals.

### Storage of Chemicals

The following storage practices may result in a longer storage life of herbicides or may decrease the danger of misuse or injury.

1. Keep herbicides and other pesticides under lock and key away from the reach of children and animals.

2. Store herbicides in a cool dry place. Liquid formulations should not be exposed to freezing temperatures as the emulsions may settle out.
3. Keep the materials in their original labeled containers and mark the year of purchase. Label information concerning uses and tolerances may change from year to year.
4. Fold the tops of bags over several times to keep out moisture. Keep the tops of bottles and cans firmly in place.
5. Do not store 2,4-D type herbicides with other pesticides as they may absorb the volatile 2,4-D and cause injury to plants.
6. Always read the label for further storage instructions.

### Disposal of Containers

A private disposal pit may be prepared for disposal of containers and excess material. It should be located a safe distance from homes, wells, streams, crops, and livestock. Level, well drained soil is preferred as it will allow the residue to be absorbed through the soil and lessen the danger of run-off. As a general rule, herbicide containers should not be burned as the vapors may damage surrounding crops. Glass and metal containers should be broken and buried to a depth of at least 18 inches in the disposal pit. This practice also applies for surplus chemicals.

### 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 type herbicides.**

When 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. Do not leave corrosive cleaning agents in the tank or spray system 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. Do not allow solutions to run into streams or other water sources.

### Warning

Suggestions in this bulletin 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 could lead to confiscation of the crop if a residue is found on produce in either the fresh market or processed crop.

**Do not use any herbicide unless the label states that the chemical may be used on the specific crop to be sprayed.**

### Weed Sprayers

Many types of sprayers are suitable for chemical weed control. You do not need to buy expensive, high-gallonage, high-pressure spray equipment. A complete weed-control sprayer should have the following features:

1. A low pressure pump that is easily replaced, which wetttable powders will not damage, and which has a minimum capacity of 9 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. To increase agitation in the tank, place an agitator nozzle on the end of the overflow hose. 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. Wetttable 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.**

7. For tree fruit and nurseries, 110° angle nozzles

are excellent. A rigid boom with three 110° angle nozzles located 2 feet apart and 14 inches above the ground will spray a strip 6 feet wide. The sprayed area can be reduced to 4 feet by plugging the inside nozzle or extended to 8 or more feet by making the boom proportionately longer and adding more nozzles.

For vineyards and nurseries a TOC nozzle placed on a gun or on the end of a boom may be used, if it can be held at a rigid 45° angle.

### 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 overall spraying, using 80 degree nozzles, 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 in Row Crops

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

**For 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 1⅓ 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.

### Orchard, Vineyard and Nursery Application

Drive down the row in one direction; never go in a circle around the trees, since this concentrates the spray at the base of the tree.

Apply the spray as a complete row treatment or

as squares under the orchard trees. It is usually best to spray a strip on one side of a row going in one direction and on the other side coming back. In vineyards, the entire band (under a row) may be sprayed with a 45° angle TOC nozzle placed on a gun or boom. The width of the band will be determined by the age of the plants and desires of the grower. Most orchard trees should have weeds controlled under the full spread of the branches. For young trees, vineyards and nurseries a 3-4 foot band in the row may be sufficient.

## 1969 SUGGESTIONS FOR CHEMICAL WEED CONTROL IN HORTICULTURAL CROPS

### ALWAYS READ THE LABEL ON THE CONTAINER

**NOTE:** — Rates Given Are for Pounds of Active Ingredients per Acre Actually Covered with Spray Material unless otherwise specified.

At the time this publication was prepared certain herbicides, identified by marginal dots, were registered on a "no residue" or "zero tolerance" basis.

After December 31, 1968, registration under the Federal Insecticide, Fungicide, and Rodenticide Act for pesticides previously registered for use in a manner involving food or feed on a "no residue" or "zero tolerance" basis will be cancelled unless: (1) finite (numerical) tolerances or exemptions from the requirements of a toler-

ance have been established by the Food and Drug Administration; or (2) progress reports have been submitted to the Pesticides Registration Division, USDA, showing that studies are being conducted to obtain data to support finite tolerances.

