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1987 Weed Control Guide for Vegetable Crops



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1987 Weed Control Guide for Vegetable Crops

By Bernard H. Zandstra and Alan R. Putnam, Department of Horticulture

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Other Extension Publications with Information on Weed Control

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E-154 <i>Fruit Pesticide Handbook</i> \$1.85	E-1215 <i>A Quick Test for Atrazine Carryover</i> Single copy free to Michigan residents.	E-1858 <i>Using Spray Additives with Herbicides</i> \$0.40
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Basic Principles of Weed Control with Herbicides

Weeds reduce crop yields by competing with crops for water, nutrients, and light. Some weeds release toxins that inhibit crop growth, and others may harbor insects, diseases, or nematodes that attack crops. Weeds often interfere with harvesting operations, and sometimes contamination with weed seeds or other plant parts may render a crop unfit for market. Profitable crop production depends on effective weed control.

Effective weed control in vegetable crops requires the use of a combination of management techniques, cultural methods, and herbicides. Growing the same crop year after year and using the same weed control techniques will encourage the development of problem weeds. Rotation of crops, herbicides, and tillage methods will help reduce this problem. Perennial weeds, such as quackgrass, yellow nutsedge, or Canada thistle, should be killed with herbicides the year before planting vegetable crops. Small infestations of perennial weeds should be eradicated immediately with spot sprays. Whenever possible, weeds should be prevented from producing seeds to help reduce infestation in future years.

Types of herbicides: PREEMERGENCE herbicides kill germinating weed seedlings in the soil. They may be applied and mixed into the soil prior to planting (pre-plant incorporated) or applied to the soil surface after planting but before weeds emerge.

Most soil-applied herbicides require soil moisture to be effective. Best weed control will be obtained when these herbicides are carried into the soil by rainfall or sprinkler irrigation. In general, lower rates of preemergence herbicides are used on sandy (coarse-textured) soils than on clays or mucks (fine-textured) soils to obtain the same level of control.

POSTEMERGENCE herbicides are applied to the foliage of plants. They may burn off the tops of weeds (contact herbicides) or they may be translocated throughout the plants

and kill the growing points (translocated or systemic herbicides). Translocated postemergence herbicides are effective against perennial weeds.

Registration of Herbicides

Recommendations in this bulletin are based on field trials conducted in Michigan and other North Central states over a period of several years. Herbicides must be registered with the U.S. Environmental Protection Agency and the Michigan Department of Agriculture before they can be used legally in Michigan. Use of a herbicide in a manner not consistent with the product label can lead to fines or condemnation of the crop.

The pesticide label is a legal document on pesticide use. Read it carefully and follow all instructions. Do not mix and apply together pesticides if it is forbidden on any of the labels. Mixes recommended in this bulletin are legitimate.

The Use of Herbicides

Equipment

A weed control sprayer should be made of non-corrosive materials, easy to clean, and have the seven following features.

1. **A tank** with a volume of 100 to 300 gallons to reduce filling and mixing operations.

2. **A pump** with a capacity of at least 10 gallons per minute and pressure up to 100 pounds per square inch (PSI).

3. **An agitation system** — The bypass from the pressure control is a good source of agitation. Direct the bypass line into the bottom of the tank.

4. **Screens** — There should be 50 mesh screens in the intake line and at each nozzle.

5. **Pressure gauge** — The pressure gauge should be able to measure accurately pressures up to 100 PSI.

6. **Adjustable spray boom** — boom should be adjustable from 18 to 36 inches above the ground.

7. **Nozzles** — Flat fan nozzles with 73 to 95° angles are best suited for most weed control work. Nozzle volume can vary from 1 to 10 gallons per minute, depending on the application; 8002 or 8004 are good gen-

eral-use nozzles.

Sprayer Calibration

One of the most important factors in effective weed control is accurate calibration of the equipment. The following steps can be used as a guide to calibrate a ground sprayer.

1. **Determine** the desired application volume of carrier (usually water) in gallons per acre (GPA). Ten to 30 GPA at 30 to 40 PSI is sufficient for most weed control applications.

2. **Adjust** the boom height so that the spray overlaps about 30% at the ground (or other surface to be sprayed). With 80° nozzles, this places the nozzles about 20 inches apart on the boom and 20 inches above the sprayed surface. Check each nozzle at the recommended pressure for output. Replace any defective nozzles and screens.

3. **Fill** the spray tank and system with water.

4. **Spray** a measurable area in the field, at a fixed speed and at the desired pressure. Spray at least 20% of the total tank volume and at least 2 acres of area.

5. **Measure** the volume of water (in gallons) needed to refill the tank.

6. **Determine** the area (in acres) that was test sprayed using the following formula: length of area sprayed (in feet) × boom width (in feet) ÷ 43,560 = acres sprayed.

7. **Divide** the volume sprayed by the area sprayed to obtain the actual output of the sprayer in gallons per acre.

8. **Make adjustments** to tractor speed, pressure, or nozzle size and repeat steps 3 to 7 to change application rate.

9. **Calculate** the amount of formulated pesticide needed to treat the desired area.

Band application — The expense of herbicide application can be reduced by spraying bands over the crop rows rather than the whole field (broadcast application). When spraying in bands, adjust the amount of herbicide for the area actually sprayed, rather than the total acreage. The amount of chemical per gallon of carrier will remain the same. Use even spray nozzles (e.g., 8004E) rather than tapered spray nozzles (e.g., 8004) for band

applications.

Pesticide Use Precautions

Handle herbicides, like all pesticides, with extreme caution and respect. There are three good reasons for using pesticides safely and wisely:

1. To protect yourself and others from poisoning.
2. To prevent harming and polluting the environment.
3. To prevent crop injury.

Pesticide accidents occur most often during mixing and tank filling operations. Although accidental ingestion of chemicals is considered to be the greatest health hazard, there is also great danger of poisoning when pesticides contact skin or eyes and when the dust or vapors are inhaled.

Protective clothing should be worn at all times during the handling and application of pesticides and the cleaning of spray equipment. Garments should include full coverage clothing, chemical resistant gloves and boots, splashguard goggles, and an MSHA/NIOSH approved respirator with a carbon absorbent cartridge appropriate for the chemical being used. Heed all the precautionary statements on the product label and cover-up to protect yourself.

Using more chemical than recommended on the label is illegal and can result in the carryover of residues in the soil. Pesticides may also leach into surface or ground water. Herbicide residues can also damage sensitive crops the following year. Some long-residual herbicides last more than one year in the soil; keep this in mind when planning a crop rotation program. The herbicides recommended in this bulletin should dissipate in one growing season unless otherwise noted. Check the product labels for precautions on rotational crops.

Herbicides offer an effective and economical means of weed control. Crop plants are seldom completely resistant to herbicide injury, but have some level of tolerance. The ability of a herbicide to kill weeds without harming crop plants (selectivity) may be partially lost under unfavorable weather conditions. Herbicide drift to non-target crops often results in crop injury. Do not spray under windy conditions.

Cleaning Pesticide Sprayers

It is important to clean weed control

sprayers after use, especially if they are used for more than one crop and for application of insecticides and fungicides. The need for extensive cleaning can be minimized if one sprayer is dedicated to herbicide application only.

Do not use a sprayer to apply insecticides or fungicides if the sprayer has been used to apply 2,4-D type herbicides.

When cleaning a sprayer used only for herbicide application, only water rinsing is necessary. Rinse the whole sprayer with water, inside and out, including boom, hoses, and nozzles. Partially fill the spray tank with water and keep the pump running so that the water is circulated throughout the entire system. Spray the water out through the nozzles. Apply the rinsate to cropland according to recommended rates. Repeat process when changing herbicides and at the end of each day.

