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WEED CONTROL GUIDE FOR FIELD CROPS

COOPERATIVE EXTENSION SERVICE MICHIGAN STATE UNIVERSITY

This publication contains pesticide recommendations based on research and pesticide regulations. However, changes in pesticide regulations occur constantly. Some pesticides mentioned may no longer be available, and some uses may no longer be legal. If you have questions about the legality and/or registration status for using pesticides, contact your county Cooperative Extension Service office.

To protect yourself and others and the environment, always read the label before applying any pesticide.

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1991 WEED CONTROL GUIDE for Field Crops

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COOPERATIVE EXTENSION SERVICE MICHIGAN STATE UNIVERSITY

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Pesticides must be registered with the U.S. Environmental Protection Agency and the Michigan Department of Agriculture before they can be legally used in Michigan. This bulletin suggests using pesticides in the management of crop pests. Purchase only those pesticide products labeled for 1) the crop you wish to use it on and 2) the pest you wish to manage on that crop. Remember, the pesticide label is the legal document on pesticide use. The label must be read carefully and all instructions and limitations followed closely. The use of a pesticide in a manner not consistent with the label can lead to the injury of crops, humans, animals, and the environment, and also lead to civil fines and/or condemnation of the crop. Pesticides are management tools for the control of pests in crops but only when they are used in an effective, economical, and environmentally sound manner.

See pesticide emergency information — Inside back cover.

Weeds reduce crop yields by competing 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 at times 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 field crops requires the use of a combination of management techniques, including cultural methods and herbicides. Growing the same crop year after year and using the same weed control techniques encourage the development of problem weeds. Rotation of crops, herbicides, and tillage methods help reduce this problem.

Cultural Control of Weeds

Crop competition is a very useful method of weed control. Maintaining production practices that optimize crop growth means the crop plants can compete more effectively with weeds. Several crop management practices can improve the competitive ability of the crop. These practices include crop and variety selection, planting date, population, soil fertility, drainage, etc. Recommended crop production practices are also beneficial weed control practices.

Crop and herbicide rotation may also be helpful in maintaining adequate weed control. Many weeds cannot tolerate crop rotation. Using the same herbicide program each year allows weeds tolerant of the herbicides to expand. Rotate herbicide programs to prevent this problem and to reduce the likelihood of resistant weeds (e.g., triazine-resistant weeds) becoming a problem.

Cultivation

Timely, shallow cultivation may be necessary following herbicide treatment. Be sure to cultivate as shallowly as possible to prevent bringing new weed seeds from below the herbicide layer to the soil surface.

Do not cultivate most preemergence herbicides for at least 2 weeks after application unless weeds resistant to the chemical appear. If weeds appear and dry weather persists for 2 weeks after herbicide application, rotary hoe or cultivate shallowly. Delay cultivation after postemergence herbicide applications for at least 7 to 10 days to allow the chemical to move into weed stems and roots.

Chemical Control of Weeds

No one chemical used as a herbicide will kill all species of weeds. Therefore, select the right herbicide for the job. The first step for successful weed control with herbicides is to identify the weed species present. Note that some weed species are resistant to all of the present selective herbicides.

Annual weeds are easier to kill when they are small seedlings and when conditions favor rapid growth. However, crop plants are also easily injured under these conditions. Selective herbicides should control the weeds with little or no injury to the crop.

Timing and rate of application are very important with chemical weed control. Spraying at the wrong time often results in poor weed control and crop injury. No crop plant is completely resistant to injury from herbicides. Too much chemical can damage the crop.

Types of Herbicides

Chemical control of weeds can be obtained with either preplant incorporated, preemergence, or postemergence herbicides. Many herbicides can be applied by more than one of these methods.

Preplant incorporated herbicides are compounds incorporated into the soil prior to planting. Incorporation of some of these compounds is necessary to prevent losses of volatile active ingredients (ex., *Treflan, Eptam*) or to overcome photodecomposition losses if the materials are left on the soil surface. Preplant incorporated herbicides have increased activity in the absence of rainfall required to move the herbicide into the weed-seed germination zone. This concept is often referred to as herbicide "activation." Incorporation is also often required to obtain perennial weed suppression from soil-applied herbicides.

Advantages of preplant incorporated herbicides:

(1) No weed competition to the crop with early control of weeds;

(2) Weeds already controlled where wet weather later delays cultivation or spraying;

(3) Less reliance on rainfall to position the herbicides in the soil. Generally more reliable weed control than preemergence sprays;

(4) Much more effective control on some perennial weeds (nutsedge) than with preemergence sprays.

Disadvantages of preplant incorporated herbicides:

(1) Incorporation operation represents added cost and fuel usage in herbicide application;

(2) Soil compaction is increased by the incorporation operation;

(3) Herbicide may be diluted by improper incorporation (too deep) resulting in reduced weed control;

(4) "Streaking" pattern of good and poor weed control can result from incomplete incorporation. Two pass incorporation helps prevent this problem;

(5) Planting operations may be slowed somewhat due to herbicide application and incorporation operation.

Preemergence herbicides are compounds that are applied to the soil surface after the crop has been planted but before the crop seedlings emerge through the soil.

Advantages of preemergence herbicides:

(1) No weed competition to the crop with early control of weeds;

(2) Weeds already controlled

where wet weather delays cultivation or spraying;

(3) Planting and herbicide application may be one operation;

(4) In the case of corn, herbicides can be used which will not present a hazard to nearby 2,4-D- or *Banvel*-sensitive crops and plants.

Disadvantages of preemergence herbicides:

(1) Preemergence applications are generally ineffective under dry soil conditions. Some preemergence herbicides are ineffective if dry conditions persist for only a few days; other herbicides may give weed control after as much as 10 days to 2 weeks of dry weather;

(2) On sandy soil, heavy rains may leach the herbicide down to the germinating crop seed and cause injury;

(3) Perennial weeds usually are not controlled by preemergence herbicide applications.

Postemergence herbicides are compounds applied to the foliage of weeds. They may burn off the above-ground parts of weeds (contact herbicides) or they may be translocated throughout the plants and kill the growing points (translocated or systemic herbicides).

Advantages of postemergence herbicides:

(1) Can be used in an emergency, since they are not applied until the weeds are present in the field;

(2) Can be used on any soil type, and soil moisture conditions are usually not a problem;

(3) Are usually more effective (though more injurious to the crop) at high temperatures.

Disadvantages of postemergence herbicides:

(1) Should not be applied to weeds when the foliage is wet with dew or rain;

(2) There is a greater risk of crop injury for certain crops;

(3) With many postemergence herbicides, timing of application is critical for effective control;

(4) There is a risk that rain may prevent application at the proper time.

Temperature greatly influences the effectiveness and volatility of many postemergence herbicides. Ideally, herbicides should be applied when temperatures range between 65° and 80°F. Low temperatures (below 60°F.) can result in reduced weed control, while temperatures above 80°F. can result in crop injury. Late afternoon herbicide applications are less likely to result in injury than are early morning applications. Early morning application predisposes the crop plant to danger periods of high temperatures, which increase the potential for herbicide injury.

Volatile herbicides, such as dicamba (*Banvel*), or ester formulations of 2,4-D, may vaporize at temperatures as low as 70°F. Wind may then move sufficient vapors to areas with sensitive crops and cause crop injury. Amine formulations of 2,4-D may eliminate some of the danger of vapor drift; however, spray drift (droplets) may still occur. Extreme caution is required when applying herbicides near sensitive crops.

Herbicide Formulations and Additives

Herbicides are available in a variety of formulations; granular and those mixed in water are most common. Usually, equal weed control can be expected from granular and those mixed in water. In some cases, granules have given less control. Generally, this has been due to (1) use of equipment giving non-uniform distribution of the granules or (2) formulations with too high a concentration, resulting in inadequate volume for uniform distribution.

The use of granular formulations does not eliminate the need for calibration. Various materials will "feed" differently because of variations in carrier and particle size. Therefore, granular applicators, like sprayers, should be accurately calibrated.

Herbicide Formulations

DF — *Dry Flowable Granule*
DG — *Dispersible Granule*
DS — *Dry Soluble Granule*
EC — *Emulsifiable Concentrate*
F — *Flowable*
G — *Granule*
L — *Liquid*
WP — *Wettable Powder*
WSP — *Wettable Soluble Powder*

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 legally used in Michigan. The pesticide label is the legal document on pesticide use. The label must be read carefully and all the instructions followed closely. Use of a herbicide in a manner not consistent with the label can lead to civil fines and/or condemnation of the crop. Do not mix and apply any pesticides and fertilizers if forbidden on either label.

Combinations of Herbicides

Two or more herbicides are usually applied as a tank mix versus separate applications. Combinations are used to give more consistent or broader spectrum weed control, to decrease herbicide residue (for example, atrazine carryover) or to obtain adequate season-long weed control. Growers and commercial applicators are responsible for poor weed control, crop injury and/or unwanted herbicide residue from herbicides labeled for single application but misused in combinations.

Compatibility of Pesticide-Fertilizer Combinations

Combinations of herbicides, insecticides and/or fungicides applied in either water or liquid fertilizer carriers decrease trips over the field and application costs; however, compatibility is critical. Always test the compatibility of each mixture to be applied even

though the product labels allow mixing. Follow the label instructions closely during any mixing operation after you have tested for compatibility.

A single compatibility test requires only a glass quart jar and the pesticides and liquid fertilizer to be mixed. Place one pint of liquid fertilizer in the quart jar and add two teaspoons of the liquid pesticide. If the pesticide is a wettable powder, add two teaspoons of powder in sufficient water to form a slurry and add the slurry to the fertilizer. Cover the jar, shake well, and observe the mixture for 30 seconds. Check the mixture again after 30 minutes. If the mixture does not separate, it is compatible; however, check each batch of liquid fertilizer, as they may vary in mixing properties. Also, check compatibility if water source changes, as water pH and mineral content influence compatibility.

If more than one pesticide is to be mixed with liquid fertilizer or water, the pesticides should be premixed in liquid fertilizer or water and tested for compatibility by mixing appropriate proportions of all components. The combination should be thoroughly agitated before each additional pesticide is added, and a specific mixing order should be followed. Generally, unless label directions state otherwise, add the pesticides being tested in the following order:

1. wettable powders or dispersible granules,
2. flowables or aqueous liquids,
3. emulsifiable concentrates,
4. crop oil concentrates.

Spray tanks should be at least half filled with the carrier before the pesticide premixes are added. If the mixture foams excessively, separates or becomes syrupy, do not apply the mixture. Compatibility agents are available which may be added to improve mixing ability.

Even if all components appear compatible, the field tank mixture will require constant, vigorous agitation to prevent separation or improper pesticide distribution in the tank. Be sure the entire tank is agitated and mixed before spraying. Do not store pesticide mixtures overnight unless they are constantly agitated. Best results are obtained by applying the entire mixture in one day. (See Extension Bulletin E-1858, "Using Spray Additives with Herbicides.")

Additives for Herbicides — Some Definitions

(1) Adjuvant — any substance which enhances the herbicide effectiveness, an "added ingredient."
(2) Surfactant — a surface active material which can facilitate emulsifying, dispersing, spreading, wetting, sticking, or other surface-modifying characteristics of herbicide solutions.
(3) Emulsifier — an agent that promotes the dispersion of one liquid in another.
(4) Wetting agent (spreader) — reduces water surface tension, causing better contact between spray solution and treated surfaces.
(5) Soap — sodium or potassium salts of fatty acids. Can form insoluble materials in hard water. *Detergents* are synthetic materials used for cleaning.
(6) Sticker — Deposit builder, increases herbicide adhesion to plant surfaces.
(7) Defoaming agent — self-explanatory.
(8) Compatibility agent or cosolvent — may aid in dispersion of otherwise incompatible mixtures.

During the development of a herbicide, the chemical company attempts to formulate the active ingredient to optimize performance, mixing, and handling under diverse conditions. Every commercially available herbicide formulation contains its own particular set of additives to accomplish this. Sometimes additional additives are required for specific applications or when compatibility or mixing problems occur. The herbicide label will describe the need and use of these additives. The indiscriminate use of additives should be avoided since they may not improve herbicide performance and may actually reduce weed control, or cause crop injury.

Additives can be referred to as "adjuvants." This term merely denotes an added ingredient. Surface active additives are called surfactants. Therefore, all surfactants are also additives or adjuvants. All herbicide formulations contain surfactants. Emulsifiable concentrates contain emulsifiers, which aid in the dispersion of the formulation into the water phase. Wettable powders contain wetting agents and dispersants, which facilitate moistening the tiny particles and prevent clumping. Postemergent herbicides, such as 2,4-D and Roundup, contain wetting agents, which help spread the spray over the leaf surface.

When to Use Additives

Herbicides may be applied either to the soil or to the foliage, so the addition of a surfactant is left to the user. Sometimes additives are only required for postemergence treatments made during adverse climatic conditions. In other cases, the nature of the herbicide may necessitate addition of the surfactant to the spray mixture rather than the formulation. The herbicide label always gives directions for such additive requirements.

Although claims have been made that additives increase the effectiveness of soil-applied herbicides, there is no independent data to support these claims. Experiments conducted by several universities failed to show any benefit from the inclusion of spray additives with soil-applied herbicides. Additives are used with postemergence applications to aid coverage of leaf surfaces and increase penetration into the leaf.

Crop Oil Concentrates

Crop oil concentrates contain a mixture of emulsifiers and surfactants. A common ratio is 80% oil and 20% surfactant. Crop oil concentrates are generally recommended at a rate of 1 quart per acre or less.

These additives are recommended with postemergence applications of several herbicides. Herbicide labels contain specific

directions on the use of additives.

There is a greater risk for crop injury when using additives with postemergence atrazine applications. Injury is frequently associated with cold, wet or cloudy conditions. The injury appears as a temporary stunting plus necrosis of the leaf margins. *Banvel*, 2,4-D, or *Bladex* should not be included in a spray mix of atrazine plus crop oil concentrate or severe injury to the crop may occur.

Adjuvants, Surfactants, Wetting Agents, Soaps

Many spray additives are currently available and many exaggerated claims have been made. In most cases, these materials are no better than crop oil concentrates. In fact, under poor environmental conditions for postemergence weed control, the crop oil concentrates can be slightly superior. Remember that any benefit comes only in postemergence, not preemergence, applications. Additives aid performance of the herbicide in adverse conditions but are not a way to use less herbicide.

The *Bladex 90DF* and *80W* labels call for the addition of a non-ionic surfactant for postemergence applications under drought conditions. Weeds can become more difficult to kill under these conditions. However, because of the increased chance of crop injury and the infrequency of these conditions in the spring, additions of surfactants or oils are not recommended for postemergence *Bladex 80W* or *90DF* use in Michigan.