Before using any herbicide in this publication identified by a marginal dot (•) consult your County Extension Agricultural Agent regarding the registration status of that material on food or feed crops.

### Vegetables

Plant	Chemical	Pounds per acre actually sprayed*	Time of application (In relation to crops)	Weeds controlled	Remarks and limitations
Asparagus Seedlings	linuron (Lorox) or diuron (Karmex)	1 1	After planting seed.	Annuals	Do not use on very sandy soils. Double rate for muck soils.
	amiben (Vegiben)	2-3	After planting seed.	Annuals	Use lowest rate on sandy soils. If soil is dry, irrigate after application.

\*Unless otherwise specified.



Plant	Chemical	Pounds per acre actually sprayed*	Time of application (In relation to crops)	Weeds controlled	Remarks and limitations
Asparagus (year after transplanting)	monuron (Telvar)	1 to 2	After disking in the spring and again after the harvest season.	Annuals	May apply during harvest period. Total dosage not to exceed 6 lb. per acre per year.
	simazine (Princep)	2 to 4	Same as above.	Annuals	Apply before weeds emerge.
	dalapon (Dowpon)	10 to 15	During or at the end of the cutting season when quackgrass 4-6 in. high.	Quackgrass	Spray made during the cutting season should be made immediately after harvesting. Do not spray fern.
	2,4-D (sodium salt)	2	During or after the cutting season when weeds are growing rapidly.	Annual and perennial broadleaved weeds.	Spray made during the cutting season should be made immediately after harvesting. When spraying after the harvest season, use drop nozzles to avoid spraying fern.
Beans (Snap and Lima)	trifluralin (Treflan)	½ to ¾	Before planting.	Annuals, especially grasses	Work into soil 2-4 inches immediately after spraying. Use lowest rate on sandy soils.
	DNBP (Premerge, Sinox P E)	3 to 4	Just before emergence to crook stage of beans.	Annuals	Apply no later than crook stage. Apply when soil surface is moist if possible.
Beans (Snap)	EPTC (Eptam)	3	Before or at planting.	Annuals	Harrow into top 2 inches of soil. Irrigate 3 to 14 days after application.
Beets	pyrazon (Pyramin)	4	From planting to before weeds form 2 true leaves.	Annuals	Pre-emergence or post-emergence on beets. Addition of the surfactant X-77 at 2 qts./100 gal. may increase the kill of small weeds which have already emerged. Don't apply post-emergence to beets until they have 2 true leaves.
Cabbage, Broccoli and Cauliflower (Transplants)	trifluralin (Treflan)	½ to 1	Before transplanting.	Annuals especially grasses	Work into soil 2-4 inches immediately after spraying. Transplant immediately to 21 days after application. Use lowest rate on sandy soils and highest rate on soils high in clay or organic matter.
	nitrofen (Tok)	3 to 6	One week after transplanting.	Annuals	Irrigate after application if soil is dry.
Cabbage, Broccoli and Cauliflower (Seed beds or field seeded)	CDEC (Vegadex)	4	After planting seed.	Annuals	Irrigate after application if possible.
	nitrofen (Tok)	3 to 6	After planting seed.	Annuals	Irrigate after application if soil is dry. (Use lowest rate on sandy soils.)
Carrots, Parsnips and Dill	stoddard solvent	40 to 75 gal.	After 2 true leaves have formed.	Annuals except ragweed	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.
Carrots	linuron (Lorox)	1 to 2	At planting or after 2 true leaves have formed.	Annuals	Do not apply when temperatures are above 85°F.
	CIPC (Chloro IPC)	4	At planting.	Annuals	Pre-emergence only, will not control ragweed.

\* Unless otherwise specified.