Clean sprayers completely when changing from herbicides to other pesticides. Add 1 gallon of ammonia to 100 gallons of water. Pump it through the system. Leave the cleaning solution in the sprayer system for at least two hours and then pump it out through the nozzles. Do not apply the washing solution to crops. Rinse the system with water after draining the rinsate. Do not leave pesticide solution or cleaning solution in the tank overnight.

Pesticide Storage and Disposal

Reduce the need for and the hazards of pesticide storage and disposal by buying only what you will use during a growing season and mixing only what you need for each application. In addition, try to apply leftovers, water-rinsates, etc., to the appropriate crop rather than storing or disposing of it. Long-term storage may reduce the effectiveness and/or increase the toxicity of herbicides.

If storage is necessary, choose a suitable environment that is dry, cool, and out of direct sunlight. Avoid extreme heat or cold. Place in a location that is not accessible to children and animals and that is not near food, feed, or water. Keep pesticides under lock and key when not in use. Store pesticides in their original containers. Store herbicides separately from insecticides and fungicides to prevent possible interaction. Check the product label for specific storage recommendations. Do

not store protective equipment with any pesticides.

Always triple rinse pesticide containers immediately after emptying. Then, crush or puncture rinsed containers to prevent reuse. Dispose of rinsed containers in a licensed sanitary landfill or recycle through a scrap metal dealer. Consult the phone directory for scrap metal dealers or contact your county Cooperative Extension Service office for the nearest landfills. Also, the product label will have additional, important information on disposal. Consult it.

Key to Abbreviations in this publication

ae = acid equivalent
ai = active ingredient
DF = dry flowable
DS = dry soluble
E or EC = emulsifiable concentrate
ES = emulsifiable solution
F or FL = flowable
G = granular
L = liquid
S or SP = soluble powder
W or WP = wettable powder

WEED CONTROL RECOMMENDATIONS FOR VEGETABLE CROPS

Crop	Weed Problem	Chemical	Pounds Active Ingredient (AI)/Acre	Amount of Commercial Formulation/Acre	Remarks and Limitations
ASPARAGUS (Seedlings or newly planted crowns)	Germinating or emerged annuals	linuron (LOROX 4L)	1/2 - 1 1/2	1/2 - 1 1/2 qt	Apply before emergence and after fern is 6 inches high. Plant seed at least 1 inch deep; use 1 lb rate postemergence. Do not exceed 2 lb ai/acre/year. Does not control crabgrass postemergence. Pre-emergence weed control will be reduced in soils with organic matter greater than 5%.
	Germinating or emerged annuals	chloramben (AMIBEN 75DS)	2 - 3	2 1/2 - 4 lb	Apply before asparagus and weeds emerge. Use lowest rate on sandy soils. If soil is dry, irrigate after application.
ASPARAGUS (Seedlings)	Germinating or emerged annuals	terbacil (SINBAR 80WP)	0.8 - 1.6	1 - 2 lb	Spray 300 lb/acre activated charcoal in a 1 inch band over rows at planting. Then apply Sinbar. One-half inch moisture within 2 weeks of application will improve control. Do not use on soils with less than 1% organic matter. Do not plant any crop other than asparagus within 2 years of application. Use lowest rate on sand and sandy loam soils.
	Emerged annuals	paraquat (PARAQUAT PLUS) (2 lb/gal)	1/2	1 qt	Apply after weeds emerge, but before asparagus emerges. For maximum knockdown, add a surfactant at 1 qt/100 gal of spray solution.
ASPARAGUS (Established one year or more)	Germinating or emerged annuals	diuron (KARMEX 80WP)	2 - 3	2 1/2 - 4 lb	Apply after tillage or chopping fern in the spring and again after the harvest season, if necessary. Apply before weeds emerge. Total dosage should not exceed 4.8 lb ai/acre/year. 6-8 weeks residual activity.
	Germinating or emerged annuals	simazine (PRINCEP 80WP)	2 - 4	2 1/2 - 5 lb	Apply after tillage or chopping fern in the spring and again after the harvest season, if necessary. Apply before weeds emerge. Total dosage should not exceed 4 lb ai/acre/year. 6-8 weeks residual activity.
Germinating or emerged annuals	Germinating or emerged annuals	napropamide (DEVIRINOL 50WP)	4	8 lb	Apply after emergence in the spring and incorporate 1 to 2 inches. Gives good grass control. 4-6 weeks residual activity.
	Germinating or emerged annuals	trifluralin (TREFLAN 4EC)	1 - 1 1/2	1 - 1 1/2 qt	Use higher rate on heavier soils. Apply and incorporate 1-2 inches early in the spring when spears are at least 4 inches below the soil surface. Gives good grass control. 4-6 weeks residual activity.
Germinating or emerged annuals	Germinating or emerged annuals	linuron (LOROX 4L)	1/2 - 2	1/2 - 2 qt	Apply before or after crop emergence. Use high rate pre-emergence. Make 1 to 4 applications of 1/2 to 1 lb ai/acre post-emergence. Do not apply within 1 day of harvest. Do not exceed 4 lb ai/acre/year. Does not control crabgrass postemergence. Pre-emergence control will be reduced in soils with organic matter greater than 5%. 4 weeks residual activity.

Crop	Weed Problem	Chemical	Pounds Active Ingredient (AI)/Acre	Amount of Commercial Formulation/Acre	Remarks and Limitations
	Germinating annuals, Sandbur	metribuzin (SENCOR 4F, LEXONE 4F)	1 - 2	1 - 2 qt	Apply after tillage or chopping fern in the spring and again after the harvest season, if necessary. Apply before weeds emerge. Total dosage may not exceed 2 lb ai/acre/year. Two applications are necessary for good season-long sandbur control. 6-8 weeks residual activity.
	Germinating annuals, quackgrass	terbacil (SINBAR 80WP)	1.2 - 2.4	1½ - 3 lb	Apply prior to spear emergence or after a clean cutting. Do not use on soils with less than 1% organic matter. Do not apply to diseased plants. Do not apply more than 2.4 lb ai/acre/year. Do not apply more than 2 applications per year. Do not plant to any crop other than asparagus within 2 years of application. Use lowest rate on sandy and sandy-loam soils. 8-12 weeks residual activity.
	Emerged annuals	paraquat (PARAQUAT PLUS)	½ - 1	1 - 2 qt	Apply before crop emergence or after the last harvest. Include a non-ionic surfactant. 6 day harvest restriction.
	Quackgrass	glyphosate (ROUNDUP) (3 lb/gal)	1½	2 qt	Apply immediately after the last harvest when all spears are snapped off. Do not let herbicide contact fern. Roundup is most effective when applied to actively growing quackgrass just before seed stalks appear.
		dalaion (DOWPON 85% salt)	8.5	10 lb	Apply before, during, or at the end of the harvest season when quackgrass is 4-6 inches high, and again 3-4 weeks later. During the harvest season, spray immediately after a harvest. Do not spray fern.
	Emerged perennials, mareetail, volunteer asparagus	glyphosate (ROUNDUP) (3 lb/gal) 2,4-D Alkanolamine salts (FORMULA 40) (4 lb/gal)	1½ - 3 2	2 - 4 qt 2 qt	Apply immediately after the last harvest when all spears are snapped off. Do not let herbicide contact emerged spears or fern. Include ½ qt non-ionic surfactant per acre. Spot spray weeds that escape first application. Apply before, during, or after the harvest season when weeds are growing rapidly. During the harvest season, spray immediately after a harvest to minimize injury to asparagus. When spraying after the harvest season, use drop nozzles to avoid spraying fern.
BEANS (snap, lima)	Emerged annuals	paraquat (PARAQUAT PLUS)	½ - 1	1 - 2 qt	Apply before or after seeding but before crop emergence. Include a non-ionic surfactant.
	Quackgrass	glyphosate (ROUNDUP) (3 lb/gal)	1½	2 qt	Apply to 8-10 inch tall quackgrass in the fall or spring prior to planting. Allow at least 5 days before plowing.
	Germinating broadleaves and some grasses	chloramben (AMIBEN 75DS)	2 - 3	2½ - 4 lb	Apply before emergence. If possible, apply when soil is moist. Use high rate on heavy, high-organic matter soils, for black nightshade control. Do not use on very light, sandy soils.
	Germinating grasses and some broadleaves	EPTC (EPTAM 7E)	3	2 qt	Apply before planting. Incorporate 2-4 inches into soil immediately after spraying. Gives good nutsedge, quackgrass, and annual grass suppression. Do not use on lima beans.