Roundup is formulated with a surfactant. Additional surfactant is needed with low volume application (refer to the *Roundup* label). The addition of a defoaming agent can be a help if excessive foaming is a problem. This addition is explained in the "Mixing" portion of the *Roundup* label.

Compatibility Problems

Compatibility problems in tank mixing herbicides usually occur when mixing directions are not followed. Some common causes of compatibility problems: mixing two herbicides in concentrated form, adding an EC to the spray tank before suspending the wettable powder, insufficient agitation, excessive agitation, and air leaks. Problems are much more likely when mixing herbicides with fluid fertilizers. The fertilizer solution is already loaded to near capacity with nutrients. Adding an herbicide to the already loaded solution may cause problems. Also, the fertilizer may interfere with the herbicide formulation additives. Since fertilizer may vary greatly from batch to batch, the only safe procedure is to test for compatibility in a small container before mixing a large quantity. If compatibility problems are encountered, the addition of *compatibility agents* may help.

Foaming is usually due to excessive agitation or a bypass line that empties above the spray solution level in the spray tank. When foaming is a problem, addition of a *defoamer* can help.

Pre-slurry the powder if you have problems in getting a wettable powder to wet and become suspended in solution. Adding a wetting agent to the spray tank will sometimes correct a floating powder problem.

Herbicide Application Equipment

Sprayer Implements—A good weed control sprayer should be made of non-corrosive materials, be easy to clean, and have the 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 4 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 accurately measure pressures up to 100 PSI.

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

(7) *Nozzles*—Flat fan nozzles of 73 to 95° angle with replacement tips are best suited for most weed control work. Nozzle volume can vary from 1 to 10 gallons per minute, depending on the applications. Good general-use nozzles are 8002 or 8004. These nozzles permit the boom to be carried closer to the ground and thus reduce spray drift.

Herbicide Incorporation Implements—Disks, especially large tandem disks, are poor tools for incorporation. Depth and riding are difficult to control and non-uniform distribution of the herbicide in the soil is likely.

A disk does have a place for special applications, such as chopping the quackgrass rhizomes, which is required for Eradicane activity. The disk should be used at a depth of 4 to 5 inches and a speed of 4 to 6 mph. Incorporation must be done in two directions.

A field cultivator can give acceptable one-pass incorporation of herbicides if special care is taken in setup and operation. Wide sweeps give better incorporation than points. Shanks should be close enough to allow for this, and three sets of sweeps are also required. It is important to follow with a leveling tool, such as a flex-tine drag or spring-tooth harrow, to smooth out ridges behind the cultivator.

The speed of the cultivator should be at least 6 mph, at a depth of 3 to 4 inches. Actual incorporation will occur at one-half the tool depth. Caution must be taken not to run the rear portion of the cultivator lower than the front. If the back of the tool is lower, untreated soil can be brought to the surface, burying the herbicide.

Danish-type harrows equipped with "S" tines and rolling baskets can do a good job of one-pass incorporation. Rolling baskets outperform other trailing operations.

Operation considerations are similar to those with the field

cultivator. Again, good soil tilth is a prerequisite for one-pass incorporation.

PTO-driven tools do a good job of one-pass incorporation. However, their application in Michigan may be limited. These tools are operated at lower speeds and are not as wide as other implements.

Herbicide Incorporation

The most consistent incorporation (no streaking), especially when using a disk or field cultivator alone, is achieved with two passes at an angle to each other. However, new tillage implements have made one-pass incorporation of herbicides a possibility. Although a majority of the questions concerning incorporation concern the best implement to use for one-way incorporation, soil condition influences the success of incorporation more than the tool used. The reliability of one-pass incorporation will also be influenced by the tillage system used.

In clean tillage (low crop residue) situations, preemergence applications made on wet soil will likely perform as well or better than two-pass incorporated treatments. One-pass incorporation is not a good approach with less than optimum soil tilth.

High crop residue levels (corn stalks disked or chisel plowed with one or two secondary tillage operations) make one-pass incorporation difficult. If the residue level is great enough to clog the incorporation tool, two-pass incorporation is advisable. The soil should also have good tilth, as outlined above.

Where ridges are left from fall plowing or use of a chisel plow in the spring, it is advisable to level the ground before herbicide application. Streaking is favored by application of the herbicide to rough ground.

Soil Types

Soil texture (sand, silt, clay) and organic matter influence the effectiveness of soil-applied herbicides. In general, lower rates of herbicides are used on sandy (coarse textured) soils than on clays or soils high in organic matter (fine textured) to obtain the same level of control. **Herbicide rate recommendations in this bulletin are given for medium-textured soils with greater than 3% organic matter.** Clay and organic matter adsorb herbicides, making them less available to kill weeds. Soils with high clay and organic matter content require higher herbicide rates for adequate weed control. Sandy soils with low organic matter content require careful herbicide rate selection to avoid crop injury.

Soil pH can influence the activity of soil-applied herbicides. Some herbicides (metribuzin) are more available at higher soil pH. Rates must be reduced to avoid crop injury. Knowledge of the soil pH is needed to determine proper rate.

Organic matter analysis is available through Cooperative Extension Service county offices or directly through the MSU Soil Testing Laboratory. Organic matter analysis may be determined on soil samples submitted for N-P-K analysis for an additional charge. Organic matter levels change slowly and may need to be checked every four years.

Organic matter analyses are only as accurate or representative as the soil sample, so each field should be checked individually. See Extension Bulletin E-498, "Sampling Soils," for proper soil sampling procedures.

Remember, follow herbicide label recommendations and adjust herbicide rates for soil texture and organic matter as specified on the label.

Accurate Calibration

Accurate applicator calibration is essential for effective chemical weed control without crop injury. Calibrate a new sprayer before use and routinely re-calibrate the sprayer during the growing season.

Use the following steps as a guide to calibrate a ground sprayer for broadcast application.

1. Determine the desired application volume of carrier (usually water) in gallons per acre (GPA). For most weed control applications, 5-30 GPA at 30-40 PSI is sufficient.
2. Adjust the boom height so that the spray overlaps about 30% at the ground (or other surface to be sprayed). With 80 degree 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. All nozzles should deliver within 10% of each other.
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 $\times$ boom width (in feet) $\div$ 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 3-7 to change application rate to the recommended values.
9. Calculate the amount of formulated pesticide needed to treat the desired area.

The following procedures can be used to calibrate a ground sprayer for either banded or broadcast applications.

(1) Determine the desired application volume of GPA.

(2) Check each nozzle at the recommended pressure for output. Replace any defective nozzles and screens. All nozzles should deliver within 10% of each other.

(3) For band application, accurately determine the width, in inches, of the band sprayed. For broadcast application, measure the distance, in inches, between adjacent nozzles.

(4) Locate this width in the table below and read off the

corresponding course distance.

WIDTH (inches)	COURSE DISTANCE (feet)
8	510
10	408
12	340
14	291
16	255
18	227
20	204
22	185
24	170
26	157

(5) In the field to be sprayed, mark off the course of the proper distance.

(6) Fill the tank completely with water only.

(7) Tie a quart container (graduated in ounces) to one nozzle on the sprayer to catch all of that nozzle's spray.

(8) Start a distance back from the beginning of the course to get up to operating speed, and turn the sprayer ON at the beginning of the course and OFF at the end.

(9) Remove the quart container, and read the volume collected IN OUNCES.

(10) OUNCES Collected = GPA.

Pesticide Use Precautions

Herbicides, like all pesticides, should be handled with extreme caution and respect. There are three important reasons for using pesticides safely and wisely:

- To protect yourself and others from poisoning.
- To avoid harming and polluting the environment.
- To avoid crop injury.

These three points cannot be emphasized enough.

Pesticide accidents occur most often during mixing and tank filling operations. Although accidental ingestion of chemicals is considered the greatest health hazard, there is also great danger of poisoning when pesticides contact skin or eyes, or 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. Such equipment should include full coverage clothing, chemical-resistant rubber gloves and boots, splash-guard goggles, and a MSHA/NIOSH-approved respirator for the chemical compound being used. Care for these items as you would your implements. Heed all the precautionary statements on the product label and cover-up to protect yourself.

Using more chemical than is recommended on any label is illegal and can result in the carryover of residues in the soil. Pesticides may also leach into ground and surface 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.

Herbicide Residues and Bioassays

With the advent of preplant and preemergence herbicides which give season-long weed control, the accumulation of herbicides in the soil and their influence on subsequent crops in the rotation have become important in crop management. However, when used at recommended rates in seasons of normal rainfall and temperature, most recommended herbicides for field crops do not present a problem on crops planted the following season. Exceptions are listed in the "Remarks" column of Tables 1-11 and Table 22 for each herbicide combination.

Atrazine carryover to rotation crops is a common problem. A problem with herbicide residues is more likely to occur the year following a season of limited rainfall and cool temperatures because of the slow dissipation of the herbicide.

Herbicide bioassays can indicate whether enough herbicide is present to harm the crop. Obtain soil for a bioassay late in the fall prior to freeze-up or early in the spring. The bioassay procedure is a relatively simple test, but a few basic steps should be followed.

(1) Collect soil from several locations in the field. Reliability of the assay depends on accurate sampling. Sample soil to the depth the field has been tilled. Approximately 5 lb of soil are needed for each sample. Collect an equal amount of soil from an adjacent field where no herbicide has been applied. This second sample is used as a check.

(2) Start the bioassay within one or two weeks after soil is collected to prevent the loss of herbicide under warm conditions. If the assay cannot be run immediately, store the soil in a cool place, or even allow it to freeze.

(3) If the soil is wet, allow it to dry so that it may be worked easily. If the soil is cloddy, crush the clods but do not pulverize.

(4) Partially fill two, 1-qt containers with soil, one with the soil being tested and the other with soil from the "check" field. Punch holes in the bottoms of the containers to allow drainage. Tin cans or milk cartons make satisfactory containers.

(5) Plant 15 seeds of a sensitive crop in each container and cover with ½ inch of soil. Wet the soil, but do not saturate. Oats are very sensitive to both triazines and dinitroanilines. Place exactly the same number of seeds in each container. Knowing the exact number of seeds planted enables seedling emergence to be measured. Do not plant too many seeds or the seedlings may compete for the herbicide and decrease the injurious effects.

(6) Place containers in a warm place (70 to 75° F), preferably in a window to receive as much sunlight as possible. Additional artificial

light should also be supplied to obtain approximately a 15-hour day length. Water plants sparingly, but do not let the soil dry out.

(7) Determine plant emergence, and monitor plant growth for at least three weeks after planting. Compare "check" plants with those in the soil being tested.

(8) Atrazine injury may cause yellowing of the oat leaves, with the plant becoming droopy and finally dying; if carryover is marginal, stunting may occur. Stunting can be determined by a comparison with "check" plants. Dinitroaniline injury may result in a decrease in seedling emergence and/or stunting of the seedlings.

(9) If any evidence of herbicide carryover is observed, it is advisable to plant a resistant crop.

Soil can also be analyzed in a laboratory for the amount of herbicide remaining in the soil. Most herbicides can be detected with a chemical soil analysis. This procedure is more expensive than a plant bioassay. Consult your county Cooperative Extension Service agent for a listing of commercial laboratories.

Herbicide Application

Herbicide Spray Volumes and Rates

Tables 1-3, 5 and 7-11 list chemicals which will give satisfactory weed control without injury to crops, except as noted under "Remarks." The volume of water to use will vary with the herbicide, although generally 10 to 40 gal per acre and a spraying pressure of 30 to 40 psi is recommended. With wettable powders such as atrazine, use nozzles that deliver at least 15 gal per acre. Use 30 to 40 gal of water per acre when spraying quackgrass with atrazine. Use 10 gal of water per acre or less when spraying quackgrass or annual grasses with *Poast.*

Some contact-type postemergence herbicides (*Basagran, Blazer*) require a minimum of 20 gallons per acre spray volume and 40 psi spray pressure to insure adequate coverage. Flat fan nozzles are effective for herbicide applications. Hollow cone nozzles can also give good results, especially for postemergence applications at higher pressures. If higher pressures are used, be sure the nozzles are designed to be operated at the increased pressure. Operating nozzles beyond the specified pressure range will result in a poor spray pattern, insufficient coverage, and lack of weed control.

Herbicides are available in a number of different formulations and concentrations. For this reason, the recommended rates in Table 1 (col. 3) are given as pounds of active ingredient per acre. Thus, when a liquid formulation contains 4 lb of active ingredient (or acid equivalent) per gallon, 1 pt will provide ½ lb of active ingredient, or 1 qt will provide 1 lb of active ingredient.

Band Application

In cultivated crops, spraying narrow bands of herbicide over the rows will take less material per acre, cutting the cost per acre for the chemical. Where chemical costs are high, band spraying may be justified. Timely cultivation of weeds in the unsprayed area between rows is necessary.

In seasons when the soil is too wet to cultivate, overall spraying has the advantage of controlling weeds between the rows.

When band spraying, be very careful to maintain the proper rate of application on the area sprayed. (If you lower the spray boom to narrow the area covered by a given nozzle, remember that each nozzle is still delivering the same amount of spray mixture as it did on the wider area.) Use nozzles designed for banding, as the spray volume with these nozzles is the same across the entire band.

Cleaning Pesticide Sprayers

It is important to clean pesticide sprayers after each use, especially if they are used for more than one crop and for the 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 soil applications of herbicides, usually only a thorough water rinse is necessary. Exceptions are sulfonyl urea herbicides, such as chlorimuron-ethyl *(Classic), Lorox Plus, Preview,* and also *Command.* A thorough cleaning with ammonia is required. Consult these specific herbicide labels for detailed spray tank cleaning procedures. Rinse the entire sprayer, inside and out, including the 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 rinsate out through the nozzles. This process should be repeated when changing soil-applied herbicides and at the end of each day. Money can be saved and the environment protected if the water rinsing is done in the field using a water-filled nurse tank and if the water rinsate is applied to the crop according to label rates. Many herbicide labels have specific instructions for cleaning the spray system. Always read and follow these directions carefully.

Unless otherwise specified, thoroughly wash the entire spray system after all postemergence applications. Use one of the following cleaning agents in 100 gal of water:

(1) 1 gal household ammonia
(2) 5 lb of sal soda; or
(3) 8 lb trisodium phosphate.

Run the pump so that the cleaning solution is circulated throughout the entire system for at least 2 hours and then pump it out through the nozzles. Do not dump this cleaning solution, and do not apply it to any crop or crop land. Discard the cleaning solution in an appropriate pesticide rinsate degradation pit. Rinse the entire system with water after all the cleaning solution has drained from the sprayer. Do not leave pesticide solutions or cleaning solutions in the tank overnight.