Plant	Chemical	Pounds per acre actually sprayed*	Time of application (In relation to crops)	Weeds controlled	Remarks and limitations
Celery	nitrofen (Tok)	4 to 6	7 days after transplanting and repeat if needed.	Annuals	Apply before weeds are 1 inch high. Very effective on emerged purslane.
	CDEC (Vegadex)	4	2 to 4 days after transplanting.	Annuals	Apply as a directed spray no later than 4 days from transplanting. Irrigate after application.
	stoddard solvent	40 to 75 gal.	In plant bed.	Annuals	In seed bed only.
Cucumbers and Muskmelons	NPA (Alanap) and bensulide (Prefar)	4 plus 6	At planting.	Annuals	If irrigation is available, apply the two chemicals after planting and irrigate immediately. With no irrigation, apply bensulide and work into soil 2-3 inches prior to planting. Apply NPA to the surface after planting.
	NPA (Alanap) and DNBP (Premerge, Sinox PE)	4 plus 2	At planting.	Annuals	Pre-emergence only. Plant seed to a depth of 1 inch or injury may result. Irrigate lightly if soil is dry. Do not use on very sandy soils.
Lettuce	CDEC (Vegadex)	4	At planting.	Annuals	Pre-emergence only.
<b>Onions (Seeded) Note — Calibrate carefully for both herbicide and banded insecticide rates. An excess of either chemical will increase possibility of injury.</b>					
	CDAA (Randox) liquid or granular	2 to 6	Use these chemicals according to your weed problem. CDAA is particularly good for control of annual grasses, purslane and pigweed. CIPC is particularly good for control of purslane, chickweed and smartweed.		
	CIPC (Chloro IPC) liquid or granular	2 to 6	Apply no more than 4 pounds per acre of either chemical or a combination of 3 plus 3 lbs. per acre of both chemicals just before, or as the onions emerge. Make a second application after 2 to 3 true leaves are formed and use a third and fourth application as needed. Several applications at these lower rates give more effective weed control and will not cause injury. Granular materials may be used if no weeds are present when applied. Use CIPC and granular CDAA no later than 30 days before harvest and CDAA emulsion no later than 45 days before harvest.		
	EXD (Herbisan 5)	5 to 10	Either before or after onions come up.	Annuals	On post-emergence applications, use a shield so that only bottom 1 or 2 inches is sprayed. Apply no later than 48 hours before harvest.
Peas	DNBP (Premerge, Sinox PE)	1 to 2	2 to 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. Do not graze or feed vines to livestock within 40 days after application.
Peppers	diphenamid (Dymid, Enide)	5	After transplanting.	Annuals	Apply before weeds emerge.
	trifluralin (treflan)	½ to 1	Before transplanting.	Annuals	Work into the soil immediately after application. Use lowest rate on sandy soils.
Spinach	CDEC (Vegadex)	4	At planting on mineral soils.	Annuals	Do not apply if temperatures are above 80°F. Irrigate after application if possible.
	Ro-Neet	3 - 4	Before planting.	Annuals	Apply to soil and incorporate 2-3 inches immediately. Use on mineral soils only.

\* Unless otherwise specified.



Plant	Chemical	Pounds per acre actually sprayed*	Time of application (In relation to crops)	Weeds controlled	Remarks and limitations
Squash and Pumpkins	Amiben (Vegiben)	2	At planting.	Annuals	
Sweet Corn	atrazine (Aatrex)	2	From 1 to 10 days after planting.	Annuals	Use 4 lbs. per acre on muck soil. Do not plant other vegetable crops the year following atrazine application of 2 lbs. or more.
	simazine (Princep)	2	At planting only.	Annuals	Pre-emergence only. Use 4 lbs. per acre on muck soil. Do not plant other vegetable crops the year following simazine application of 2 lbs. or more.
	atrazine (Aatrex) plus propachlor (Ramrod)	1 plus 3	At planting only.	Annuals	Pre-emergence only. Other vegetable crops may be planted the next year.
Sweet Potatoes	diphenamid (Dymid, Enide)	5	At planting.	Annuals	
Tomatoes (direct seeded)	diphenamid (Dymid, Enide)	5	Before coming up.	Annuals	
Tomatoes (transplanted)	diphenamid (Dymid, Enide)	5	After transplanting.	Annuals	
	trifluralin (Treflan)	½ to 1	Before transplanting.	Annuals	Work into soil immediately after application. Use lower rate on sandy soils.
	Amiben (Vegiben)	4	3 to 5 days after transplanting or at lay by.	Annuals	Use granular formulation only.