	metolachlor (DUAL 8E)	1½ - 3	¾ - 1½ qt	Use lower rate on sandy soils with less than 3% organic matter. Incorporate 1 to 2 inches before planting, or apply preemergence after planting.
	trifluralin (TREFLAN 4EC)	½ - ¾	½ - ¾ qt	Apply before planting. Incorporate into soil 2 to 3 inches soon after spraying. Use lowest rate on sandy soils. Does not control ragweed.
	bentazon (BASAGRAN) (4 lb/gal)	¾ - 1	¾ - 1 qt	Apply after beans have more than 1 expanded trifoliolate leaf to prevent crop injury. Two applications are needed for nutsedge and Canada thistle control. Do not apply more than 2 lb ai/acre/year.
BEETS (Red)	pyrazon (PYRAMIN RB 75WP)	3 - 4	4 - 5 lb	Apply from planting up until weeds are 1 inch high. On muck soils, better control is obtained by spraying small weeds after beets have two true leaves. Add crop oil at 1 gal/40 gal of spray or a surfactant, such as X-77 at 1 pt/50 gal of spray.
	cycloate (RO-NEET 6E)	3 - 4	2 - 3 qt	Apply before planting. Incorporate 2-3 inches after spraying. Use lowest rate on sandy soils. Not effective on muck soils.
	diethyl-ethyl/ (ANTOR 4ES)	3 - 6	3 - 6 qt	Apply and incorporate 1-2 inches before seeding, or apply pre-emergence after seeding to moist soil. Needs rain or irrigation for activation. Use only on beets for processing.
	phenmedipham (SPIN-AID 1.3 EC)	1	3 qt	Apply after beets have 4 true leaves. Use no more than 22 gal spray solution per acre. Do not apply if beets are under any type of stress. CHECK LABEL FOR WEEDS CONTROLLED AND PRECAUTIONS. Does not control redroot pigweed. 60 day harvest restriction.
	glyphosate (ROUNDUP) (3 lb/gal)	1½ - 2	2 - 3 qt	Apply to emerged perennials before planting in the spring or after harvest in the fall. Check label for best time of year, stage of growth, and rate for each problem perennial weed.
BROCCOLI, BRUSSELS SPROUTS, CABBAGE, CAULIFLOWER (Seeded or transplanted)	paraquat (PARAQUAT PLUS)	½ - 1	1 - 2 qt	Apply before transplanting or before or after seeding, but before crop emergence. Include a non-ionic surfactant.
	trifluralin (TREFLAN 4EC)	½ - ¾	½ - ¾ qt	Apply before seeding or transplanting. Incorporate 2-3 inches soon after spraying. Use lowest rate on sandy soils and highest rate on soils high in clay or organic matter. Not effective on muck soils.
	napropamide (DEVIRINOL 50WP)	1 - 2	2 - 4 lb	Apply before seeding or transplanting and incorporate 1-2 inches. May be applied after planting. Irrigate within 24 hours and soak soil 2-4 inches.
	DCPA (DACTHAL 75WP)	8 - 10	10 - 13 lb	Apply after seeding or transplanting but before weeds germinate. Not effective on muck soils.
	glyphosate (ROUNDUP) (3 lb/gal)	1½ - 2	2 - 3 qt	Apply to emerged perennials before planting in the spring or after harvest in the fall. Check label for best time of year, stage of growth, and rate for each problem perennial weed.
CARROTS	linuron (LOROX 4L)	½ - 1½	½ - 1½ qt	Apply before emergence and after carrots are 3-4 inches tall. Use higher rate on weeds more than 2 inches tall. Do not apply over carrots when temperature exceeds 85° F and do not apply at pressures greater than 40 psi. Do not mix with other pesticides or wetting agents. Do not apply within 2 days of an application of stoddard solvent. Do not exceed 2 lb ai/acre/year.

Crop	Weed Problem	Chemical	Pounds Active Ingredient (AI)/Acre	Amount of Commercial Formulation/Acre	Remarks and Limitations
	Selected germinating annuals	chlorpropham (FURLOE-CHLORO IPC 4E)	4	4 qt	Apply before carrots emerge. Provides weed control for 3-4 weeks on muck soil. Extremely effective on chickweed, smartweed, and field dodder.
	Emerged annuals	stoddard solvent (several trade names)	40 - 60 gal		Apply after carrots have 2 true leaves. Do not spray within 42 days of harvest. Do not apply within 14 days of applying Lorox.
	Perennials	glyphosate (ROUNDUP) (3 lb/gal)	1 1/2 - 2	2 - 3 qt	Apply to emerged perennials before planting in the spring or after harvest in the fall. Check label for best time of year, stage of growth, and rate for each problem perennial weed.
CARROTS (Mineral soil)	Germinating grasses and some broadleaves	trifluralin (TREFLAN 4EC)	1/2 - 1	1/2 - 1 qt	Apply before planting. Incorporate 2-3 inches soon after spraying. Use lowest rate on sandy soils. Does not control ragweed.
CELERY (Transplanted)	Germinating or emerged annuals	prometryn (CAPAROL 4L) linuron (LOROX 4L)	1 - 2 1	1 - 2 qt 1 qt	Make 1 application 2-6 weeks after transplanting but before weeds are 2 inches tall. Do not exceed 2 lb ai/acre/year. Apply after transplanting but before weeds are 2 inches tall. Do not exceed 40 psi pressure. Do not apply when temperatures exceed 85° F and do not mix with wetting agents or other pesticides.
CELERY (Outdoor seedbeds)	Emerged annuals	stoddard solvent (several trade names)	50 - 60 gal		Apply after celery has formed true leaves.
CUCUMBERS (seeded)	Emerged annuals	paraquat (PARAQUAT PLUS)	1/2 - 1	1 - 2 qt	Apply before or after seeding but before crop emergence. Include a non-ionic surfactant.
	Germinating broadleaves and grasses	naptalam (ALANAP) (2 lb/gal) plus bensulide (PREFAR 4E)	3 - 4 plus 4 - 6	6 - 8 qt plus 4 - 6 qt	Apply after planting or in a split application. With irrigation, apply the two chemicals in a tank mix and irrigate immediately. With no irrigation, apply bensulide prior to planting and incorporate 2-3 inches. Apply naptalam to surface after planting. Use the lowest rates on sandy soils. A second application of naptalam may be made a month after planting before cucumbers vine out. It will extend pre-emergence control and give some postemergence control of emerged broadleaves.
	Germinating nightshade, ragweed, smartweed	chloramben (AMIBEN 75DS)	2 - 3	2 1/2 - 4 lb	Use only with a vermiculite anticrustant and activated carbon seed protection system. After seeding with the anticrustant, broadcast chloramben in 10 - 40 gal water per acre. Some weeds will germinate in the row.
CUCUMBERS (Transplanted)	Germinating broadleaves	naptalam (ALANAP) (2 lb/gal)	4	8 qt	Apply before or after transplanting but before weeds emerge. Irrigate after application if soil is dry. Apply with bensulide before planting when grasses are a problem.
	Germinating grasses	bensulide (PREFAR 4E)	6	6 qt	Apply before transplanting. Irrigate or incorporate into top 2 inches of soil.