Corrosion and mechanical damage to pumps, tanks, nozzles, etc. may result from leaving water in the spray system over the winter. To prepare the spray equipment for storage, disconnect all the hoses, and allow all water to drain out. Coat all bare metal parts with oil or a rust inhibitor. Disassemble metal nozzles, and store them in oil. Prepare the spray pump for storage based on the manufacturer's recommendations.

Pesticides and the Environment

Many people who live in rural Michigan get their drinking water from wells. Well water is groundwater, so it is easy to see why you should be concerned about keeping herbicides out of groundwater. Several processes determine the fate of herbicides and whether they will end up in your drinking supply. Sometimes these processes are beneficial and enhance weed control. For example, the leaching of a root-absorbed herbicide into the root zone can enhance weed control. The degradation of pesticides can remove non-essential pesticide residues from the environment. Often, however, these processes are detrimental. Runoff can move a herbicide away from target weeds. As a result, chemical is wasted, weed control is reduced and there is an increased chance of damage to non-target plants, hazard to human health, and pollution of nearby soil and water.

In this section we will examine the fate of pesticides and the various processes that affect their stability and persistence following an application, disposal, or spill.

Adsorption is the binding of chemicals to soil particles. (This term is sometimes confused with *ab*sorption, the process by which plants intake chemicals.) The amount and persistence of pesticide adsorption varies with pesticide properties, soil moisture content, soil pH, and soil texture. Soils high in organic matter or clay are the most adsorptive; coarse, sandy soils that lack organic matter or clay are much less adsorptive.

A soil-adsorbed herbicide is less likely to volatilize, leach or be degraded by microorganisms. When herbicides are tightly held by soil particles, they are less available for absorption by plants. Therefore certain herbicides used on highly adsorptive soils may require higher rates or more frequent applications to compensate for the portion of the herbicide that binds to the soil particles and is unavailable for plant uptake.

Volatilization occurs when a solid or a liquid turns into a gas. Volatilization of pesticides increases with higher air temperature and air movement, higher temperature at the treated surface (soil, plant, etc.), low relative humidity, and decreasing size of spray droplets. Pesticides also volatilize more readily from coarse-textured soils and from medium- to fine-textured soils with high moisture content.

A pesticide in a gaseous state can be carried away from the treated area by air currents. The movement of pesticide vapors in the atmosphere is called **vapor drift**. Unlike the drift of sprays and dusts that can sometimes be seen during an application, vapor drift is invisible.

Avoid applying volatile herbicides such as *Banvel* (dicamba) or *Eptam* (EPTC) when conditions favor volatilization. The vapor pressure rating of the herbicide may help indicate the volatility of the material. The higher the vapor pressure rating, the more volatile the pesticide. Herbicide labels usually mention the potential for volatility of the herbicides. Volatilization can sometimes be reduced through the use of low volatile formulations or soil incorporation of the herbicide (e.g., *Eptam* or *Sutan*).

Photodegradation is the breakdown of herbicides, such as *Treflan*, by the action of sunlight. Herbicides applied to foliage, the soil surface, or structures vary considerably in their stability when exposed to natural light. Like other degradation processes, photodegradation reduces the amount of chemical present, which can subsequently reduce the level of weed control. Soil incorporation by mechanical means during or after application, or by irrigation water or rainfall following application, can reduce herbicide exposure to sunlight.

Microbial degradation occurs when microorganisms such as fungi and bacteria use an herbicide as a food source. Microbial degradation can be rapid and thorough under soil conditions favoring microbial growth. These conditions include warm temperatures, favorable pH levels, adequate soil moisture, aeration (oxygen), and fertility. The amount of adsorption also influences microbial degradation. Adsorbed herbicides are more slowly degraded because they are less available to some microorganisms.

Chemical degradation is the breakdown of a herbicide by soil processes not involving a living organism. The adsorption of herbicides to the soil, soil pH levels, soil temperature and moisture all influence the rate and type of chemical reactions that occur. Some pesticides, especially the organophosphate insecticides, are susceptible to degradation by hydrolysis in high pH (alkaline) soils or spray mixes. Some herbicides, such as atrazine and *Classic*, are more rapidly degraded on low pH soils.

Absorption or plant uptake is the process by which plants and microorganisms take up chemicals. It is another process that can transfer herbicides in the environment. Once absorbed, most herbicides are degraded within plants. Residues may persist inside the plant or be released back into the environment as the plant tissues decay.

Crop removal is another herbicide transfer process. When treated crops are harvested, the herbicide residues are removed with them and transferred to a new location. After harvest, many agricultural commodities are washed or processed, which can remove or degrade much of the remaining residue.

Runoff moves herbicides in water. Runoff occurs as water moves over a sloping surface, carrying herbicies either mixed in the water or bound to eroding soil. The amount of herbicide runoff depends on the grade or slope of

the field, the erodibility and texture of the soil, the soil moisture content, the amount and timing of irrigation or rainfall (especially in relation to the time of herbicide application), and properties of the herbicide. For example, a herbicide application made to a heavy clay soil already saturated with water is highly susceptible to runoff. Established vegetation or plant residues also influence runoff because of their ability to retain soil and moisture.

Herbicide losses from runoff are greatest when heavy rainfall occurs shortly after an herbicide application. If heavy rainfall is expected, delay applying pesticides. Some no-tillage and minimum-tillage cropping systems have been found to reduce herbicide runoff, as do soil incorporation application methods. In addition, adjuvants that promote postemergence herbicide retention on leaf surfaces can reduce the pesticide content in runoff water. Finally, surface grading, drainage ditches and dikes, and the use of border vegetation can help reduce the amount and control the movement of runoff waters.

Leaching is another process that moves herbicides in water. In contrast to runoff, which occurs as water moves on the surface of the soil, leaching occurs as water moves through the soil. Several factors influence the leaching of herbicides. These include the water solubility of the herbicide. A herbicide dissolved in water can move readily with the water as it seeps through the soil. Soil structure and texture influence soil permeability (how fast the water moves through soil), as well as the amount and persistence of herbicide adsorption to soil particles. Adsorption is probably the most important factor influencing leaching of herbicides. If an herbicide is strongly adsorbed to soil particles, it is less likely to leach, regardless of its solubility, unless the soil particles themselves move with the water flow.

Groundwater contamination is a major concern associated with the leaching of herbicides from treated fields, mixing and rinsing sites, waste disposal areas, and manufacturing facilities. Refer to the next section in this chapter, "Groundwater Contamination," for information on how to prevent contamination.

Groundwater Contamination

Groundwater is the water beneath the earth's surface occupying the saturated zone (the area where all the pores in the rock or soil are filled with water). It is stored in water-bearing geological formations known as **aquifers**. Groundwater moves through aquifers and can be obtained at points of natural discharge such as springs or streams, or by drilling a well into the aquifer.

The upper level of the saturated zone in the ground is called the **water table**. The water table depth below the soil surface fluctuates throughout the year, depending on the amount of water removed from the ground and the amount of water added by recharge and connected surface waters. **Recharge** is water that seeps through the soil from rain, melting snow, or irrigation. **Surface waters** are visible bodies of water such as lakes, rivers, and oceans.

Both surface water and groundwater are subject to contamination by **non-point source pollution**. This type of pollution generally results from land runoff, precipitation, acid rain, or percolation rather than from a discharge at a specific, single location, such as a single pipe or well head. Contamination from these single sites are known as point source pollution.

The potential for the pollution of groundwater from improper waste disposal is a major concern. Problems result from domestic waste (e.g., septic systems, landfills, waste treatment plants), industrial waste (e.g., landfills, brine and mine wastes, deep well disposal), and government-generated waste (e.g., radioactive wastes).

Improper agricultural practices are another concern. Inadequate handling of livestock waste storage facilities and improper application of manures and fertilizers can cause unacceptable levels of nitrates in groundwater. Pesticide residues in groundwater, in particular, are receiving considerable national attention. Evidence suggests that, in certain areas, agriculture's relative contribution to groundwater contamination may be significant.

Herbicides in Groundwater

Earlier we discussed herbicide fate and the numerous transfer and breakdown processes that occur in the environment. Those processes help determine whether herbicides reach groundwater or are degraded before reaching these underground waters. Geological characteristics, such as the depth of the water table and the presence of sinkholes, are also critical. If the water table is close to the soil surface, fewer opportunities may exist for adsorption and degradation to occur.

On the soil surface and within the first few inches of soil, herbicides can be volatilized, adsorbed to soil particles, taken up by plants, broken down by sunlight, or degraded by soil microorganisms and chemical reactions. The extent of herbicide leaching is affected by both pesticide and soil properties. Weather conditions and management practices also affect leaching of herbicides through the soil. Too much rain or irrigation water can leach herbicides beyond the zone where weeds are controlled. A herbicide that is not volatilized, absorbed by plants, bound to soil, or degraded can potentially move through the soil to groundwater.

After herbicides reach groundwater, they may continue to break down, but at a much slower rate because of less available light, heat, and oxygen. The movement of groundwater is often slow and difficult to predict. Substances that enter the groundwater in one location can turn up years later in other locations. A major difficulty in dealing with groundwater contaminants is that the sources of pollution are not easily recognizable. The problem is occurring underground, out of sight.

Keeping Herbicides Out of Groundwater

It is very difficult to purify or clean contaminated groundwater. Treatment is complicated, time consuming, expensive, and often not feasible. The best solution to groundwater contamination is to prevent the problem in the first place. The following pesticide applicator practices can reduce the potential for surface and groundwater contamination.

- **Use integrated pest management programs** — Minimize herbicide use by combining chemical control with other pest management practices such as tillage, cultivation, crop rotation, and pest scouting.
- **Consider the geology of your area** — When planning herbicide applications, be aware of the water table depth and the permeability of the geological layers between the surface soil and groundwater.
- **Consider soil characteristics** — The susceptibility of the soil to leaching should be determined. Soil texture and organic matter content, in particular, influence chemical movement into groundwater. The leachability of the soil may determine whether a herbicide should be used in that area.
- **Select herbicides carefully** — Remember, herbicides that are highly soluble, relatively stable, and not readily adsorbed to soil tend to be the most likely to leach. Choose herbicides with the least potential for leaching into groundwater. Read labels carefully and consult a specialist from a Cooperative Extension Service office or your chemical dealer, if necessary.
- **Follow label directions** — The label carries crucial information about the proper rate, timing, and placement of the herbicide.
- **Calibrate accurately** — Equipment should be calibrated carefully and often. During calibration, check the equipment for leaks and malfunctions.
- **Measure accurately** — Concentrates need to be carefully measured before they are placed into the spray tank. Do not "add a little extra" to ensure the herbicide will do a better job. Such practices only increase the likelihood of injury to the treated crop, the cost of pest control, and the chance of groundwater contamination.
- **Avoid back-siphoning** — The end of the fill hose should remain above the water level in the spray tank at all times to prevent back-siphoning of chemical into the water supply. Use an anti-backflow device when siphoning water directly from a well, pond, or stream. These practices also reduce the likelihood of the hose's becoming contaminated with herbicides.
- **Consider weather and irrigation** — If you suspect heavy or sustained rain, delay applying herbicides. Control the quantity of irrigation to minimize the potential for herbicide leaching and runoff.
- **Clean up spills** — Avoid spills. When they do occur, contain and clean them up quickly with an absorbent material such as cat litter. Chemicals spilled near wells and sinkholes can move directly and rapidly into groundwater.
- **Change the location of mixing areas** — Mix and load pesticides on an impervious pad, if possible. If mixing is done in the field, change the location of the mixing area regularly. Do not mix herbicides adjacent to the well water source, and do not *let* the water run inadvertently on the soil near the mixing area. This will increase herbicide leaching.
- **Dispose of wastes properly** — All herbicide wastes must be disposed of in accordance with local, state, and federal laws. Triple-rinse containers. Pour the rinsewater into the spray tank for use in treating the site or the crop. *Do not* pour rinsate on the soil, particularly repeatedly in the same location. This will saturate the soil and increase the potential for herbicide leaching.
- **Store herbicides away from water sources** — Herbicide storage facilities should be situated away from wells, cisterns, springs, and other water sources.

Michigan's aquifers currently provide a vast supply of clean water for agriculture, homes, and industry. They can ensure high quality groundwater for future needs only if they are protected now. Be sure to understand how your activities, including herbicide usage, can affect them.

Effects on Non-target Organisms

Applying pesticides carelessly can harm non-target organisms that are beneficial to agriculture and our environment. It is crucial that we protect these species.

Bees and other pollinators

Bees and other pollinating insects are essential for successful production of many crops, such as deciduous tree fruits, small fruits, most seed crops and certain vegetables. Many pesticides, particularly insecticides, are highly toxic to pollinating honeybees and wild bees. Check herbicide labels to identify those that are toxic to bees. *Gramoxone Extra* (paraquat), for example, is an herbicide toxic to bees. Be aware of how bee poisonings can occur and how to prevent them.

The following precautions reduce the chance of bee poisoning.

- Do not apply herbicides (such as *Gramoxone Extra*) that are toxic to bees during bloom. Even shade trees and weeds should not be sprayed during bloom. Mow cover crops and weeds to remove blooms before spraying.
- Reduce drift during application. Aerial applications usually are more hazardous to bees than ground applications.
- Time pesticide applications carefully. Evening applications are less hazardous than early morning ones; both are safer than midday applications.
- Do not treat near hives. Bees may need to be moved or covered before you use insecticides near colonies.

Other beneficial insects and microorganisms

The best way to avoid injury of beneficial insects and micro-

organisms is to minimize herbicide usage. Use selective herbicides whenever possible and apply them only when necessary as part of a total pest management program.

Fish and other wildlife

Pesticides can be harmful to all kinds of vertebrates. Most recognizable are the direct effects from acute poisoning. Fish kills often are a direct result of water pollution by a pesticide. Pesticides can enter water via drift, surface runoff, soil erosion, leaching, and, in some cases, deliberate or careless release of pesticide directly into the water. Fish kills are most often caused by insecticide contamination of small ponds or streams with low water volume or turnover.

Bird kills from pesticides occur in a number of ways. Birds can ingest the toxicant in granules, baits, or treated seed; they may be exposed directly to the spray; they may consume a treated crop or drink or use contaminated water; they may feed on pesticide-contaminated prey.

To avoid environmental damage, use pesticides carefully, wisely and according to the instructions on the product labels.

Pesticide Storage and Disposal

Reduce the need for and the hazards of pesticide storage and disposal by buying only what will be used during a growing season and mixing only what is needed for each application. In addition, try to apply left-overs, water rinsates, etc. to the appropriate crop rather than storing or disposing of them. 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 herbicides separately from insecticides and fungicides to prevent possible interaction. Check the product label for specific storage instructions.