### Small Fruits

Plant	Chemical	Pounds per acre actually sprayed*	Time of application (In relation to crops)	Weeds controlled	Remarks and limitations
Grapes (Bearing)	Paraquat	½ to 1	In spring or spot spray in summer as needed.	Annuals and knockdown of perennials	Has no residual effect in soil. May be combined with diuron or simazine for season-long control of quackgrass and annuals.
	diuron (Karmex)	2 to 5	In spring before weeds emerge.	Annuals	Band treatment, use lower rates on lighter soils. Do not apply in vineyards less than 3 years old.
	simazine (Princep)	3 to 4	In spring before weeds emerge.	Annuals	Band treatment, use lower rates on lighter soils. Do not apply in vineyards less than 3 years old.
	2,4-D (wax bar)		In spring before grape shoots reach the ground.	Broadleaved perennials	Drag bar over areas where perennial weeds are a problem. Do not allow bar to contact grape foliage.
Non-Bearing Grapes	Paraquat	½ to 1	Use as directed. Spray as necessary during growing season.	Annuals and Perennials	Direct the spray under vine after trellising. Do not allow spray to touch grape leaves. Addition of a wetting agent at 2 quarts per 100 gallons will increase effectiveness.

\* Unless otherwise specified.



Plant	Chemical	Pounds per acre actually sprayed*	Time of application (In relation to crops)	Weeds controlled	Remarks and limitations
Blueberries	diuron (Karmex)	2 to 4	Apply in spring when weed growth starts.	Annuals and Reed Canary grass.	Apply at least 60 days before harvest. Not effective on organic soils.
	simazine (Princep)	2 to 4	Late fall or in spring when weed growth starts.	Annuals	Both fall and spring applications may be needed where weed problems are especially severe.
	dichlobenil (Casoron)	4 to 6	November	Quackgrass and annuals	For quackgrass control use granular material in the fall.
Non-Bearing Blueberries	Amitrole-T (Cytrol)	2	In spring after grass growth starts.	Quackgrass	Combine with simazine or diuron for control of all weeds.
Brambles	diuron (Karmex)	2	Before weeds appear in spring.	Annuals	Apply before brambles leaf out.
	simazine (Princep)	2 to 4	Before weeds appear in spring.	Annuals	Apply before brambles leaf out.
	dichlobenil (Casoron)	4	November	Quackgrass and annuals	For quackgrass suppression, use granular formulation in the fall.
Strawberries (New and Established Plantings)	D CPA (Dacthal) and Sesone	8 plus 2	Apply 7 to 10 days after transplanting or in the spring on established plants. Repeat applications in summer and fall if needed.	Annuals	Apply to moist soil before weeds appear. Don't spray within 7 days of harvest. Late summer and fall applications are effective in controlling winter annuals. D CPA is particularly effective on grasses on light sandy soils.
	diphenamid (Dymid, Enide)	4 to 6	Apply 7 to 10 days after transplanting or in spring or fall on established fields.	Annuals, especially grasses.	Do not use on new plantings on extremely sandy soils. Irrigate after application, if possible. Do not apply within 60 days of harvest.
	chloroxuron (Tenoran)	4	Apply to emerged weeds in fall or early spring.	Annual broadleaved weeds	Particularly effective on broad leaved weeds less than one inch high. May be used with D CPA or diphenamid where grasses are also a problem. Do not apply within 60 days of harvest.
Strawberries (established planting)	2,4-D (amine form only)	1	Apply immediately after harvest.	Annuals	Renovate immediately after harvest and then spray with 2,4-D (amine formulation).

### Tree Fruits

Plant	Chemical	Pounds per acre actually sprayed*	Time of application (In relation to crops)	Weeds controlled	Remarks and limitations
First year plantings (apples, pears, peaches, cherries, plums)	Paraquat	1	Before or after planting trees.	Annuals and knockdown of perennials	Spray <sup>1</sup> in a band 4-6 ft. wide before or after planting trees. Do not spray foliage of trees; 2-3 applications are needed for season-long control.