DILL	Emerged annuals	stoddard solvent (several trade names)	40 - 60 gallons	Apply after 2 true leaves are formed.
EGGPLANT	Germinating annuals	DCPA (DACTHAL 75WP)	8	11 lb
		napropamide (DEVIRINOL 50WP)	1 - 2	2 - 4 lb
ENDIVE, ESCAROLE	Germinating annuals, quack-grass	pronamide (KERB 50WP)	1 - 1½	2 - 3 lb
HORSERADISH	Germinating annuals	DCPA (DACTHAL 75WP)	8 - 10	11 - 13 lb
	Perennials	glyphosate (ROUNDUP) (3 lb/gal)	1½ - 2	2 - 3 qt
LETTUCE	Germinating annuals, quack-grass	pronamide (KERB 50WP)	1 - 2	2 - 4 lb
	Germinating annuals, especially grasses	benfin (BALAN 1.5LC)	1 - 1½	3 - 4 qt
	Perennials	glyphosate (ROUNDUP) (3 lb/gal)	1½ - 2	2 - 3 qt
MINT	Germinating annuals	terbacil (SINBAR 80WP)	0.4 - 0.8	½ - 1 lb
		oryzalin (SURFLAN AS) (4 lb/gal)	1 - 1½	1 - 1½ qt
	Emerged broadleaves	bentazon (BASAGRAN) (4 lb/gal)	1	1 qt
MUSKMELONS (Transplanted)	Emerged annuals	paraquat (PARAQUAT PLUS)	½ - 1	1 - 2 qt
	Germinating broadleaves	naptalam (ALANAP) (2 lb/gal)	4	8 qt
	Germinating grasses	bensulide (PREFAR 4E)	6	6 qt

Crop	Weed Problem	Chemical	Pounds Active Ingredient (AI)/Acre	Amount of Commercial Formulation/Acre	Remarks and Limitations
COLLARDS, KALE, MUSTARD, TURNIP GREENS	Germinating annuals	DCPA (DACTHAL 75WP)	8 - 10	11 - 13 lb	Apply after seeding but before weeds emerge. Not effective on muck soils.
		trifluralin (TREFLAN 4EC)	1/2 - 3/4	1/2 - 3/4 qt	Apply before planting. Incorporate 2-3 inches into soil soon after spraying. Use lowest rate on sandy soils. Not effective on muck soils.
OKRA (Seeded or transplanted)	Perennials	glyphosate (ROUNDUP) (3 lb/gal)	1 1/2 - 2	2 - 3 qt	Apply to emerged perennials before planting in the spring or after harvest in the fall. Check label for best time of year, stage of growth, and rate for each problem perennial weed.
	Germinating annuals	metolachlor (DUAL 8E)	1 1/2 - 3	3/4 - 1 1/2 qt	May be preplant incorporated or applied preemergence.
ONIONS (Seeded or sets)	Germinating annuals	trifluralin (TREFLAN 4EC)	1/2 - 1	1/2 - 1 qt	Apply and incorporate before planting.
		diphenamid (ENIDE 90W)	3 - 5	3 1/2 - 5 1/2 lb	Apply after seeding. Use higher rate on heavier soils. May reduce stands of fall seeded small grains.
ONIONS (Seeded or sets)	Germinating annuals	chlorpropham (FURLOE- CHLORO IPC 4E)	4 - 6	4 - 6 qt	Apply after planting until loop stage and again after 2 full true-leaf stage. Apply before or just as weeds emerge. Do not use on soils with less than 4% organic matter. Good on purslane, chickweed, smartweed. 30-day harvest restriction.
	Emerged broadleaves	oxyfluorfen (GOAL 1.6E)	1/16 - 1/8	5 - 10 fl oz	Apply as a broadcast spray in 20-40 gal water per acre. Apply after onions have at least 2 expanded true leaves. Spray during sunny, warm weather. Do not apply more than 1/2 lb ai (2 1/2 pt) total per acre per year. Do not apply after bulbing begins, or within 60 days of harvest.
ONIONS (Mineral soil)	Perennials	bromoxynil (BROMINAL ME 4)	1/4 - 3/8	8 - 12 fl oz	Use for control of wild mustards, shepherdspurse, and other cruciferous weeds. Follow label precautions carefully to prevent crop injury.
	Germinating annuals	glyphosate (ROUNDUP) (3 lb/gal)	6 - 10	8 - 14 lb	Apply to emerged perennials before planting in the spring or after harvest in the fall. Check label for best time of year, stage of growth, and rate for each problem perennial weed.
ONIONS (transplants)	Germinating annuals	DCPA (DACTHAL 75WP)	0.3 - 0.5	8 - 14 lb	Can be used on seed, sets, or transplants. Apply immediately after planting or after a clean cultivation. Use higher rate on heavier, darker soils.
		oxyfluorfen (GOAL 1.6E)	1 1/2 - 2	3/4 - 1 1/4 qt	Apply within 2 days after transplanting. For post-emergence use, see seeded onions. Do not exceed a total of 1/2 lb/acre/year pre- and post-emergence.
GREEN ONIONS	Germinating annuals	DCPA (DACTHAL 75WP)	6 - 10	8 - 14 lb	Apply immediately after seeding or after a clean cultivation. Use higher rate on heavier soils.

PARSLEY	Emerged annuals	stoddard solvent (several trade names)	40 - 60 gallons		Apply after 2 true leaves form.
PARSNIPS	Germinating annuals	linuron (LOROX 4L)	1 - 2	1 - 2 qt	Apply before parsnips emerge and again after they are 4 inches tall. Apply when weeds are less than 2 inches tall. Do not apply when temperatures exceed 85° F. Do not apply at pressure greater than 40 psi. Do not apply within 2 days of stoddard solvent.
	Emerged annuals	stoddard solvent (several trade names)	40 - 60 gallons		Apply after 2 true leaves form. Do not apply within 14 days of linuron application.
PEAS	Quackgrass	glyphosate (ROUNDUP) (3 lb/gal)	1 1/2	2 qt	Apply to 8-10 inch tall quackgrass in the fall or spring prior to planting. Allow at least 5 days before plowing.
	Germinating grasses and some broadleaves	trifluralin (TREFLAN 4EC)	1/2 - 3/4	1/2 - 3/4 qt	Apply before planting. Incorporate 2-3 inches soon after spraying. Use lower rate on early plantings on sandy soils.
		metolachlor (DUAL 8E)	1 1/2 - 3	3/4 - 1 1/2 qt	Use lower rate on sandy soils with less than 3% organic matter. Apply preemergence only; do not incorporate.
		oryzalin (SURFLAN AS) (4 lb/gal) plus trifluralin (TREFLAN 4EC)	1/2	1/2 qt	Also suppresses common root rot (<i>Aphanomyces euteiches</i>). Follow normal TREFLAN procedures for soil incorporation. May be applied up to 2 weeks before planting.
		propachlor (RAMROD 4L)	3 - 4	3 - 4 qt	Apply before peas emerge. Use lower rate on sandy soils.
	Emerged annuals	paraquat (PARAQUAT PLUS)	1/2 - 1	1 - 2 qt	Apply before or after seeding but before crop emergence. Include a non-ionic surfactant.
	Canada thistle and emerged annuals	MCPB (CAN-TROL, THISTROL) (2 lb/gal)	1/2 - 1	1 - 2 qt	Apply when peas have developed 6-12 nodes. Do not apply later than 3 nodes before pea flowering or yields may be reduced. Do not apply when peas are under stress or when temperatures exceed 90° F.
	Emerged annuals, yellow nutsedge, Canada thistle	bentazon (BASAGRAN) (4 lb/gal)	3/4 - 1	3/4 - 1 qt	Apply after peas have 3 pairs of leaves to prevent injury. Two applications are needed for nutsedge and Canada thistle control. Do not apply more than 2 lb ai/acre/year.
PEAS (Southern)	Germinating annuals	metolachlor (DUAL 8E)	1 1/2 - 3	3/4 - 1 1/2 qt	Use lower rates on sandy soils with less than 3% organic matter. Incorporate 1-2 inches before planting, or apply preemergence after planting.
		trifluralin (TREFLAN 4EC)	1/2 - 1	1/2 - 1 qt	Apply before planting and incorporate 2-3 inches. Use lower rate on sandy soils.
	Emerged annuals, yellow nutsedge, Canada thistle	bentazon (BASAGRAN) (4 lb/gal)	3/4 - 1	3/4 - 1 qt	Apply after peas have 3 pairs of leaves to prevent injury. Two applications are needed for nutsedge and Canada thistle control. Do not apply more than 2 lb ai/acre/year.
PEPPERS (Seeded)	Germinating annuals	diphenamid (ENIDE 90W)	5	5 1/2 lb	Apply before peppers and weeds emerge. Irrigate after application if soil is dry.