Always triple-rinse pesticide containers immediately after emptying. One-third of the container should be filled with water each time. Pour the container rinsate into the tank solution to be applied to the crop. After a triple rinse, crush or puncture the rinsed containers to prevent any misuse. Dispose of the triple-rinsed containers in a licensed sanitary landfill or recycle through a scrap metal dealer. Consult the telephone directory for scrap metal dealers and contact your nearest county Cooperative Extension Service office for the nearest landfills. Finally, read the pesticide product label for any important information on disposal procedures.

Endangered Species Act

To minimize the adverse impact of pesticides on endangered species, the EPA has initiated a new program, **The Endangered Species Act**. Every implicated pesticide will have an endangered species warning statement regarding use of the product within the geographic area where endangered species restrictions apply. Users must then obtain a county-specific endangered species bulletin, which will identify the specific area where use restrictions apply. Application of listed pesticides in the identified geographic areas in that county will be restricted or prohibited.

SARA Title III Emergency Planning and Community Right to Know Act.

The Community Right to Know law, under SARA Title III, requires farmers to notify their State Emergency Response Commission (SERC), Local Emergency Planning Committee and local fire department that they store extremely hazardous materials. Farmers should check with their state Department of Natural Resources or their Cooperative Extension Service county office to receive a list of EPA-established "extremely hazardous substances" and their threshold planning quantities. These groups may request maps of the storage facility and detailed lists of materials stored.

This law also requires that, in the event of a spill, the SERC, LEPC and National Response Commission be notified. The reportable quantities for spills are much less than for storage and can be obtained from the above sources.

Restricted Use Pesticides

Several herbicides are currently classified as Restricted Use Pesticides and as such, can be purchased and applied only by Certified Commercial or Private Pesticide Applicators. Certification of pesticide applicators is administered by the Michigan Department of Agriculture. The following list contains the herbicides included in this guide that are classified as Restricted Use Pesticides.

Aatrex
Arena
Atrazine
Bicep
Bladex
Bronco
Buctril
Buctril-Atrazine
Bullet
Cycle
Extrazine II
Gramoxone Extra
Laddok
Lariat
Lasso
Marksman
Micro-Tech Lasso
Sutazine

CHEMICALS FOR WEED CONTROL IN FIELD CROPS

IMPORTANT: READ THE FOLLOWING BEFORE USING

Rates are expressed in pounds of active ingredient (a.i.) per acre for the area actually sprayed; rates in formulation column are given as pounds or liquid measure of product unless otherwise noted.

(NOTE: Commercial rates are expressed in pt or qt or gal or lb).

Apply all agricultural chemicals in accordance with regulations and labels as to rates, timing and crops for which they may be used.

Rates recommended in this bulletin are for medium-textured soils with 3% or greater organic matter.

Many herbicides may also be applied as granules or impregnated on dry fertilizer. With these application methods, uniform application of the herbicide is necessary for acceptable weed control.

TABLE 1—CORN

PREPLANT — MINERAL SOIL

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves **Annual grasses** (including green foxtail, giant foxtail, fall panicum, witchgrass, crabgrass and sandbur) **Nutsedge**	atrazine (commercial product) + butylate *(Sutan Plus)*	1 + 4	1 qt 4L OR 1.1 lb 90% DG + 4¾ pt	• Must be incorporated or mixed into top 2 to 3 in. of soil. • *Bladex* may be included for more effective fall panicum control. (See remarks for three-way tank mixes, pg. 15.) • Commercial prepackaged mix of butylate and atrazine *(Sutazine)* is available. • Increase *Sutan Plus* rate to 6 pt/A for more effective nutsedge control. • Do not use on corn seed stocks (Breeders, Foundation, or Increase).
Annual broadleaves **Annual grasses** (including green foxtail, giant foxtail, fall panicum, witchgrass, and crabgrass) **Nutsedge**	atrazine (commercial product) + EPTC with protectant *(Eradicane)*	1 + 4	1 qt 4L OR 1.1 lb 90% DG + 4¾ pt	• *Eradicane Extra* is also available and should be used at the rate of 5 pt/A. • Must be incorporated or mixed into top 2 to 3 in. of soil. • Increase *Eradicane* rate to 6 pt/A for more effective nutsedge control. • *Bladex* may be included for more effective fall panicum control. (See remarks for three-way tank mixes, pg. 15.) • Do not apply *Eradicane* to fields that were treated with a thiocarbamate herbicide *(Eptam, Neet, Eradicane, Eradicane Extra, Sutan Plus)* the previous year. • Do not use on corn seed stocks (Breeders, Foundation, or Increase).

(Continued on next page)

CORN — PREPLANT — MINERAL SOIL (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued) **Annual broadleaves** **Annual grasses** (including green foxtail, giant foxtail, fall panicum, witchgrass and crabgrass) **Nutsedge**	atrazine (commercial product) + metolachlor *Dual)*	1 + 2	1 qt 4L OR 1.1 lb 90% DG + 1 qt	• Gives better nutsedge control if incorporated 2 to 3 in. • Will be more effective preplant, especially on nutsedge, in areas where soils tend to be dry. • *Bladex* may be included for more effective fall panicum control. (See remarks for three-way tank mixes, pg. 17.) • Incorporated *Dual* rate of one quart may give only fair control of some annual grasses (especially fall panicum) and nutsedge. • Commercial prepackaged mix of *Dual* plus atrazine (*BICEP*) is available.
	atrazine (commercial product) + alachlor *(Lasso, Arena, Micro-Tech Lasso)*	1 + 2½	1 qt 4L OR 1.1 lb 90% DG + 2½ qt	• For fair to good control of nutsedge, increase rate of *Lasso* to 3 qt/A. • Will be more effective preplant, especially on nutsedge, in areas where soils tend to be dry. • 2½ qt/A of *Lasso* should be used for effective fall panicum control. • *Bladex* may be included for more effective fall panicum control. (See remarks on three-way tank mixes, pg. 17.) • Prepackaged mixes of alachlor plus atrazine (*Bullet, Lariat*) are available.
	cyanazine *(Bladex)* + butylate *(Sutan Plus)*	1¾ + 4	1¾ qt 4L OR 1.9 lb 90% DF + 4¾ pt	• Do not use on corn seed stocks (Breeders, Foundation, or Increase). • Must be incorporated or mixed into top 2 to 3 in. of soil immediately after application. • No residue carryover. • Can be used where residue problems have existed with atrazine. • Increase *Sutan Plus* rate to 6 pt for more effective nutsedge control. • Both materials weak on pigweed.
	cyanazine *(Bladex)* + alachlor *(Lasso, Arena, Micro-Tech Lasso)*	1¾ + 2½	1¾ qt 4L OR 1.9 lb 90% DF + 2½ qt	• No residue carryover. • Can be used where residue problems have existed with atrazine.
	cyanazine *(Bladex)* + metolachlor *(Dual)*	1¾ + 2	1¾ qt 4L OR 1.9 lb 90% DF + 1 qt	• No residue carryover. • Can be used where residue problems have existed with atrazine. • Prepackaged mix of *Dual* plus cyanazine (*Cycle* [1:17]) is available.

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CORN — PREPLANT — MINERAL SOIL (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves	atrazine	½	½ qt 4L	• NOTE SPECIFIC REMARKS ABOVE FOR *SUTAN PLUS, ERADICANE, DUAL,* AND *LASSO.*
Annual grasses	(commercial product)		OR	• Can be used to reduce risk of atrazine carryover.
(including green foxtail, giant foxtail, fall panicum, witchgrass, and crabgrass)*(Bladex)*			⅗ lb 90% DG	• The preferred treatment where fall panicum is a problem.
Nutsedge	+	+	+	• May substitute *Princep* for atrazine if fall panicum is a severe problem.
	cyanazine	1¼	1¼ qt 4L	• *Eradicane Extra* is also available and should be used at the rate of 5 pt/A.
			OR	• Do not apply *Eradicane* to fields that were treated with a thiocarbamate herbicide the previous year.
	+	+	1.4 lb 90% DF	• Prepackaged mix of *Bladex* plus atrazine (*Extrazine II* [3:1]) is available.
	butylate *(Sutan Plus)*	4	+	
	OR	OR	4¾ pt	
	EPTC with protectant *(Eradicane)*	4	OR	
	OR	OR	4¾ pt	
	metolachlor *(Dual)*	2	OR	
	OR	OR	1 qt	
	alachlor *(Lasso, Arena, Micro-Tech Lasso)*	2½	OR	
			2½ qt	

CORN — PREPLANT FOLLOWED BY POSTEMERGENCE — MINERAL SOIL

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves **Annual grasses**	*Sutan Plus, Eradicane, Eradicane Extra, Lasso, Arena, Micro-Tech Lasso,* or *Dual* as listed under "Corn — Preplant — Mineral Soil" section, page 15. FOLLOWED BY: See "Corn — Postemergence — Mineral Soil" section, page 20.			

CORN — PREEMERGENCE — MINERAL SOIL

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
	atrazine	1	1 qt 4L	• 2½ qt/A of *Lasso, Arena,* or *Micro-Tech Lasso* should be used for more effective fall panicum control.
	(commercial product)		OR	• *Bladex* may be included for more effective fall panicum control. (See remarks for three-way tank mixes, pg. 18.)
			1.1 lb 90% DG	• Prepackaged mixes of alachlor plus atrazine (*Bullet, Lariat*) are available.
	+	+	+	
	alachlor *(Lasso, Arena, Micro-Tech Lasso)*	2	2 qt	
	atrazine	1	1 qt 4L	• *Bladex* may be included for more effective fall panicum control. (See remarks for three-way tank mixes, pg. 18.)
	(commerical product)		OR	
			1.1 lb 90% WDG	
	+	+	+	
	metolachlor *(Dual)*	2	1 qt	
Annual broadleaves **Annual grasses** (including fall panicum, green foxtail, giant foxtail, witchgrass, and crabgrass)	atrazine	1	1 qt 4L	• APPLY AFTER PLANTING.
	(commercial product)		OR	• DO NOT INCORPORATE.
			1.1 lb 90% DG	• Do not use on sandy soil with less than 1.5% organic matter.
	+	+	+	• *Bladex* may be included for more effective fall panicum control. (See remarks for three-way tank mixes, below.)
	pendimethalin *(Prowl)*	1½	1½ qt	• Do not use on no-till corn.

(Continued on next page)

CORN — PREEMERGENCE — MINERAL SOIL (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued) **Annual broadleaves** **Annual grasses** (including fall panicum, green foxtail, giant foxtail, witchgrass, and crabgrass)	cyanazine *(Bladex)* + alachlor *(Lasso, Arena, Micro-Tech Lasso)*	1¾ + 2	1¾ qt 4L OR 1.9 lb 90% DF + 2 qt	• Can be used where residue problems have existed with atrazine.
	cyanazine *(Bladex)* + metolachlor *(Dual)*	1¾ + 2	1¾ qt 4L OR 1.9 lb 90% DF + 1 qt	• Can be used where residue problems have existed with atrazine. • Prepackaged mix of *Dual* plus cyanazine (*Cycle* [1:17]) is available.
	cyanazine *(Bladex)* + pendimethalin *(Prowl)*	1¾ + 1½	1¾ qt 4L OR 1.9 lb 90% DF + 1½ qt	• APPLY AFTER PLANTING. • Do not use on sandy soils with less than 1.5% organic matter. • Both materials weak on pigweed. • Do not use on no-till corn.
	atrazine (commercial product) + cyanazine *(Bladex)* + alachlor *Lasso, Arena, Micro-Tech Lasso)* OR pendimethalin *(Prowl)* OR metolachlor *(Dual)*	½ + 1¼ + 2 OR 1½ OR 2	½ qt 4L OR ⅗ lb 90% DG + 1¼ qt 4L OR 1.4 lb 90% DF + 2 qt OR 1½ qt 1 qt	• Can be used to reduce risk of atrazine carryover. • See specific remarks for alachlor, metolachlor and pendimethelin in combination with atrazine. • The preferred treatment where fall panicum is a problem. • May substitute *Princep* for atrazine if fall panicum is a severe problem. • Prepackaged mix of *Bladex* plus atrazine (*Extrazine II* [3:1]) is available.
	cyanazine *(Bladex)* + atrazine (commercial product)	1¾ + ¾	1¾ qt 4L OR 1.9 lb 90% DF + ¾ qt 4L OR ⅘ lb 90% DG	• Adjust *Bladex* rate according to soil type (refer to *Bladex* label for details.). • Do not use on sands or loamy sands with less than 1% organic matter. • Will not control yellow nutsedge. • Prepackaged mix of *Bladex* plus atrazine (*Extrazine II* [3:1]) is available.

CORN — PREEMERGENCE FOLLOWED BY POSTEMERGENCE — MINERAL SOIL

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves **Annual grasses**	*Lasso, Arena, Micro-Tech Lasso, Prowl,* or *Dual* as listed under "Corn — Preemergence — Mineral Soil" section, page 15. FOLLOWED BY: See "Corn — Postemergence — Mineral Soil" section, page 17.			

CORN — PREEMERGENCE FOLLOWED BY POSTEMERGENCE — ORGANIC SOIL

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses **Annual broadleaves**	propachlor *(Ramrod)* FOLLOWED BY:	5	5 qt	• Must be followed with a postemergence treatment for control of broadleaved weeds.
	See "Corn — Postemergence — Organic Soil" section, page 20.			