\* Unless otherwise specified.



Plant	Chemical	Pounds per acre actually sprayed*	Time of application (In relation to crops)	Weeds controlled	Remarks and limitations
Non-bearing trees (A non-bearing tree is one from which no fruit is removed for commercial sale.)	simazine (Princep) plus Amitrole-T (Cytrol)	2 to 4 2	In late April or early May when quackgrass has 2 to 6 inches of new growth.	Annuals and quackgrass	Trees must be established one year.
	simazine (Princep) plus Paraquat	2 to 4 ½	Late April or early May.	Annuals and suppression of perennials	Same as above. Use lower rate of simazine on sandy soils.
	dichlobenil (Casoron)	6	November	Quackgrass and annuals	For quackgrass control use granular material in the fall.
Bearing apples and Pears	simazine (Princep) plus Amitrole-T (Cytrol)	4 2	Before bloom when quackgrass has 2 to 6 inches of new growth.	Annuals and quackgrass	
	diuron (Karmex) plus Amitrole-T (Cytrol)	3.2 2	Same as above	Same as above	
	simazine (Princep)	4	In spring before weeds emerge.	Annuals	Year to year repeat applications will kill quackgrass.
	diuron (Karmex)	3.2	Same as above.	Annuals	
	dichlobenil (Casoron)	6	November	Quackgrass and annuals	For quackgrass control use granular material in the fall.
	dalapon (Dowpon)	10	When quackgrass has 4-6 inches of new growth.	Grass suppression.	Will suppress quackgrass for 1 to 2 months.
	AMS (Ammate-X)	60 lb./100 gal.	When poison ivy is in full leaf.	Poison ivy	Apply as a spot spray in infested areas, wetting the poison ivy foliage thoroughly. Do not allow spray drift to contact tree foliage and avoid wetting tree trunks.
	2,4-D (acid or amine only)	1	When weeds are in full leaf.	Perennial broadleaved weeds	Use these low volatile forms only. Spray only when there is no danger of drift onto foliage.
Apples and Peaches	terbacil (Sinbar)	1½ to 3	Late April or early May	Annuals and Quackgrass	Trees must be established 3 yrs. Use lowest rate on sandy soils. On sand pockets or knobs, do not apply any chemical.
Bearing sour cherries, sweet cherries, peaches, and plums	simazine (Princep) plus Paraquat	2 to 4 ½	Before growth starts in the spring.	Annuals and quackgrass suppression	Year to year repeat applications will suppress quackgrass. Do not spray in very sandy or gravelly areas in the orchard. Use low rate of simazine on plums.
	dichlobenil (Casoron)	6	November.	Quackgrass and annuals	For quackgrass control use granular material in the fall.

\* Unless otherwise specified.