Crop	Weed Problem	Chemical	Pounds Active Ingredient (AI)/Acre	Amount of Commercial Formulation/Acre	Remarks and Limitations
PEPPERS (Transplanted)	Germinating annuals	napropamide (DEVIRINOL 50WP)	1 - 2	2 - 4 lb	Apply before planting. Incorporate 1-2 inches. Use lower rate on coarse, sandy soils and higher rate on heavy, clay soils. Carryover the following year may affect sensitive crops.
		diphenamid (ENIDE 90WP)	5	5½ lb	Apply after transplanting but before weeds emerge. Irrigate after application if soil is dry.
		napropamide (DEVIRINOL 50WP)	1 - 2	2 - 4 lb	Apply before planting. Incorporate 1-2 inches. Use lower rate on coarse, sandy soils and higher rate on heavy, clay soils. Carryover the following year may affect sensitive crops.
POTATOES	Quackgrass	trifluralin (TREFLAN 4EC)	½ - 1	½ - 1 qt	Apply before transplanting. Incorporate 2-3 inches soon after application. Use lower rate on sandy soils.
		chloramben (AMIBEN 10G)	2 - 4	20 - 40 lb	Apply 3 to 5 days after transplanting but before weed emergence, or later in the season after a cultivation. Use granular formulation only. Controls ragweed, smartweed, and nightshade. Use lowest rate on sandy soils.
POTATOES	Quackgrass	dalapon (DOWPON M 85% salt)	10	13½ lb	Apply in spring when quackgrass is 4-6 inches tall. Wait 1 week before plowing. Use 30-40 gal water/acre.
		EPTC (EPTAM) (7 lb/gal)	4 - 6	2¾ - 3½ qt	Apply and incorporate immediately to a depth of 2-3 inches. Use higher rate for nutsedge control. May stunt Superior variety. EPTC should be followed by linuron, metribuzin, or dinoseb after weeds emerge but before potatoes emerge.
		metolachlor (DUAL 8E)	1½ - 3	¾ - 1½ qt	Use lower rate on light, sandy soils with less than 3% organic matter. May be incorporated to 3 inches before planting, applied pre-emergence after planting, or incorporated after planting before potatoes emerge. Cool, wet soil conditions after application may delay maturity or reduce yields of early maturing varieties.
POTATOES	Germinating and emerged broadleaves and some grasses	linuron (LOROX 4L)	1	1 qt	Apply to emerged weeds before potatoes emerge. Apply after field leveling.
		metribuzin (SENCOR 4F, LEXONE 4F)	½ - 1	½ - 1 qt	Apply on weeds up to 1 inch high, before potatoes emerge. Use higher rate on muck soils. Apply after field leveling.
POTATOES	Emerged annual broadleaves	metribuzin (SENCOR 4F, LEXONE 4F)	¼	8 fl oz	Apply post-emergence over the top of potatoes. Avoid spraying during the 12-15 inch stage to avoid injury. Do not apply after 3 cool, cloudy days. Do not use on early maturing or red skin varieties. Do not apply within 1 day of other pesticides. Do not apply more than 1 lb at metribuzin/acre/year. May cause injury to sensitive crops the following year. 60 day harvest restriction.
		glyphosate (ROUNDUP) (3 lb/gal)	1½ - 2	2 - 3 qt	Apply to emerged perennials before planting in the spring or after harvest in the fall. Check label for best time of year, stage of growth, and rate for each problem perennial weed.

RHUBARB	Emerging annual weeds	paraquat (PARAQUAT PLUS) (2 lb/gal)	1/2 - 1	1 - 2 qt	For use on dormant rhubarb, use higher rate for heavier weed infestation. Do not exceed 2 applications per season. Gives some suppression of quackgrass.
RUTABAGA, TURNIP	Germinating annuals	DCPA (DACTHAL 75WP)	8	11 lb	Apply before crop and weeds emerge. If soil is dry, irrigate lightly after application.
SPINACH	Germinating annuals	diethyl-ethyl (ANTOR 4ES)	3 - 4	3 - 4 qt	Apply and incorporate 1-2 inches before seeding, or apply pre-emergence after seeding to moist soil. Needs rain or irrigation for activation.
	Germinating broadleaves	chlorpropham (FURLOE-CIPC 4E)	1 - 2	1 - 2 qt	Apply immediately after planting. Use lower rate when temperature is below 60° F.
	Perennials	glyphosate (ROUNDUP) (3 lb/gal)	1 1/2 - 2	2 - 3 qt	Apply to emerged perennials before planting in the spring or after harvest in the fall. Check label for best time of year, stage of growth, and rate for each problem perennial weed.
SQUASH, PUMPKINS	Emerging annuals	paraquat (PARAQUAT PLUS)	1/2 - 1	1 - 2 qt	Apply before or after seeding but before crop emergence. Include a non-ionic surfactant.
	Germinating annuals	chloramben (AMIBEN 75DS)	2	2 1/2 lb	Apply before crop or weeds emerge. If soil is dry, irrigate after application.
		propachlor (RAMROD 4L)	4 - 6	4 - 6 qt	Apply after seeding but before weeds emerge. Use high rate on heavier soils. Use only on pumpkins for processing.
STRAWBERRIES (New and established plantings)	Germinating annuals	diphenamid (ENIDE 90W)	4 - 6	4 1/2 - 6 1/2 lb	Apply about 5 days after planting and before weeds emerge in spring or fall on established fields. Do not use on new plantings on sandy soil. Do not apply within 60 days of harvest. Controls seedling grains if applied prior to mulching.
		DCPA (DACTHAL 75WP)	6 - 8	8 - 11 lb	Apply about 5 days after planting but before weeds emerge in spring on established fields. Particularly effective on sandy soils. Do not apply after first bloom.
		napropamide (DEVIRINOL 50WP)	1 - 2	2 - 4 lb	Apply before weeds emerge in spring, or in fall or following cultivation. May inhibit runner rooting on extremely light, sandy soils. Must be irrigated in or incorporated 2 inches deep prior to planting.
	Germinating and emerged broadleaves	chloroxuron (TENORAN 50WP)	4	8 lb	Apply after transplanting but before weeds are 2 inches tall; apply in fall or spring on established fields. Do not apply within 60 days of harvest. Do not apply more than twice in a season.
	Emerging annuals	paraquat (PARAQUAT PLUS)	1/2	1 qt	Apply as a directed spray, using shields to protect strawberry plants. Do not allow spray to contact strawberry plants. Do not apply within 21 days of harvest.
STRAWBERRIES (Established plantings)	Emerging broadleaves	2,4-D (FORMULA 40) (4 lb/gal)	1	1 qt	Apply after harvest at renovation (after mowing). Do not apply after August 1 or misshapen fruit may be produced the next season.
	Emerging and germinating annuals	terbacil (SINBAR 80WP)	1/4 - 5%	5 - 12 oz	Apply at renovation (after mowing) or in late fall. Use the lowest rate on sandy soils. Do not use on the "Guardian" variety. Check the label for crops that can be planted after strawberries.