CORN — POSTEMERGENCE — MINERAL SOIL

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves (except smartweed and wild buckwheat)	2,4-D amine	½	1 pt	• For corn over 6 to 8 in., use drop nozzles. • Ester formulations will cause more crop injury and are not recommended. • Oil-soluble amines of 2,4-D *(Dacamine, Weedar E-3)* are available and are used at lower rates. • Use drift control additives with some 2,4-D amine products to reduce risk of spray particle drift. Check product label. • Not effective on smartweed or wild buckwheat. • Hybrids vary in tolerance. • Most effective when weeds are small (2 to 4 in.).
Annual broadleaves (including smartweed and wild buckwheat)	dicamba *(Banvel)*	½	1 pt	• Apply postemergence to corn from emergence up to the 5-leaf stage or 8 in. tall, whichever comes first. For larger corn, reduce rate to ½ pt/A. • For corn over 8 in., use drop nozzles. • USE EXTREME CAUTION. DRIFT TO NEARBY SENSITIVE CROPS IS A HAZARD. • To reduce the risk of volatilization, do not apply if the air temperature is expected to exceed 85° F on the day of application. • Use pressure no greater than 20 psi. • Do not apply if soybeans in the vicinity are over 10 in. tall or have begun to bloom. • Drift control agents may be used to reduce the risk of spray particle drift.
Annual broadleaves	dicamba *(Banvel)* + atrazine (commercial product)	½ + 1	1 pt + 1 qt 4L OR 1.1 lb 90% DG	• Do not apply if soybeans in the vicinity are over 10 in. tall or have begun to bloom. • Drift control agents may be used to reduce the risk of spray particle drift. • Use lower rates on coarser soils or soils low in organic matter. • Apply postemergence to corn from emergence up to the 5-leaf stage or 8 in. tall, whichever comes first. For larger corn, reduce *Banvel* rate to ½ pt/A. • Treatment must follow a preplant-incorporated or pre-emergence herbicide application for grass control. • Do not use with crop oil concentrate or other additives. • See additional remarks and limitations for dicamba *(Banvel)*. • Commercial prepackaged mix of dicamba and atrazine *(Marksman)* is available.
	bentazon *(Basagran)* + crop oil concentrate	1 + 1 qt	1 qt + 1 qt	• Use a minimum of 40 psi and 20 gal of water/A. • Weak on pigweed, nightshade, and lambsquarters. • Corn is tolerant to *Basagran* at all growth stages. For best results, apply early to small weeds. • Urea ammonium nitrate (28% liquid nitrogen) may be used at 1 gal/A instead of crop oil concentrate for improved velvetleaf control. Do not use urea ammonium nitrate if common lambsquarters is present.

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CORN — POSTEMERGENCE — MINERAL SOIL (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves	bentazon *(Basagran)* + atrazine (commercial product) + crop oil concentrate	¾ + ¾ + 1 qt	¾ qt + ¾ qt 4L OR 0.8 lb 90% DG + 1 qt	• Gives better control of some broadleaf weeds, especially pigweed, than *Basagran* alone. • Combination reduces risk of carryover from post-emergence application of atrazine alone. • Urea ammonium nitrate (28% liquid nitrogen) may be used at 1 gal/A instead of crop oil concentrate. Do not use urea ammonium nitrate if common lambsquarters is present. • Commercial prepackaged mix of *Basagran* plus atrazine *(Laddok)* is available.
	bromoxynil *(Buctril)*	⅜	1½ pt 2E	• For best results, weeds must be small (see label for details). • Do not mix with spray additives or liquid fertilizers. • For ground applications, use minimum of 20 gal of water/A and 30 psi. • Apply to corn between the 4-leaf stage (4 visible leaves) and the 8-leaf stage. • Redroot pigweed and mustard must be controlled when very small (refer to label for details).
	bromoxynil *(Buctril)* + atrazine (commercial product)	¼ + ½	1 pt 2E + ½ qt 4L OR 0.6 lb 90% DG	• Apply to weeds less than 4 in. tall for effective control. • Apply to corn between the 3-leaf stage (3 leaves visible) and the 8-leaf stage. • Do not mix with spray additives or liquid fertilizers. • Better control of redroot pigweed and wild mustard than *Buctril* alone. • Combination reduces risk of carryover from post-emergence application of atrazine alone. • Prepackaged mix *(Buctril-Atrazine)* is available.
ONLY ragweed, cocklebur, jimsonweed, Canada thistle, sowthistle, and Jerusalem artichoke	clopyralid *(Stinger)*	0.188	½ pt	• Apply to field corn up to 24 in. tall. • Do not graze or harvest treated corn silage as feed within 40 days after treatment. • Apply in 10 gal. of water or more per acre. • Treat ragweed, cocklebur, jimsonweed, and Jerusalem artichoke up to the 5-leaf stage. • Treat Canada thistle between rosette stage (at least 4 in.) and bud stage. Rate may be increased to ⅔ pt/A for Canada thistle control. Do not cultivate prior to application or within 20 days after application. • Do not apply more than ⅔ pt per acre per year.
Annual broadleaves **Annual grasses** (except green foxtail, giant foxtail, fall panicum, witchgrass, and crabgrass)	atrazine (commercial product) + crop oil concentrate	2 + 1 qt	2 qt 4L OR 2⅕ lb 90% DG + 1 qt	• Emergency use. • Grasses must be less than 1½ in. tall. • TIMING OF APPLICATION IS CRITICAL TO GET BEST RESULTS. • Surfactant at 1 pt/A may be used in place of crop oil concentrate but is less effective. • Greater chance for carryover because treatment is later in season. • Do not add *Banvel* or 2,4-D or crop injury may occur.
Annual broadleaves **Annual grasses** (except fall panicum and witchgrass)	cyanazine *(Bladex)*	2	2.2 lb 90% DF	• USE WETTABLE POWDER OR DRY FLOWABLE ONLY. • Apply before weeds are 1½ in. tall. • Apply postemergence through the 4-leaf stage of corn (before 5th leaf is visible). • Some temporary stunting of corn may occur, especially in sandy soil. • Do not use with crop oil concentrate or other additives or severe crop injury may occur. • Application rate is lower if treatment follows a previous *Bladex* or *Extrazine II* application. See label.

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CORN — POSTEMERGENCE — MINERAL SOIL (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves **Annual grasses** (except fall panicum and witchgrass)	cyanazine *(Bladex)* + atrazine (commercial product)	1½ + ½	1.7 lb 90% DF + ⅜ lb 90% DG	• USE WETTABLE POWDER OR DRY FLOWABLE ONLY. • Apply before weeds are 1½ in. tall. • Apply postemergence through the 4-leaf stage of corn (before 5th leaf is visible). • Application rate is lower if treatment follows a previous *Bladex* or *Extrazine II* application. See label. • Some temporary stunting of corn may occur. • Do not use with crop oil concentrate or other additives or severe crop injury may occur. • Prepackaged mix of *Bladex* plus atrazine (*Extrazine II* [3:1]) is available.
Annual grasses (except crabgrass) **Pigweed, Smartweed, Jimsonweed**	nicosulfuron *(Accent)* + crop oil concentrate OR surfactant	0.03125 + 1% + ¼%	⅔ oz. 75% DF + 1% + ¼%	• Apply to small, actively growing grasses (giant foxtail, yellow foxtail up to 4 in.; fall panicum up to 3 in.; green foxtail up to 2 in.; barnyard grass up to 6 in.; pigweed, smartweed up to 4 in.; jimsonweed up to 3 in.) • A second application may be made 2 to 4 weeks later. Do not apply more than 1⅓ oz. per acre in one season. • Crop oil concentrate or surfactant must be added to obtain adequate control. Liquid nitrogen fertilizer (28% N) added at 4% (4 gal/100 gal) in addition to crop oil concentrate or surfactant may improve control of certain species. • Apply to corn between the 2-leaf and 6-leaf stage. • Cultivation 10 to 14 days after treatment may improve control. • Do not apply to corn previously treated with any formulation of *Counter* insecticide. • Do not apply to corn that has been treated within seven days before with foliar-applied organophosphate insecticides such as *Lorsban* or malathion or with the herbicides *Basagran* or *Laddok* as severe injury may result. Do not apply these materials within three days after Accent application. • Refer to Table 22, pg. 110 for rotation crop restrictions. • Refer to label for special sprayer cleanup instructions. • Do not apply through any type of irrigation system. • Do not harvest for 30 days after treatment.

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CORN — POSTEMERGENCE — MINERAL SOIL (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves **Fall panicum**	primisulfuron *(Beacon)* + crop oil concentrate OR surfactant	0.0356 + 1% OR ¼%	0.76 oz. 75% DG + 1% OR ¼%	• Apply to small, actively growing weeds (fall panicum up to 2 in.; ragweed up to 9 in.; cocklebur, nightshade, jimsonweed, smartweed, pigweed, velvetleaf up to 4 in.) • The recommended rate may be split into two applications. The second application of the split should be made when the new weed growth is at the optimum height. Do not apply more than 0.76 oz. of *Beacon* per acre in one season. • Crop oil concentrate or surfactant must be added to obtain adequate results. Liquid nitrogen fertilizer (28% N) added at 4% (4 gal/100 gal) in addition to crop oil concentrate or surfactant may improve control of certain species. • Apply to corn between 4 in. and 20 in. in height. • Cultivation 10 to 14 days after treatment may improve control. • Do not apply to corn previously treated with any formulation of *Counter* insecticide. If organophosphate insecticides other than *Counter* are applied at planting time, wait at least 20 days after planting to apply *Beacon.* • Do not treat with a foliar-applied organophosphate insecticide such as *Lorsban* or malathion or with *Basagran* or *Laddok* within 10 days before or after *Beacon* application. • A small number of corn hybrids are classified as "potentially susceptible." Use of *Beacon* on these hybrids is not recommended. Consult the chemical dealer, seed dealer, or manufacturer for the current list of potentially susceptible hybrids. • Refer to Table 22, pg. 110 for rotation crop restrictions. • Refer to label for special sprayer cleanup instructions. • Apply in a minimum of 10 gal. of water per acre. • Do not apply through any type of irrigation system. • Do not harvest for 30 days after treatment. • Sold in water-soluble pouches. One pouch treats 2 acres.

CORN — POSTEMERGENCE — ORGANIC SOIL

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves (except smartweed and wild buckwheat)	2,4-D amine	½	1 pt	• For corn over 6 to 8 in., use drop nozzles. • Most effective when weeds are small (2 to 4 in.) • Ester formulations will cause more crop injury and are not recommended. • Oil-soluble amines of 2,4-D *(Dacamine, Weedar E-3)* are available and are used at lower rates. • Use drift control additives with some 2,4-D amine products to reduce risk of spray particle drift. Check the product label. • Not effective on smartweed or wild buckwheat. • Hybrids vary in tolerance.

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CORN — POSTEMERGENCE — ORGANIC SOIL (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued) **Annual broadleaves**	dicamba *(Banvel)*	½ lb	1 pt	• Apply postemergence to corn from emergence up to the 5-leaf stage or 8 in. tall, whichever comes first. For larger corn, reduce rate to ½ pt/A. • For corn over 8 in., use drop nozzles. • USE EXTREME CAUTION. DRIFT TO NEARBY SENSITIVE CROPS IS A HAZARD. • Use pressure no greater than 20 psi. • Do not apply if soybeans in the vicinity are over 10 in. tall or have begun to bloom. • Drift control agents may be used to reduce drift danger. • To reduce the risk of volatilization do not apply if the air temperature is expected to exceed 85° F on the day of application.
	dicamba *(Banvel)* + atrazine (commercial product)	½ + 1	1 pt + 1 qt 4L OR 1.1 lb 90% DG	• Do not apply if soybeans in the vicinity are over 10 in. tall or have begun to bloom. • Drift control agents may be used to reduce the risk of spray particle drift. • Apply postemergence to corn from emergence up to the 5-leaf stage or 8 in. tall, whichever comes first. For larger corn, reduce *Banvel* rate to ½ pt/A. • Treatment must follow a preplant-incorporated or preemergence herbicide application for grass control. • Do not use with crop oil concentrate or other additives. • See additional remarks and limitations for dicamba *(Banvel)*. • Commercial prepackaged mix of dicamba and atrazine *(Marksman)* is available.
	bentazon *(Basagran)* + crop oil concentrate	1 + 1 qt	1 qt + 1 qt	• Use a minimum of 40 psi and 20 gal of water/A. • Weak on pigweed, nightshade, and lambsquarters. • Corn is tolerant to *Basagran* at all growth stages. However, best results are obtained with early applications to small weeds. • Urea ammonium nitrate (28% liquid nitrogen) may be used at 1 gal/A instead of crop oil concentrate for improved velvetleaf control. Do not use urea ammonium nitrate if common lambsquarters is present.
	bentazon *(Basagran)* + atrazine (commercial product) + crop oil concentrate	¾ + ¾ + 1 qt	¾ qt + ¾ qt 4L OR 0.8 lb 90% DG + 1 qt	• Use a minimum of 40 psi and 20 gal of water/A. • Gives better control of some broadleaf weeds, especially pigweed, than *Basagran* alone. • Combination reduces risk of carryover from post-emergence application of atrazine alone. • Urea ammonium nitrate (28% liquid nitrogen) may be used at 1 gal/A instead of crop oil concentrate. Do not use urea ammonium nitrate if common lambsquarters is present. • Commercial prepackaged mix of *Basagran* plus atrazine *(Laddok)* is available.
	bromoxynil *(Buctril)*	⅜	1½ pt 2E	• For best results, weeds must be small (see label for details). • Apply to corn between the 4-leaf stage (4 visible leaves) and the 8-leaf stage. • Do not mix with spray additives or liquid fertilizers. • For ground application, use minimum of 20 gal of water/A and 30 psi. • Redroot pigweed and mustard must be controlled when very small (refer to label for details).