## Flowers and Ornamentals

Plant	Chemical	Pounds per acre actually sprayed*	Time of application (In relation to crops)	Weeds controlled	Remarks and limitations
Gladiolus	DNBP (Premerge, Sinox PE)	4 to 8	Before emergence.	Annuals	Use 4-pound rate on cornels. Do not use near other annual plants.
	DNBP (granular)	4 to 8	Pre-spike.	Annuals	Must use granular form and cultivate before application.
	diuron (Karmex)	1	After planting.	Annuals	Spray on weed free soil. Use lower rate on light soil.
Peonies	simazine (Princep)	2 to 3	After planting. Fall or spring before growth.	Annuals and Winter Annuals	Do not apply after emergence.
	diuron (Karmex)	1 to 2	Fall or spring before growth.	Annuals and Winter Annuals	Do not apply after emergence.
Roses	simazine (Princep)	2 to 3	Fall or spring.	Annuals and Winter Annuals	Apply to weed free soil before growth starts.
	simazine (Princep) (granular)	4 to 6	Fall or spring.	Annuals and Winter Annuals	Apply to weed free soil before growth starts.
Tulips, daffodils	DNBP (Premerge, Sinox PE)	4 to 6	Fall.	Annuals and Winter Annuals	
	simazine (Princep)	1 to 2	Fall or spring before emergence.	Annuals and Winter Annuals	Do not apply after emergence.
Lining-out stock (evergreens and deciduous)	trifluralin (Treflan)	½ to 1	Before transplanting.	Annuals	Work into soil 3-4 inches immediately after spraying. Consult label for species not to spray.
	simazine (Princep)	1 to 2	After transplanting.	Annuals	Consult label for species not to spray. Apply to weed free soil 2-4 weeks after transplanting.
	dichlobenil (Casoron)	3 to 5	After transplanting.	Annuals	Band spray if cover crop is desired. Do not apply until 4 weeks after transplanting.
Established stock (evergreens and deciduous)	simazine (Princep)	2 to 6	In spring when there is 3 inches of new grass growth or any time planting is free of weeds.	Annuals and Quackgrass	Check label for species not to spray. Apply higher rate on heavier soils and where quackgrass is severe.
	dichlobenil (Casoron)	3 to 5	Spring or fall.	Annuals and Quackgrass	Check label for species not to spray. Use granular formulation in fall for quackgrass control.
	diphenamid (Dymid, Enide)	4 to 6	Fall.	Winter and spring annuals	Apply before weeds emerge. Consult label for species not to spray.
Shade Trees	simazine (Princep) plus Amitrole-T (Cytrol)	2 to 4 plus 1 to 2	In spring when there is 3 inches of new quackgrass growth.	Annuals and Quackgrass and other perennials	Direct the nozzles so that no spray strikes the tree foliage. Spray a band and cultivate between rows.
	simazine (Princep) plus Paraquat	2 to 4 plus ½	Before weeds are 6 inches high.	Annuals and knockdown of perennials	Direct the nozzles so that no spray strikes the tree foliage.
Transplants, Ivy and Ground Covers	simazine (Princep) (granular)	4	1 week after planting.	Annuals	Check label for species not to treat. Use accurate granular spreader.
	dichlobenil (Casoron) (granular)	3 to 5	Immediately after planting.	Annuals	Same as above.

\* Unless otherwise specified.



## Container-Grown Plants

Chemical	Pounds per acre actually sprayed*	Time of application (In relation to crops)	Weeds controlled	Remarks and limitations
dichlobenil (Casoron)	3 to 5	After planting.	} Annuals	Check label for species that should not be treated. Granular formulation recommended.
simazine (Princep)	2 to 4	Same as above.		
trifluralin (Treflan)	2 to 4	Same as above.		

## Potting Soil and Transplant Beds

Methyl bromide (MC-33)	1 to 2 lb. per 100 sq. feet	14 to 21 days before using.	All weeds	Follow label instructions carefully.
Vapam (VPM)	1 to 2 quarts per 100 sq. ft.	Several weeks be- fore using.	All weeds	Follow label instructions carefully.
Mylone	1 to 2 lb. per 100 sq. ft.	Several weeks be- fore using.	All weeds	Read the label. Follow label instructions carefully.

## Quackgrass Control Before Growing Crop

Amitrole-T (Cyrol)	2 to 4	Before August, pre- ferably in spring.	Quackgrass	Must wait 8 months before plant- ing food crops except corn, wait 10 days before planting corn. Ad- dition of a crop oil at 2 gal./40 gal. of spray will increase effec- tiveness. Plow or work soil 10-14 days after spraying.
dalapon (Dowpon)	10 to 20	Sept. to Nov. 15.	Quackgrass	Apply when grass is at least 4 inches high. If quackgrass is low in vigor, apply nitrogen to stim- ulate growth 2 weeks before spraying.
dalapon (Dowpon)	10	Spring when grass is at least 4 inches high.	Quackgrass	Wait at least five weeks before planting. Do not use in the spring before planting strawberries.

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

Amitrole (Aminotriazol, Weedazol)	2 to 4	Spring or summer during active growth.		Apply when weeds are in full leaf but before flowers appear. Use lower rate on poison ivy.
AMS (Ammate-X)	60 lb./100 gal.	When poison ivy is in full leaf.	Poison ivy	Thoroughly wet the foliage of poison ivy in infested areas. Avoid drift onto crop plants.

\* Unless otherwise specified.