Crop	Weed Problem	Chemical	Pounds Active Ingredient (AI)/Acre	Amount of Commercial Formulation/Acre	Remarks and Limitations
SWEET CORN	Germinating broadleaves	atrazine (80WP)	1	1 1/4 lb	Apply after planting but before weeds are 1 inch tall. Observe label warnings on crop rotations.
	Germinating annuals	atrazine (80WP) plus alachlor (LASSO 4EC)	1 plus 2	1 1/4 lb plus 2 qt	Apply before crop or weeds emerge. Observe label warnings on crop rotations.
		cyanazine (BLADEX 4L) plus alachlor (LASSO 4EC) or metolachlor (DUAL 8E)	0.6 - 2 plus 2 - 2 1/2 or 1 - 2 1/2	0.6 - 2 qt plus 2 - 2 1/2 qt or 1/2 - 1 1/4 qt	Apply after planting but before weeds emerge. Use highest rates on soils with 4% or more organic matter. If used at correct rates, there should be no herbicide carryover the following year. Rainfall or irrigation (1/2 inch) after application will improve weed control.
		metolachlor (DUAL 8E)	1 1/2 - 3	3/4 - 1 1/2 qt	Use lower rate on sandy soils with less than 3% organic matter. Incorporate 1-2 inches before planting, or apply preemergence after planting.
	Emerged broadleaves	2,4-D amine salts	1/2		Spray after corn and weeds emerge but before corn is 8 inches tall. Avoid drift onto sensitive crops.
	Quackgrass	atrazine (80WP)	3 - 4	4 - 5 lb	Apply before corn emerges. Do not plant crops other than corn the following year.
		glyphosate (ROUNDUP) (3 lb/gal)	1 1/2	2 qt	Apply to 8-inch quackgrass in the fall or spring before planting. Wait at least 5 days before plowing.
		EPTC (ERADICANE EXTRA 6-E)	6	4 qt	Incorporate immediately after application. Do not use on soils with more than 10% organic matter. Suppresses emergence of quack grass and nutsedge.
	Nutsedge	butylate (SUTAN Plus 6.7E) alachlor (LASSO 4EC) EPTC (ERADICANE 6.7E)	4 3 4	2 1/2 qt 3 qt 2 1/2 qt	Apply before planting. Incorporate 2-3 inches after spraying. Also controls annual grasses. Apply before corn emerges. If soil is dry, shallow incorporation may increase effectiveness. Apply before planting. Incorporate 2-3 inches after spraying. Also controls annual grasses.
	Nutsedge Canada thistle, other broadleaves	bentazon (BASAGRAN) (4 lb/gal)	3/4 - 1	3/4 - 1 qt	Treat nutsedge when 4-6 inches tall and again 10 days later. Apply to broadleaves when they are small and actively growing. Always add 1 qt crop oil concentrate per acre to the spray mix.
SWEET POTATOES	Germinating grasses	diphenamid (ENIDE 90W)	5	5 1/2 lb	Apply after transplanting, but before weeds emerge.

Germinating broadleaves	chloramben (AMIBEN 75DS)	3.6	5 lb	Apply immediately after transplanting.
Perennials	glyphosate (ROUNDUP) (3 lb/gal)	1½ - 2	2 - 3 qt	Apply to emerged perennials before planting in the spring or after harvest in the fall. Check label for best time of year, stage of growth, and rate for each problem perennial weed.
TOMATOES (Seeded)				
Emerged annuals	paraquat (PARAQUAT PLUS)	½ - 1	1 - 2 qt	Apply before or after seeding but before crop emergence. Include a non-ionic surfactant.
Germinating annuals	diphenamid (ENIDE 90W)	5	5½ lb	Apply before tomatoes or weeds emerge. If soil is dry, irrigate after application.
	napropamide (DEVIRINOL 50WP)	1 - 2	2 - 4 lb	Apply before planting. Incorporate 1-2 inches. Use lower rate on coarse, sandy soils and higher rate on heavy, clay soils. Carryover may affect corn, small grains, alfalfa, lettuce, and sugar beets.
Germinating or emerged broadleaves	metribuzin (SENCOR 4F, LEXONE 4F)	¼	8 fl oz	Apply as a directed spray or broadcast after tomatoes have 5-6 leaves. Apply after 3 sunny, warm days. Do not apply within 1 day of application of other pesticides. Do not tank mix with other pesticides. Multiple applications can be made with a minimum of 14 days between applications. Up to 1 lb ai/acre can be applied as a directed spray. Avoid contact with tomato foliage. 7 days harvest restriction. Do not apply more than 1 lb ai/acre/year.
Germinating nightshade, ragweed, smartweed	chloramben (AMIBEN 75DS)	2 - 3	2½ - 4 lb	Use only with a vermiculite anticrustant and activated carbon seed protection system. After seeding with the anticrustant, broadcast chloramben in 10-40 gal water per acre. Some weeds will germinate in the row.
	chloramben (AMIBEN 10G)	3 - 4	30 - 40 lb	Apply after the last cultivation to weed-free soil. Apply when tomato foliage is dry. Use granular formulation only.
Nutsedge	pebulate (TILLAM 6E)	4 - 6	2½ - 4 qt	Apply as a directed spray to clean, cultivated soil and incorporate or irrigate.
TOMATOES (Transplanted)				
Germinating annuals	napropamide (DEVIRINOL 50WP)	1 - 2	2 - 4 lb	Apply before planting. Incorporate 1-2 inches. Use lower rate on coarse, sandy soils and higher rate on heavy, clay soils. Carryover may affect corn, small grains, alfalfa, lettuce, and sugar beets.
	trifluralin (TREFLAN 4EC)	½ - 1	½ - 1 qt	Apply before transplanting. Incorporate 2-3 inches soon after application. Use lowest rate on sandy soils.
	diphenamid (ENIDE 90W)	4 - 6	4½ - 6½ lb	Apply after transplanting and before weeds emerge.
Germinating nightshade, ragweed, smartweed	chloramben (AMIBEN 10G)	3 - 4	30 - 40 lb	Apply 3 to 5 days after transplanting but before weed emergence, or later in the season after a cultivation. Use granular formulations only. Effective on ragweed, smartweed, and nightshade. Use lowest rate on sandy soils.
Germinating and emerged broadleaves	metribuzin (SENCOR 4F, LEXONE 4F)	¼	8 fl oz	Apply after transplants have started growing and before weeds are 2 inches tall. Repeat as necessary. Apply after 3 sunny, warm days. Do not apply within 1 day of application of other pesticides. Do not tank mix with other pesticides. Do not apply more than 1 lb ai/acre/year. Do not use hotcaps on treated plants within 7 days of application.