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CORN — POSTEMERGENCE — ORGANIC SOIL (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued) **Annual broadleaves**	bromoxynil *(Buctril)*	¼	1 pt 2E	• Apply to weeds less than 4 in. tall for effective control. • Apply to corn between the 3-leaf stage (3 leaves visible) and the 8-leaf stage. • Do not mix with spray additives or liquid fertilizers. • Better control of redroot pigweed and wild mustard than *Buctril* alone. • Combination reduces risk of carryover from post-emergence application of atrazine alone. • Prepackaged mix *(Buctril-Atrazine)* is available.
	+	+	+	
	atrazine (commercial product)	½	½ qt 4L OR 0.6 lb 90% DG	
ONLY ragweed, cocklebur, jimsonweed, Canada thistle, sowthistle, and Jerusalem artichoke	clopyralid *(Stinger)*	0.188	½ pt	• Apply to field corn up to 24 in. tall. • Do not graze or harvest treated corn silage as feed within 40 days after treatment. • Apply in 10 gal. of water or more per acre. • Treat ragweed, cocklebur, jimsonweed, and Jerusalem artichoke up to the 5-leaf stage. • Treat Canada thistle between rosette stage (at least 4 in.) and bud stage. Rate may be increased to ⅔ pt/A for Canada thistle control. Do not cultivate prior to application or within 20 days after application. • Do not apply more than ⅔ pt. per acre per year.
Annual broadleaves **Annual grasses** (except fall panicum, green foxtail, giant foxtail, witchgrass, and crabgrass)	atrazine (commercial product)	3	3 qt 4L OR 3½ lb 90% DG	• Emergency use. • Grasses should be less than 1½ in. tall. • Timing of application is critical to get best results. • Surfactants at 1 pt/A may be used in place of crop oil concentrate but are less effective. • Greater chance for carryover because treatment is later in the season. • Do not add *Banvel* or 2,4-D or injury may occur.
	+	+	+	
	crop oil concentrate	1 qt	1 qt	
	cyanazine *(Bladex)*	2	2.2 lb 90% DF	• USE WETTABLE POWDER OR DRY FLOWABLE ONLY. • Apply before weeds are 1½ in. tall. • Apply postemergence through the 4-leaf stage of corn (before 5th leaf is visible). • Some temporary stunting of corn may occur. • Do not use with crop oil concentrate or other additives or severe crop injury may occur. • Application rate is lower if treatment follows a previous *Bladex* or *Extrazine II* application. See label.
	cyanazine *(Bladex)*	1½	1.7 lb 90% DF	• USE WETTABLE POWDER OR DRY FLOWABLE ONLY. • Apply before weeds are 1½ in. tall. • Apply postemergence through the 4-leaf stage of corn (before 5th leaf is visible). • Application rate is lower if treatment follows a previous *Bladex* or *Extrazine II* application. See label. • Some temporary stunting of corn may occur. • Do not use with crop oil concentrate or other additives or severe crop injury may occur. • Prepackaged mix of *Bladex* plus atrazine (*Extrazine II* [3:1]) is available.
	+	+	+	
	atrazine (commercial product)	½	⅜ lb 90% DG	

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CORN — POSTEMERGENCE — ORGANIC SOIL (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses (except crabgrass) **Pigweed, Smartweed, Jimsonweed**	nicosulfuron *(Accent)* + crop oil concentrate OR + surfactant	0.03125 + 1% + ¼%	⅔ oz. 75% DF + 1% + ¼%	• Apply to small, actively growing grasses (giant foxtail, yellow foxtail up to 4 in.; fall panicum up to 3 in.; green foxtail up to 2 in.; barnyard grass up to 6 in.; pigweed, smartweed up to 4 in.; jimsonweed up to 3 in.) • A second application may be made 2 to 4 weeks later. Do not apply more than 1⅓ oz. per acre in one season. • Crop oil concentrate or surfactant must be added to obtain adequate control. Liquid nitrogen fertilizer (28% N) added at 4% (4 gal/100 gal) in addition to crop oil concentrate or surfactant may improve control of certain species. • Apply to corn between the 2-leaf and 6-leaf stage. • Cultivation 10 to 14 days after treatment may improve control. • Do not apply to corn previously treated with any formulation of *Counter* insecticide. • Do not apply to corn that has been treated within seven days before with foliar-applied organophosphate insecticides such as *Lorsban* or malathion or with the herbicides *Basagran* or *Laddok* as severe injury may result. Do not apply these materials within three days after Accent application. • Refer to Table 22, pg. 110 for rotation crop restrictions. • Refer to label for special sprayer cleanup instructions. • Do not apply through any type of irrigation system. • Do not harvest for 30 days after treatment.

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CORN — POSTEMERGENCE — ORGANIC SOIL (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves **Fall panicum**	primisulfuron *(Beacon)* + crop oil concentrate OR surfactant	0.0356 + 1% OR ¼%	0.76 oz. 75% DG + 1% OR ¼%	• Apply to small, actively growing weeds (fall panicum up to 2 in.; ragweed up to 9 in.; cocklebur, nightshade, jimsonweed, smartweed, pigweed, velvetleaf up to 4 in.) • The recommended rate may be split into two applications. The second application of the split should be made when the new weed growth is at the optimum height. Do not apply more than 0.76 oz. of *Beacon* per acre in one season. • Crop oil concentrate or surfactant must be added to obtain adequate results. Liquid nitrogen fertilizer (28% N) added at 4% (4 gal/100 gal) in addition to crop oil concentrate or surfactant may improve control of certain species. • Apply to corn between 4 in. and 20 in. in height. • Cultivation 10 to 14 days after treatment may improve control. • Do not apply to corn previously treated with any formulation of *Counter* insecticide. If organophosphate insecticides other than *Counter* are applied at planting time, wait at least 20 days after planting to apply *Beacon.* • Do not treat with a foliar-applied organophosphate insecticide such as *Lorsban* or malathion or with *Basagran* or *Laddok* within 10 days before or after *Beacon* application. • A small number of corn hybrids are classified as "potentially susceptible." Use of *Beacon* on these hybrids is not recommended. Consult the chemical dealer, seed dealer, or manufacturer for the current list of potentially susceptible hybrids. • Refer to Table 22, pg. 110 for rotation crop restrictions. • Refer to label for special sprayer cleanup instructions. • Apply in a minimum of 10 gal. of water per acre. • Do not apply through any type of irrigation system. • Do not harvest for 30 days after treatment. • Sold in water-soluble pouches. One pouch treats 2 acres.

CORN — POSTEMERGENCE DIRECTED — ALL SOILS

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves **Annual grasses**	ametryne *(Evik)* + surfactant	1⅗ + ½%	2 lb + ½%	• CAUTION—KEEP OFF CORN FOLIAGE. • Do not use before corn is 12 in. tall. • Emergency use. • Use drop nozzles or directed spray. • Generally more effective on annual grasses than *Lorox* or *Linex*. • See label for maximum weed size. Selectivity is based on tall corn and small weeds.

(Continued on next page)

CORN — POSTEMERGENCE DIRECTED — ALL SOILS (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves **Annual grasses**	linuron *(Lorox or Linex)*	1½	3 pt 4L OR 3 lb 50% DF	• CAUTION—KEEP OFF CORN FOLIAGE. • Do not use before corn is 15 in. tall. • Emergency use.
	+ surfactant	+ ½%	+ ½%	• Use drop nozzles or directed spray. • Use lower rates on lighter soils or soils low in organic matter. • For control of small weeds not over 2 in. tall. Selectivity is based on tall corn and small weeds.
	paraquat *(Gramoxone Extra)*	0.25	0.8 pt	• CAUTION—KEEP OFF CORN FOLIAGE. • Do not use before corn is at least 10 in. tall.
	+ surfactant	+ ¼%	+ ¼%	• Emergency use. • Use drop nozzles or directed spray. • Arrange nozzles to spray no higher than the lower 3 in. of the corn stalks. • Leaves exposed to the spray will be burned. • Do not mix with liquid fertilizer. • Use caution to avoid spray drift.

CORN — SPECIAL WEED PROBLEMS — QUACKGRASS

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Preplant, preemergence **Quackgrass**	atrazine (commercial product)	1½ + 1½	1½ qt 4L OR 1.7 lb 90% DG	• Split application: Apply 1½ lb/A preplant and 1½ lb/A preemergence or preplant incorporated to give suppression of quackgrass and annual weeds. • Wait at least 1 week after preplant application before plowing. • Preplant application can be done in spring only. • Quackgrass should be at least 4 in. tall for preplant application. • When a total of 3 lb of atrazine is applied, carryover injury to sensitive crops is likely. • Do not apply more than 3 lb of atrazine per acre per year. • Avoid sites vulnerable to groundwater contamination.
Preplant incorporated **Quackgrass**	atrazine (commercial product)	1	1 qt 4L OR 1.1 lb 90% DG	• Incorporate to a depth of 4 to 5 in. immediately after application with a disk, 2 times in opposite directions.
	+ EPTC with protectant *(Eradicane)*	+ 6	+ 3½ qt	• Quackgrass control with minimum soil residue or carryover. • Will also give nutsedge control. • *Eradicane Extra* is also available and should be used at the rate of 4 qt/A. • Do not apply *Eradicane* to fields that were treated with a thiocarbamate herbicide (*Eptam, Ro-Neet, Eradicane, Eradicane Extra, Sutan Plus*) the previous year.
Postemergence **Quackgrass**	atrazine (commercial product)	1½ + 1½	1½ qt 4L OR 1.7 lb 90% DG	• Apply when quackgrass is 2 to 4 in. tall, and again 10 to 14 days later for more complete control. • When a total of 3 lb of atrazine is applied, carryover injury to sensitive crops is likely.
	+ crop oil concentrate	+ 1 qt + 1 qt	+ 1 qt	• Do not apply more than 3 lb of atrazine per acre per year. • Avoid sites vulnerable to groundwater contamination. • Do not apply to corn over 12 inches in height. • Spring applications only.

(Continued)

CORN — SPECIAL WEED PROBLEMS — QUACKGRASS

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Preplant **Quackgrass**	glyphosate *(Roundup)*	1½	2 qt	• Apply in the fall or before planting in the spring. • Fall applications generally more effective. • Apply to actively growing quackgrass at least 8 in. tall. • Use 10 to 40 gal of water/A. • Use flat fan nozzles. • No soil residue. • Can plow or till 3 days after application and plant crop. • Do not plow or till prior to treatment. • *Roundup* rate of 1 qt may be used for *single season* quackgrass control. Apply 1 qt in 5 to 10 gal of water/A with 0.5% non-ionic surfactant. This treatment is less effective on an undisturbed quackgrass sod.
	glyphosate *(Ranger)*	¾	3 pt	• Apply in the fall or before planting in the spring. • Fall applications generally more effective. • Apply to actively growing quackgrass at least 8 in. tall. • Use 5 to 10 gal of water/A. • Use flat fan nozzles. • Additional surfactant is not needed with Ranger. • Field may be tilled and planted 3 days after application. • Will provide similar quackgrass control as *Roundup* applied at 1 qt/A plus non-ionic surfactant.
Postemergence Quackgrass	nicosulfuron *(Accent)* + crop oil concentrate OR surfactant	0.03125 + 1% OR ¼%	⅔ oz. 75% DF + 1% OR ¼%	• Apply to actively growing quackgrass 6 to 8 in. in height. • A second application or cultivation 10 to 14 days later may improve control. Do not apply more than 1⅓ oz. of *Accent* per acre in one season. • See additional remarks and limitations for *Accent* under "Corn — Postemergence" section, page 19.
	primisulfuron *(Beacon)* + crop oil concentrate OR surfactant	0.0356 + 1% OR ¼%	0.76 oz. 75% DG + 1% OR ¼%	• Apply to actively growing quackgrass 6 to 8 in. in height. • A split application of 0.38 oz. per acre followed 10 to 14 days later with a second application may improve control. Do not apply more than 0.76 oz. of *Beacon* per acre in one season. • Cultivation 10 to 14 days after treatment may improve control. • See additional remarks and limitations for *Beacon* under "Corn — Postemergence" section, page 20.

CORN — SPECIAL WEED PROBLEMS — NUTSEDGE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Preplant incorporated **Nutsedge**	butylate *(Sutan Plus)*	5	3 qt	• Preplant incorporated to a depth of 2 to 3 in. • Control of annual grasses. • Combine or follow with another herbicide (see "Preplant — Mineral Soil" and "Postemergence — Mineral Soil" sections) for additional broadleaf weed control.
	EPTC *(Eradicane)*	5	3 qt	• Preplant incorporated to a depth of 2 to 3 in. • Control of annual grasses. • Combine or follow with another herbicide (see "Preplant — Mineral Soil" and "Postemergence — Mineral Soil" sections) for additional broadleaf control. • *Eradicane Extra* is also available and should be applied at the rate of 3½ qt/A. • Do not apply *Eradicane* to fields that were treated with a thiocarbamate herbicide (*Eptam, Ro-Neet, Eradicane, Eradicane Extra, Sutan Plus*) the previous year.

(Continued on next page)

CORN — SPECIAL WEED PROBLEMS — NUTSEDGE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued) **Preplant incorporated Nutsedge**	metolachlor *(Dual)*	2½	1¼ qt	• Preplant incorporated to a depth of 2 to 3 in. for consistent nutsedge control. • Control of annual grasses. • Combine or follow with another herbicide (see "Preplant — Mineral Soil" and "Postemergence — Mineral Soil" sections) for additional broadleaf weed control.
	alachlor *(Lasso, Arena, Micro-Tech Lasso)*	3	3 qt	• Preplant incorporated to a depth of 2 to 3 in. for consistent nutsedge control. • Control of annual grasses. • Combine or follow with another herbicide (see "Preplant — Mineral Soil" and "Postemergence — Mineral Soil" sections) for additional broadleaf weed control.
Postemergence **Nutsedge**	bentazon *(Basagran)* + crop oil concentrate	¾ + ¾ + 1 qt + 1 qt	1½ pt + 1 qt	• Two applications required for best nutsedge control. • Controls some broadleaves also. Check label. • Treat when nutsedge is 6 to 8 in. tall and again 7 to 10 days later. • Use a minimum of 40 psi and 20 gal of water/A. Do not use flood nozzles.
	atrazine (commercial product) + crop oil concentrate	1½ + 1½ + 1 qt + 1 qt	1½ qt 4L OR 1.7 lb 90% DG + 1 qt	• Apply 1½ lb of atrazine/A when nutsedge is 2 in. tall, and apply 1½ lb/A atrazine 10 to 14 days later. • When a total of 3 lb of atrazine is applied, carryover injury to sensitive crops is likely. • Do not apply more than 3 lb of atrazine per acre per year. • Avoid sites vulnerable to groundwater contamination. • Do not apply to corn over 12 inches in height. • Spring applications only.

CORN — SPECIAL WEED PROBLEMS — CANADA THISTLE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Postemergence **Canada Thistle**	bentazon *(Basagran)* + crop oil concentrate	1 + 1 + 1 qt + 1 qt	1 qt + 1 qt	• Two applications required for adequate Canada thistle control. • Treat when Canada thistle is 8 to 10 in. and again 7 to 10 days later. • Use a minimum of 40 psi and 20 gal of water/A. Do not use flood nozzles.
	atrazine (commercial product) + crop oil concentrate	1½ + 1½ + 1 qt + 1 qt	1½ qt 4L OR 1.7 lb 90% DG + 1 qt	• Apply 1½ lb of atrazine/A when Canada thistle is 6 to 8 in. tall, and again 10 to 14 days later. • When a total of 3 lb of atrazine is applied, carryover injury to sensitive crops is likely. • Do not apply more than 3 lb of atrazine per acre per year. • Avoid sites vulnerable to groundwater contamination. • Do not apply to corn over 12 inches in height. • Spring applications only.
	dicamba *(Banvel)*	¼ + ¼	½ pt + ½ pt	• Treat when Canada thistle is 6 to 8 in. tall and again 10 to 14 days later. • Application rate of the first treatment may be increased to ½ lb/A (1 pt/A) if the corn is in the 5-leaf stage (8 in.) or less. • For corn over 8 in., use drop nozzles. • See additional remarks and limitations for dicamba (pg. 18).

(Continued on next page)

CORN — SPECIAL WEED PROBLEMS — CANADA THISTLE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Postemergence **Canada thistle**	clopyralid *(Stinger)*	0.25	⅔ pt	• Treat Canada thistle between rosette stage (at least 4 in.) and bud stage. • Do not cultivate prior to application or within 20 days after application. • Do not apply more than ⅔ pt. per acre per year. • Do not graze or harvest treated corn silage as feed within 40 days after treatment. • Apply in 10 gal. of water or more per acre.