Crop	Weed Problem	Chemical	Pounds Active Ingredient (AI)/Acre	Amount of Commercial Formulation/Acre	Remarks and Limitations
	Nutsedge	pebulate (TILLAM 6E)	4-6	2 2/3 - 4 qt	Apply and incorporate to a depth of 2-3 inches before planting. Use lower rate on light colored soils with less than 2% organic matter.
WATERMELONS (Transplanted)	Emerged annuals	paraquat (PARAQUAT PLUS)	1/2 - 1	1 - 2 qt	Apply before planting to kill emerged weeds. Include a non-ionic surfactant.
	Germinating broadleaves	naptalam (ALANAP) (2 lb/gal)	4	8 qt	Apply before or after transplanting but before weeds emerge. If soil is dry, irrigate after application. When grasses are a problem, use with Prefar before planting.
	Germinating grasses	bensulide (PREFAR 4E)	6	6 qt	Apply before transplanting. Irrigate or incorporate 2-3 inches immediately after spraying.
NON-CROP LAND	Bare ground-long term control of annual and perennial weeds	atrazine (80WP)	10 - 20	12 - 25 lb	For use around buildings, storage areas, fence rows, etc. Use higher rate for hard-to-control perennials. Addition of sodium chlorate will improve control of field bindweed, goldenrod, and milkweed.
		diuron (80WP)	15 - 20	19 - 25 lb	Same as above.
		simazine (80WP)	10 - 20	12 - 25 lb	Same as above.
		hexazinone (VELPAR 90SP)	2 - 4 1/2	2 - 5 lb	Use higher rate on hard to kill weeds, clay soils, or soils containing more than 5% organic matter. Apply before or soon after weeds emerge. Will injure or kill woody perennials. Do not use around shade trees or ornamentals.
		bromacil (HYVAR X 80WP)	2 1/2 - 9	3 - 12 lb	Use lower rate for control of annuals, higher rate for control of perennials. Bromacil is quite soluble in water, and may move in runoff water to non-target areas. Therefore, do not use in or near turf, ornamentals, or other plants of value.
	Cattails, quackgrass, other grasses	dalapon (DOWPON M 85% salt)	8 1/2 - 17	10 - 20 lb	Apply after flowers have formed.
	Perennial broadleaves and grasses	glyphosate (ROUNDUP) (3 lb/gal)	1 1/2 - 3	2 - 4 qt	Apply to actively growing foliage. Check label for most susceptible stage of target weed. Include a non-ionic surfactant.
		amitrole (AMINO-TRIAZOLE 90SP)	2 - 3 1/2	2 - 4 lb	Kills most herbaceous broadleaves and grasses. Use higher rate to control tough perennials, such as Canada thistle, milkweed, quackgrass. Use 10 lb for cattail control. Apply to actively growing foliage. Avoid contact or drift to non-target plants, as it will injure ornamentals and shrubs.
	Emerged annuals	paraquat (PARAQUAT PLUS) (2 lb/gal)	1/2	1 qt	Apply to actively growing foliage. Include a non-ionic surfactant. Can be used in combination with residual herbicides.

Annual broadleaves	2,4-D (several trade names and formulations)	1½ - 3	Apply to actively growing foliage. Use amine or low-volatile ester formulations. Check label for amount of product per acre.
Annual and perennial broadleaves	dicamba (BANVEL) (4 lb/gal)	¼ - 2	¼ - 2 qt Controls many annual and perennial herbaceous weeds. Check label for rate for specific weeds. Prevent drift to non-target areas.
Brush control	dicamba (BANVEL) (4 lb/gal) plus 2,4-D		Apply 2-4 lb dicamba plus 4 lb 2,4-D amine or low-volatile ester in 100 gal water. Thoroughly wet leaves and branches of target brush. Brush is most easily controlled during late spring and early summer.
	triclopyr (GARLON) (4 lb/gal)	1 - 8	1 - 8 qt Use higher rates for hard to kill tree and brush species. Thoroughly wet leaves and bark of brush. Do not exceed 40 psi pressure. Avoid contact with non-target species.
	fosamine (KRENITE) (4 lb/gal)	6 - 12	6 - 12 qt Apply to brush in late summer or early fall. Response will be seen the following year. Thoroughly wet brush but do not spray to runoff. Apply in 50 to 300 gal/acre. Avoid contact with non-target plants.

Names, Sources, and Formulations of Herbicides Used on Vegetable Crops¹

Common Name	Trade Name ² and Manufacturer	Concentration and Commercial Formulations ³	Common Name	Trade Name ² and Manufacturer	Concentration and Commercial Formulations ³
alachlor	LASSO (Monsanto)	4 lb/gal L	hexazinone	VELPAR (DuPont)	90SP; 2 lb/gal L
atrazine	several (Various)	80WP; 4 lb/gal L	linuron	LOROX (DuPont)	50WP; 4 lb/gal L
benefin	BALAN (Elanco)	1½ lb/gal L	MCPB	CAN-TROL (Rhone-Poulenc)	2 lb/gal L
bensulide	PREFAR (Stauffer)	4 lb/gal L	metolachlor	THISTROL (Union Carbide)	8 lb/gal L
bentazon	BASAGRAN (BASF)	4 lb/gal L	metribuzin	DUAL (Ciba-Geigy)	50WP; 75DF; 4L
bromacil	HYVAR X (DuPont)	80WP	napropamide	LEXONE (DuPont)	50WP; 75DF; 4L
bromoxynil	BROMINAL (Union Carbide)	4 lb/gal L	naptalam	SENCOR (Mobay)	50WP; 2 lb/gal L
butylate	SUTAN PLUS (Stauffer)	6.7 lb/gal L	oryzalin	DEVIRINOL (Stauffer)	2 lb/gal L
chloramben	AMIBEN (Union Carbide)	2 lb/gal L; 10G	oxyfluorfen	ALANAP (Uniroyal)	4 lb/gal L; 75WP
chloroxuron	TENORAN (Ciba-Geigy)	50WP	paraquat	SURFLAN (Elanco)	1.6 lb/gal L
chlorpropham	FURLOE-CHLORO IPC (PPG)	4 lb/gal L	pendimethalin	GOAL (Rohm and Haas)	4 lb/gal L
cyanazine	BLADEX (Shell)	80WP; 4L	phenmedipham	PARAQUAT PLUS (Chevron)	2 lb/gal L
cycloate	RO-NEET (Stauffer)	6 lb/gal L	prometryn	GRAMOXONE (ICI)	4 lb/gal L
dalapon	DOWPON (Vertac)	85% salt	pronamide	PROWL (Amer. Cyanamid)	1.3 lb/gal L
DCPA	DACTHAL (SDS)	75WP	propachlor	SPIN-AID (NOR-AM)	80WP; 4 lb/gal L
diethyl-ethyl	ANTOR (NOR-AM)	4 lb/gal L	pyrazon	CAPAROL (Ciba-Geigy)	50WP
diphenamid	ENIDE (NOR-AM)	90WP	sethoxydim	KERB (Rohm & Haas)	4 lb/gal L
diuron	KARMEX (DuPont)	80WP	simazine	RAMROD (Monsanto)	75.5WP
EPTC	EPTAM (Stauffer)	7 lb/gal L	stoddard solvent	PYRAMIN RB (BASF)	1.53 lb/gal L
ethalfluralin	ERADICANE (Stauffer)	6.7 lb/gal L	terbacil	POAST (BASF)	80WP
fluzifop-butyl	SONALAN (Elanco)	3 lb/gal L	trifluralin	PRINCEP (Ciba-Geigy)	100% oil
glyphosate	FUSILADE 2000 (ICI)	1 lb/gal L	2,4-D	several (Various)	80WP
	ROUNDUP (Monsanto)	3 lb/gal L		SINBAR (DuPont)	4 lb/gal L
				TREFLAN (Elanco)	4 lb/gal L
				several (Various)	

¹Trade names and formulations of herbicides are given for the convenience of the users. Other formulations of the same herbicides with the same active ingredients also may be labeled for use on certain crops.

²"several" means there are several trade names for the chemical. The mention of trade names does not imply that they are endorsed or recommended over those of similar nature not listed.

³ae — acid equivalent, ai — active ingredient, DF — dry flowable, DS — dry soluble, E or EC — emulsifiable concentrate, ES — emulsifiable solution, F or FL — flowable, G — granular, L — liquid, S or SP — soluble powder, W or WP — wettable powder.

Effectiveness of Herbicides on Weeds¹

Know Your Weed Species! — All herbicides have their strengths and weaknesses. Knowing what weeds are in your field will help you choose the most effective chemical among those registered for your crop.

HERBICIDE (TRADE NAMES)	REDROOT PIGWEED	LAMBSQUARTER	GALINSOGA	MUSTARDS	NIGHTSHADE	COMMON PURSLANE	COMMON RAGWEED	SMARTWEED	CRABGRASS	FOXTAILS	BARNYARD GRASS	FALL PANICUM	STINKGRASS	QUACKGRASS	YELLOW NUTSEDGE
Preplant Incorporated Herbicides															
BALAN	G	F	P	P	P	G	P	P	E	E	E	E	E	P	P
DEVIRINOL	G	P	P	P	P	G	P	P	E	E	E	E	E	P	P
DUAL	G	F	G	P	G	F	P	F	E	E	E	E	E	P	F
EPTAM	G	G	F	F	F	F	F	F	E	E	E	E	E	G	G
PREFAR	G	P	P	P	P	P	P	P	E	E	E	E	E	P	P
RO-NEET	G	F	F	P	P	F	P	P	E	E	E	E	E	P	F
SUTAN PLUS	F	P	F	P	P	P	P	P	E	E	E	E	E	P	G
TILLAM	F	F	F	P	P	P	P	P	E	E	E	E	F	F	G
TREFLAN	G	F	P	P	P	F	P	P	E	E	E	E	E	P	P

HERBICIDE (TRADE NAMES)	REDROOT PIGWEED	LAMBSQUARTER	GALINSOGA	MUSTARDS	NIGHTSHADE	COMMON PURSLANE	COMMON RAGWEED	SMARTWEED	CRABGRASS	FOXTAILS	BARNYARD GRASS	FALL PANICUM	STINKGRASS	QUACKGRASS	YELLOW NUTSEDGE
Preemergence Surface-Applied Herbicides															
AATREX	E	E	G	E	E	E	E	E	G	G	G	P	G	G	G
ALANAP	G	G	F	F	P	F	F	G	P	P	P	P	P	P	P
AMIBEN	E	E	F	F	G	G	G	F	F	F	F	P	P	P	P
ANTOR	G	F	G	F	G	F	P	F	G	G	G	G	G	P	P
BLADEX	F	E	G	G	G	E	E	E	G	G	G	F	G	P	P
CAPAROL	E	E	F	G	G	G	G	F	G	F	F	F	F	P	P
DACTHAL	F	F	P	P	P	P	P	P	E	E	E	G	E	P	P
DUAL	G	F	G	P	G	F	P	F	E	E	E	E	E	P	F
ENIDE	G	F	P	P	P	G	P	F	E	E	E	E	E	P	P
FURLOE CHLORO IPC	F	F	P	P	P	G	P	E	F	F	F	F	F	P	P
KARMEX	E	E	G	G	G	E	E	E	F	E	E	E	E	P	P
KERB	P	F	P	P	P	G	F	F	F	F	F	F	F	G	P
LIASSO	E	F	G	P	G	G	F	F	E	E	E	E	E	P	F
LEXONE, SENCOR	G	E	E	E	P	E	E	E	F	G	G	G	G	P	P

HERBICIDE (TRADE NAMES)	REDROOT PIGWEED	LAMBSQUARTER	GALINSOGA	MUSTARDS	NIGHTSHADE	COMMON PURSLANE	COMMON RAGWEED	SMARTWEED	CRABGRASS	FOXTAILS	BARNYARD GRASS	FALL PANICUM	STINKGRASS	QUACKGRASS	YELLOW NUTSEDGE
LOROX	E	E	G	G	G	E	E	G	F	E	G	F	E	P	P
PRINCEP	E	E	G	E	E	E	E	E	F	E	E	F	E	F	P
PYRAMIN RB	G	F	P	G	G	G	G	G	F	F	F	F	F	P	P
RAMROD	G	F	G	P	G	G	F	F	E	E	E	E	E	P	P
SINBAR	G	G	G	G	G	G	G	G	G	G	G	G	G	F	P
SONALAN	G	G	P	F	F	G	P	G	E	E	E	E	E	P	P
SURFLAN	G	G	F	F	F	G	F	F	E	E	E	E	E	P	P

HERBICIDE (TRADE NAMES)	REDROOT PIGWEED	LAMBSQUARTER	GALINSOGA	MUSTARDS	NIGHTSHADE	COMMON PURSLANE	COMMON RAGWEED	SMARTWEED	CRABGRASS	FOXTAILS	BARNYARD GRASS	FALL PANICUM	STINKGRASS	QUACKGRASS	YELLOW NUTSEDGE
Herbicides with Postemergence Activity															
AATREX	E	E	G	E	G	E	E	E	G	G	G	F	G	G	G
BASAGRAN	P	G	G	F	F	G	G	E	P	P	P	P	P	P	G
BLADEX	F	G	G	G	G	G	G	G	G	G	G	G	G	P	P
BROMINAL	F	E	G	G	G	G	E	P	P	P	P	P	P	P	P
CAPAROL	E	E	G	G	G	E	F	F	F	F	F	F	F	P	P
DOWPON	P	P	P	P	P	P	P	P	F	G	G	G	G	P	P
FORMULA 40	E	E	G	G	E	P	E	P	P	P	P	P	P	P	P
GOAL	E	F	G	G	E	G	E	G	F	F	F	F	G	P	P
LEXONE, SENCOR	G	E	E	E	P	E	E	E	F	G	F	F	F	P	P
LOROX	E	E	G	G	G	E	E	P	P	F	F	F	F	P	P
PARAQUAT	E	E	G	E	E	E	E	E	E	E	E	E	E	E	E ²
ROUNDUP	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F
SPIN-AID	P	G	G	G	F	G	G	G	P	P	P	P	P	P	P
STODDARD SOLVENT	E	E	F	E	E	E	P	E	E	E	E	E	E	E	F
TENORAN	E	G	G	E	G	F	F	F	F	F	F	F	F	P	P

¹Assuming that the chemicals are applied at the proper time and at the appropriate rate for each soil type. This information is based on performance of these chemicals in vegetable crops.
²Kill of top growth only.
 E = Excellent, G = Good, F = Fair, P = Poor

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GENERAL PESTICIDE INFORMATION AND REFERRALS

County Cooperative Extension Service Office (____) ____-____

Integrated Pest Management Programs

Michigan State University

East Lansing, MI 48824

(517) 355-0117

Center for Environmental Toxicology

Michigan State University

East Lansing, MI 48824

(517) 353-6469

Pesticides and Plant Pest Management Division

Michigan Department of Agriculture

Lansing, MI 48909

(517) 373-1087

Office of Hazardous Waste Management

Michigan Department of Natural Resources

Lansing, MI 48909

(517) 373-2730

Center for Environmental Health Sciences

Michigan Department of Public Health

Lansing, MI 48909

(517) 335-8350

PESTICIDE EMERGENCY INFORMATION

Human Pesticide Poisoning

Eastern Half of Michigan

(within Detroit City proper)

(313) 745-5711

(within the 313 area code)

(800) 462-6642

(statewide)

(800) 572-1655

Poison Control Center

Children's Hospital of Michigan

3901 Beaubien

Detroit, MI 48201

Western Half of Michigan

(within Grand Rapids City proper)

(616) 774-7854

(within the 616 area code)

(800) 442-4571

(statewide)

(800) 632-2727

Blodgett Regional Poison Center

Blodgett Memorial Medical Center

1840 Wealthy, S.E.

Grand Rapids, MI 49506

Upper Peninsula

(within Marquette City proper)

(906) 225-3497

(Upper Peninsula only)

(800) 562-9781

U.P. Poison Control Center

Marquette General Hospital

420 West Magnetic Street

Marquette, MI 49855

Animal Pesticide Poisoning

Your Personal Veterinarian

(____) ____-____

and

Animal Health Diagnostic Laboratory

Michigan State University

East Lansing, MI 48824

(517) 353-1683

Pesticide Fire

Local Fire Department

(____) ____-____

and

Fire Marshal Division, Michigan State Police

(Local authorities will assist in contacting the State Fire Marshall.)

Traffic Accident

Local Police Department, Sheriff's Office, or State Police

(____) ____-____

and

Motor Carrier Division, Michigan State Police

(____) ____-____

Environment Pollution

Pollution Emergency Alerting System

Michigan Department of Natural Resources

3500 North Logan

Lansing, MI 48909

(800) 292-4706

Pesticide Use Incidence

Pesticides & Plant Pest Management Division

Michigan Department of Agriculture

(517) 373-1087