CORN — SPECIAL WEED PROBLEMS — VELVETLEAF

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Preplant incorporated **Velvetleaf**	butylate *(Sutan Plus)*	4	4¾ pt	• Preplant incorporated to a depth of 2 to 3 in. • Do not use on corn seed stocks (Breeders, Foundation, or Increase). • May require a postemergence application for complete velvetleaf control. • Commercial prepackaged mix of butylate plus atrazi0e *(Sutazine)* is available.
	+	+	+	
	atrazine (commercial product)	1	1 qt 4L OR 1.1 lb 90% DG	
	EPTC with protectant *(Eradicane)*	4	4¾ pt	• Preplant incorporated to a depth of 2 to 3 in. • May require a postemergence application for complete velvetleaf control. • *Eradicane Extra* is also available and should be used at the rate of 5 pt/A.
	+	+	+	
	atrazine (commercial product)	1	1 qt 4L OR 1.1 lb 90% DG	
Postemergence **Velvetleaf**	atrazine (commercial product)	2	2 qt 4L OR 2⅕ lb 90% DG	• Timing of application is critical for best results. • For best results, treat when the largest velvetleaf plants in the field are 2 in. tall.
	+	+	+	
	crop oil concentrate	1 qt	1 qt	
	dicamba *(Banvel)*	½	1 pt	• Apply postemergence to corn from emergence up to the 5-leaf stage or 8 in. tall, whichever comes first. For larger corn, reduce *Banvel* rate to ½ pt/A. • For corn over 8 in., use drop nozzles. • For best results, treat when the largest velvetleaf plants in the field are 2 in. tall. • USE EXTREME CAUTION. DRIFT TO NEARBY SENSITIVE CROPS IS A HAZARD. • To reduce the risk of volatilization, do not apply if the air temperature is expected to exceed 85° F on the day of application. • Use pressure no greater than 20 psi. • See additional remarks and limitations for dicamba *(Banvel)* under "Corn — Postemergence" section.
	dicamba *(Banvel)*	½	1 pt	• Apply postemergence to corn from emergence up to the 5-leaf stage or 8 in. tall, whichever comes first. For larger corn, reduce rate to ½ pt/A. • For best results, treat when the largest velvetleaf plants in the field are 2 in. tall. • Do not use with crop oil concentrate or other additives. • See additional remarks and limitations for dicamba *(Banvel)* under "Corn — Postemergence" section. • Commercial prepackaged mix of dicamba and atrazine *(Marksman) is available.*
	+	+	+	
	atrazine	1	1 qt 4L OR 1.1 lb 90% DG	

(Continued on next page)

CORN — SPECIAL WEED PROBLEMS — VELVETLEAF (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued) **Postemergence**	bentazon *(Basagran)*	3/4	3/4 qt	• For best results, treat when the largest velvetleaf plants in the field are 2 in. tall.
	+	+	+	• Combination reduces risk of carryover from post-emergence application of atrazine alone.
	atrazine (commercial product)	3/4	3/4 qt 4L OR 0.8 lb 90% DG	• Urea ammonium nitrate (28% liquid nitrogen) may be used at 1 gal/A instead of crop oil concentrate. Do not use urea ammonium nitrate if common lambsquarters is present.
	+	+	+	• Commercial prepackaged mix of *Basagran* plus atrazine *(Laddok)* is available.
	crop oil concentrate	1 qt	1 qt	
	bromoxynil *(Buctril)*	3/8	1 1/2 pt 2E	• For best results, treat when the largest velvetleaf plants in the field are 2 in. tall.
	+	+	+	• Apply to corn between the 3-leaf stage (3 leaves visible) and the 8-leaf stage.
	atrazine (commercial product)	3/4	3/4 qt 4L OR 0.8 lb 90% DG	• Do not mix with spray additives or liquid fertilizers. • Combination reduces risk of carryover from post-emergence application of atrazine alone. • Prepackaged mix (*Buctril-Atrazine*) is available.

CORN — SPECIAL WEED PROBLEMS — TRIAZINE RESISTANT LAMBSQUARTERS

Triazine-resistant common lambsquarters look the same as triazine-susceptible common lambsquarters but are resistant to triazine herbicides such as atrazine, *Bladex,* and *Princep.* The appearance of uncontrolled common lambsquarters does not confirm triazine resistance because herbicide failures have several possible causes, especially related to weather. Triazine-resistant common lambsquarters will usually exist as the dominant species in the field. Resistance to triazine herbicides can be easily confirmed by Extension agents with the use of a triazine resistance kit. Contact the Cooperative Extension Service county office for details.

Prevention is the best approach to managing herbicide resistance. Crop and herbicide rotation will prevent the development of herbicide-resistant weeds. Where triazine resistance is suspected or confirmed, avoid spreading weed seed into other fields by cleaning tillage and harvest equipment after use and by harvesting infested fields last.

In fields where triazine-resistant lambsquarters has been identified, the following herbicides and herbicide combinations are recommended for control in corn.

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Postemergence **Triazine-resistant Common Lambsquarters**	dicamba *(Banvel)*	1/2	1 pt	• Apply postemergence. Treatment must follow a preplant-incorporated or preemergence herbicide application for control of other weed species. • Apply postemergence to corn from emergence up to the 5-leaf stage or 8 in. tall, whichever comes first. For larger corn, reduce *Banvel* rate to 1/2 pt/A. • Most effective when weeds are small (4 in. or less). • For best results, treat when the largest lambsquarters plants in the field are 2 in. tall. • See additional remarks and limitations for dicamba *(Banvel)* under "Corn — Postemergence."

(Continued on next page)

CORN — SPECIAL WEED PROBLEMS — TRIAZINE RESISTANT LAMBSQUARTERS (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Postemergence **Triazine-resistant** **Common** **Lambsquarters**	dicamba *(Banvel)*	½	1 pt	• Apply postemergence. Treatment must follow a preplant-incorporated or preemergence herbicide application for grass control.
	+	+	+	• Apply postemergence to corn from emergence up to the 5-leaf stage or 8 in. tall, whichever comes first. For larger corn, reduce Banvel rate to ½ pt/A.
	atrazine (commercial product)	1	1 qt 4L OR 1.1 lb 90% DG	• Most effective when weeds are small (4 in. or less).
				• For best results, treat when the largest lambsquarters plants in the field are 2 in. tall.
				• Do not use with crop oil concentrate or other additives.
				• See additional remarks and limitations for dicamba *(Banvel)*.
				• Commercial prepackaged mix of dicamba and atrazine *(Marksman)* is available.
	bromoxynil *(Buctril)*	⅜	1½ pt 2E	• Apply postemergence. Treatment must follow a preplant-incorporated or preemergence herbicide application for control of other weed species.
				• Apply to corn between the 4-leaf stage (4 visible leaves) and the 8-leaf stage.
				• Most effective when weeds are small (6 in. or less).
				• For best results, treat when the largest lambsquarters plants in the field are 2 in. tall.
				• Treatment will not provide residual control.
				• Do not mix with spray additives or liquid fertilizers.
				• For ground applications, use a minimum of 20 gal of water/A and 30 psi.
	bromoxynil *(Buctril)*	⅜	1½ pt 2E	• Apply postemergence. Treatment must follow a preplant-incorporated or preemergence herbicide application for grass control.
	+	+	+	• Apply to corn between the 4-leaf stage (4 visible leaves) and the 8-leaf stage.
	atrazine (commercial product)	¾	¾ qt 4L OR 0.8 lb 90% DG	• Most effective when weeds are small (6 in. or less).
				• For best results, treat when the largest lambsquarters plants in the field are 2 in. tall.
				• Treatment will not provide residual control.
				• Do not mix with spray additives or liquid fertilizers.
				• For ground applications, use a minimum of 20 gal of water/A and 30 psi.
	2,4-D amine	½	1 pt	• Apply postemergence. Treatment must follow a preplant-incorporated or preemergence herbicide application for control of other weed species.
				• For corn over 6 to 8 in., use drop nozzles.
				• Most effective when weeds are small (4 in. or less).
				• For best results, treat when the largest lambsquarters plants in the field are 2 in. tall.
				• Treatment will not provide residual control.
				• Often less effective than the other recommended herbicides.
				• Ester formulations will cause more crop injury and are not recommended.
				• Oil-soluble amines of 2,4-D *(Dacamine, Weedar E-3)* are available and are used at lower rates.
				• Drift control additives can be used with some 2,4-D amine products to reduce danger of drift. Check the product label.
				• Hybrids vary in tolerance.

NO-TILL CORN

Effective weed control in no-tillage corn production requires complete control of all weeds, cover crops, and sod plants present at the time of planting. Alfalfa and quackgrass sods must be treated prior to planting. Burndown of annual weeds and cover crops can be accomplished with burndown herbicides such as paraquat (*Gramoxone Extra*) or glyphosate (*Roundup*) added to the tank mix. Either of these herbicides can be used alone prior to planting to avoid excessive cover crop growth. *Gramoxone Extra* provides faster kill. *Roundup* may provide better control if weed or cover crop growth is dense. It is preferred for perennial weeds or seedling grasses before completion of tillering. Use 1/2 pt non-ionic surfactant/100 gal of water with *Gramoxone Extra*. Double the surfactant rate if liquid fertilizer is used as the carrier. Do not use suspension fertilizers as carriers for *Gramoxone Extra*. The best carrier for *Roundup* is clean water. Reduced control may occur if *Roundup* is used in tank mixtures containing fluid fertilizer. Carefully follow the mixing instructions for *Gramoxone Extra* and *Roundup*. If weeds are small, herbicides such as *Bladex* and atrazine and/or 28% liquid nitrogen can be used for burndown. See specific recommendations in this section for details.

Many situations may require little or no adjustment in application rates. However, dense plant residue and the total reliance on herbicides for weed control may require that herbicides be used at the high end of the labelled rate range for the soil type. Postemergence herbicides listed in the "Corn — Postemergence" section (p. 17) may be used in no-till corn and may be needed to provide adequate control. Fields should be scouted routinely (weekly) for weed escapes.

NO-TILL CORN — ALFALFA SOD

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
FALL application followed by preemergence				
Alfalfa sod **Quackgrass** **Annual broadleaves** **Annual grasses**	glyphosate *(Roundup)*	1½	2 qt	• Apply *Roundup* in fall. • Best timing for treatment is 4 to 6 weeks after last alfalfa harvest. • Alfalfa should be at least 4 in. tall and actively growing. • Quackgrass, if present, should be at least 8 in. tall and actively growing. • Air temperature should be at least 60° F. • Always add non-ionic surfactant with *Gramoxone Extra*. When the herbicide carrier is water, add ½ pt surfactant per 100 gal of spray solution. • Use 20 to 60 gal of water/A with paraquat and 20 to 30 gal of water/A with *Roundup*. • Postemergence *Banvel* or 2,4-D may be needed to control alfalfa or weed escapes. • *Lasso, Micro-Tech Lasso, Arena,* or *Dual* may be included if annual grasses are expected to be a serious problem. • If weeds are small, the rate of *Gramoxone Extra* or *Roundup* may be reduced. See label for details. • *Bladex* rate varies, depending on surface residue and soil type (refer to Bladex label for details).
	FOLLOWED BY:			
	atrazine (commercial product)	2	2 qt 4L OR 2⅕ lb 90% DG	
	OR cyanazine *(Bladex)*	OR 2½	OR 2½ qt 4L OR 2.8 lb 90% DF	
	OR atrazine + cyanazine (commercial product + *Bladex*)	OR 1 + 2	OR 1 + 2 qt 4L OR 1.1 + 2.2 lb 90% DG/DF	
	+ paraquat *(Gramoxone Extra)*	+ 0.78	+ 2½ pt	

(Continued)

NO-TILL CORN — ALFALFA SOD (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
FALL application followed by preemergence				
Alfalfa sod **Annual broadleaves** **Annual grasses**	2,4-D ester	1¼	1¼ qt	• Apply 2,4-D in fall. • Alfalfa should be at least 4 in. tall and actively growing at treatment time. • Air temperature should be at least 60° F. • Apply atrazine + paraquat or *Roundup* at planting time. • Always add non-ionic surfactant with *Gramoxone Extra*. When the herbicide carrier is water, add ½ pt surfactant per 100 gal of spray solution. • Use 20 to 60 gal of water/A with paraquat and 20 to 30 gal of water/A with *Roundup*. • Postemergence *Banvel* or 2,4-D may be needed to control alfalfa escapes. • **Note:** In a mixed alfalfa-quackgrass sod, an additional 2 lb/A of atrazine may be applied by one of three methods: 1) Add 2 lb a.i./A atrazine + 1 qt/A crop oil concentrate to the 2,4-D application, or 2) Apply a total of 4 lb a.i./A atrazine at planting time, or 3) Apply 2 lb a.i./A atrazine + 1 qt/A crop oil concentrate postemergence (see "Corn — Postemergence" section) • When a total of 4 lb/A of atrazine is used, carryover may persist 2 to 3 years. • Quackgrass is usually not at the proper stage of growth (8 in. tall) for maximum effectiveness from *Roundup* treatment at corn planting. (See "Quackgrass" section for notes on *Roundup* use.) • *Lasso, Micro-Tech Lasso, Arena,* or *Dual* may be included if annual grasses are expected to be a serious problem. • If weeds are small, the rate of *Gramoxone Extra* or *Roundup* may be reduced. See label for details.
	FOLLOWED BY:			
	atrazine (commercial product)	2	2 qt 4L OR 2⅕ lb 90% DG	
	+	+	+	
	paraquat *(Gramoxone Extra)*	0.78	2½ pt	
	OR	OR	OR	
	glyphosate *(Roundup)*	1⅛	1½ qt	
SPRING application followed by preemergence				
Alfalfa sod **Annual broadleaves** **Annual grasses**	2,4-D ester	1¼	1¼ qt	• Apply 2,4-D 7 to 10 days before planting. • Alfalfa should be at least 4 in. tall at treatment time. • Apply atrazine and paraquat or *Roundup* at planting time. • Always add non-ionic surfactant with *Gramoxone Extra*. When the herbicide carrier is water, add ½ pt surfactant per 100 gal of spray solution. • Use 20 to 60 gal of water/A with paraquat and 20 to 30 gal of water/A with *Roundup*. • Postemergence *Banvel* or 2,4-D may be needed to control alfalfa escapes. • **Note:** In a mixed alfalfa-quackgrass sod, an additional 2 lb/A of atrazine may be applied by one of three methods: 1) Add 2 lb a.i./A atrazine + 1 qt/A crop oil concentrate to the 2,4-D application, or 2) Apply a total of 4 lb a.i./A atrazine at planting time, or 3) Apply 2 lb a.i./A atrazine + 1 qt/A crop oil concentrate postemergence (see "Corn — Postemergence" section) • When a total of 4 lb/A of atrazine is used, carryover may persist 2 to 3 years. • Quackgrass is usually not at the proper stage of growth (8 in. tall) for maximum effectiveness from *Roundup* treatment at corn planting. (See "Quackgrass" section for notes on *Roundup* use.) • *Lasso, Micro-Tech Lasso, Arena,* or *Dual* may be included if annual grasses are expected to be a serious problem.
	FOLLOWED BY:			
	atrazine (commercial product)	2	2 qt 4L OR 2⅕ lb 90% DG	
	+	+	+	
	paraquat *(Gramoxone Extra)*	0.78	2½ pt	
	OR	OR	OR	
	glyphosate *(Roundup)*	1⅛	1½ qt	

NO-TILL CORN — QUACKGRASS SOD

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
FALL application followed by preemergence				
Alfalfa **Quackgrass** **Annual broadleaves** **Annual grasses**	glyphosate *(Roundup)* FOLLOWED BY:	1½	2 qt	• Apply *Roundup* in fall. • Quackgrass should be at least 8 in. tall and actively growing. • Air temperature should be at least 60° F. • Always add non-ionic surfactant with *Gramoxone Extra*. When the herbicide carrier is water, add ½ pint surfactant per 100 gal of spray solution. • Use 20 to 60 gal of water/A with paraquat and 20 to 30 gal of water/A with *Roundup.* • *Lasso, Micro-Tech Lasso, Arena,* or *Dual* may be included if annual grasses are expected to be a serious problem. • *Bladex* rate varies, depending on surface residue and soil type (refer to *Bladex* label for details).
	atrazine (commercial product)	2	2 qt 4L OR 2⅕ lb 90% DG	
	OR	OR	OR	
	cyanazine *(Bladex)*	2½	2½ qt 4L OR 2.8 lb 90% DG	
	OR	OR	OR	
	atrazine + cyanazine (commercial product +	1 + 2	1 + 2 qt 4L OR 1.1 + 2.2 lb 90% DG/DF	
	+	+	+	
	paraquat *(Gramoxone Extra)*	0.78	2½ pt	

NO-TILL CORN — GRAIN STUBBLE or ROW CROP RESIDUE
(With rye or wheat cover crop)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves **Annual grasses**	atrazine (commercial product)	1½	1½ qt 4L OR 1.7 lb 90% DG	• Applied preemergence. • Use 3 qt *Lasso* for heavy grass (especially fall panicum or crabgrass) infestations. • *Bladex* may be included for more effective fall panicum control. (See remarks for four-way tank mixes, pg. 36). • Always add non-ionic surfactant with *Gramoxone Extra*. When the herbicide carrier is water, add ½ pt surfactant per 100 gal of spray solution. • To avoid excessive cover crop growth, paraquat or *Roundup* may be applied prior to planting. • Prepackaged mix of *Roundup* plus *Lasso (Bronco)* is available. • Prepackaged mix of atrazine plus *Dual (Bicep)* is available. • Prepackaged mixes of alachlor plus atrazine *(Bullet, Lariat)* are available.
	+	+	+	
	alachlor *(Lasso, Arena, Micro-Tech Lasso)*	2½	2½ qt	
	OR	OR	OR	
	metolachlor *(Dual)*	2	1 qt	
	+	+	+	
	paraquat *(Gramoxone Extra)*	0.78	2½ pt	
	OR	OR	OR	
	glyphosate *(Roundup)*	1⅛	1½ qt	
	cyanazine *(Bladex)*	2	2 qt 4L OR 2.2 lb 90% DF	• Applied preemergence. • Use 3 qt *Lasso* for heavy grass (especially fall panicum or crabgrass) infestations. • No carryover. • Always add non-ionic surfactant with *Gramoxone Extra*. When the herbicide carrier is water, add ½ pt surfactant per 100 gal of spray solution. • To avoid excessive cover crop growth, paraquat or *Roundup* may be applied prior to planting. • Prepackaged mix of *Lasso* plus *Roundup (Bronco)* is available. • *Bladex* rate varies, depending on surface residue and soil type (refer to *Bladex* label for details).
	+	+	+	
	alachlor *(Lasso, Arena, Micro-Tech Lasso)*	2½	2½ qt	
	+	+	+	
	paraquat *(Gramoxone Extra)*	0.78	2½ pt	
	OR	OR	OR	
	glyphosate *(Roundup)*	1⅛	1½ qt	

(Continued on next page)

NO-TILL CORN — GRAIN STUBBLE or ROW CROP RESIDUE (continued)

(With rye or wheat cover crop)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves	cyanazine	2	2 qt 4L	• Applied preemergence.
Annual grasses	*(Bladex)*		OR	• No carryover.
			2.2 lb 90% DF	• Always add non-ionic surfactant with *Gramoxone Extra*.
	+	+	+	When the herbicide carrier is water, add ½ pt surfactant
	metolachlor	2	1 qt	per 100 gal of spray solution.
	(Dual)			• To avoid excessive cover crop growth, paraquat or
	+	+	+	*Roundup* may be applied prior to planting.
	paraquat	0.78	2½ pt	• *Bladex* rate varies, depending on surface residue and
	(Gramoxone Extra)			soil type (refer to *Bladex* label for details).
	OR	OR	OR	• Prepackaged mix of *Dual* plus cyonazine (*Cycle* [1:17])
	glyphosate	1⅛	1½ qt	is available.
	(Roundup)			
	atrazine	¾	¾ qt 4L	• Applied preemergence.
	(commercial product)		OR	• Reduces potential atrazine carryover.
			⅘ lb 90% DG	• May substitute *Princep* for atrazine if fall panicum is a
	+	+	+	severe problem.
	cyanazine	1½	1½ qt 4L	• Always add non-ionic surfactant with *Gramoxone Extra*.
	(Bladex)		OR	When the herbicide carrier is water, add ½ pt surfactant
			1.7 lb 90% DF	per 100 gal of spray solution.
	+	+	+	• To avoid excessive cover crop growth, paraquat or
	alachlor	2½	2½ qt	*Roundup* may be applied prior to planting.
	(Lasso, Arena,			• *Bladex* rate varies, depending on surface residue and
	Micro-Tech Lasso)			soil type (refer to *Bladex* label for details).
	+	+	+	• Prepackaged mix of *Bladex* plus atrazine (*Extrazine II*
	paraquat	0.78	2½ pt	[3:1]) is available.
	(Gramoxone Extra)			• Prepackaged mixes of alachlor plus atrazine *(Bullet,*
	OR	OR	OR	*Lariat)* are available.
	glyphosate	1⅛	1½ qt	
	(Roundup)			
	atrazine	¾	¾ qt 4L	• Applied preemergence.
	(commercial product)		OR	• Reduces potential atrazine carryover.
			⅘ lb 90% DG	• May substitute *Princep* for atrazine if fall panicum is a
	+	+	+	severe problem.
	cyanazine	1½	1½ qt 4L	• Always add non-ionic surfactant with *Gramoxone Extra*.
	(Bladex)		OR	When the herbicide carrier is water, add ½ pt surfactant
			1.7 lb 90% DF	per 100 gal of spray solution.
	+	+	+	• To avoid excessive cover crop growth, paraquat or
	metolachlor	2	1 qt	*Roundup* may be applied prior to planting.
	(Dual)			• *Bladex* rate varies, depending on surface residue and
	+	+	+	soil type (refer to *Bladex* label for details).
	paraquat	0.78	2½ pt	• Prepackaged mix of *Bladex* plus atrazine (*Extrazine II*
	(Gramoxone Extra)			[3:1]) is available.
	OR	OR	OR	• Prepackaged mix of atrazine + *Dual (Bicep)* is
	glyphosate	1⅛	1½ qt	available.
	(Roundup)			
	cyanazine	2	2 qt 4L	• Applied preemergence.
	(Bladex)		OR	• Always add non-ionic surfactant with *Gramoxone Extra*.
			2.2 lb 90% DF	When the herbicide carrier is water, add ½ pt surfactant
	+	+	+	per 100 gal of spray solution.
	atrazine	1	1 qt 4L	• To avoid excessive cover crop growth, paraquat or
	(commercial product)		OR	*Roundup* may be applied prior to planting.
			1 qt 4L	• Adjust *Bladex* rate according to surface residue and
			OR	soil type. Refer to *Bladex* label for details.
			1.1 lb 90% DG	• Do not use on sands or loamy sands with less than 1%
	+	+	+	organic matter.
	paraquat	0.78	2½ pt	• Will not control yellow nutsedge.
	(Gramoxone Extra)			• Prepackaged mix of *Bladex* plus atrazine (*Extrazine II*
	OR	OR	OR	[3:1]) is available.
	glyphosate	1⅛	1½ qt	
	(Roundup)			

NO-TILL — GRAIN STUBBLE or ROW CROP RESIDUE

(Without a cover crop)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves **Annual grasses**	atrazine (commercial product)	1½	1½ qt 4L OR 1.7 lb 90% DG	• Applied preemergence. • Use 3 qt *Lasso* for heavy grass (especially fall panicum or crabgrass) infestations. • *Bladex* may be included for more effective fall panicum control. (See remarks for four-way tank mixes, pg. 38). • Always add non-ionic surfactant with *Gramoxone Extra*. When the herbicide carrier is water, add ½ pt surfactant per 100 gal of spray solution. • Prepackaged mix of *Roundup* plus *Lasso (Bronco)* is available. • Prepackaged mix of atrazine plus *Dual (Bicep)* is available. • Prepackaged mixes of alachlor plus atrazine *(Bullet, Lariat)* are available. • If weeds are small, the rate of *Gramoxone Extra* or *Roundup* may be reduced. See label for details.
	+ alachlor *(Lasso, Arena, Micro-Tech Lasso)* OR metolachlor *(Dual)* + paraquat *(Gramoxone Extra)* OR glyphosate *(Roundup)*	+ 2½ OR 2 + 0.78 OR 1⅛	+ 2½ qt OR 1 qt + 2½ pt OR 1½ qt	
	cyanazine *(Bladex)* + alachlor *(Lasso, Arena, Micro-Tech Lasso)* + paraquat *(Gramoxone Extra)* OR glyphosate *(Roundup)*	2 + 2½ + 0.78 OR 1⅛	2 qt 4L OR 2.2 lb 90% DF + 2½ qt + 2½ pt OR 1½ qt	• Applied preemergence. • Use 3 qt *Lasso* for heavy grass (especially fall panicum or crabgrass) infestations. • No carryover. • Always add non-ionic surfactant with *Gramoxone Extra*. When the herbicide carrier is water, add ½ pt surfactant per 100 gal of spray solution. • If weeds are small, the rate of *Gramoxone Extra* or *Roundup* may be reduced. See label for details. • *Bladex* rate varies, depending on surface residue and soil type (refer to *Bladex* label for details). • Prepackaged mix of *Lasso* plus *Roundup (Bronco)* is available.
	cyanazine *(Bladex)* + metolachlor *(Dual)* + paraquat *(Gramoxone Extra)* OR glyphosate *(Roundup)*	2 + 2 + 0.78 OR 1⅛	2 qt 4L OR 2.2 lb 90% DF + 1 qt + 2½ pt OR 1½ qt	• Applied preemergence. • No carryover. • Always add non-ionic surfactant with *Gramoxone Extra*. When the herbicide carrier is water, add ½ pt surfactant per 100 gal of spray solution. • If weeds are small, the rate of *Gramoxone Extra* or *Roundup* may be reduced. See label for details. • *Bladex* rate varies depending on surface residue and soil type (refer to *Bladex* label for details). • Prepackaged mix of *Dual* plus cyonazine (*Cycle* [1:17]) is available.

(Continued on next page)

NO-TILL — GRAIN STUBBLE or ROW CROP RESIDUE (continued)

(Without a cover crop)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves	atrazine	¾	¾ qt 4L	• Applied preemergence.
Annual grasses	(commercial product)		OR	• Reduces potential atrazine carryover.
			⅘ lb 90% DG	• May substitute *Princep* for atrazine if fall panicum is a
	+	+	+	severe problem.
	cyanazine	1½	1½ qt 4L	• Always add non-ionic surfactant with *Gramoxone Extra*.
	(Bladex)		OR	When the herbicide carrier is water, add ½ pt surfactant
			1.7 lb 90% DF	per 100 gal of spray solution.
	+	+	+	• If weeds are small, the rate of *Gramoxone Extra* or
	alachlor	2½	2½ qt	*Roundup* may be reduced. See label for details.
	(Lasso, Arena, Micro-Tech Lasso)			• *Bladex* rate varies, depending on surface residue and soil type (refer to *Bladex* label for details).
	+	+	+	• Prepackaged mix of *Roundup* plus *Lasso (Bronco)* is
	paraquat	0.78	2½ pt	available.
	(Gramoxone Extra)			• Prepackaged mixes of alachlor plus atrazine *(Bullet, Lariat)* are available.
	OR	OR	OR	
	glyphosate	1⅛	1½ qt	• Prepackaged mix of *Bladex* plus atrazine (*Extrazine II*
	(Roundup)			[3:1]) is available.
	atrazine	¾	¾ qt 4L	• Applied preemergence.
	(commercial product)		OR	• Reduces potential atrazine carryover.
			⅘ lb 90% DG	• May substitute *Princep* for atrazine if fall panicum is a
	+	+	+	severe problem.
	cyanazine	1½	1½ qt 4L	• Always add non-ionic surfactant with *Gramoxone Extra*.
	(Bladex)		OR	When the herbicide carrier is water, add ½ pt surfactant
			1.7 lb 90% DF	per 100 gal of spray solution.
	+	+	+	• If weeds are small, the rate of *Gramoxone Extra* or
	metolachlor	2	1 qt	*Roundup* may be reduced. See label for details.
	(Dual)			• *Bladex* rate varies, depending on surface residue and
	+	+	+	soil type (refer to *Bladex* label for details).
	paraquat	0.78	2½ pt	• Prepackaged mix of atrazine plus *Dual (Bicep)* is
	(Gramoxone Extra)			available.
	OR	OR	OR	• Prepackaged mix of *Bladex* plus atrazine (*Extrazine II*
	glyphosate	1⅛	1½ qt	[3:1]) is available.
	(Roundup)			
	cyanazine	2	2 qt 4L	• Applied preemergence.
	(Bladex)		OR	• Always add non-ionic surfactant with *Gramoxone Extra*.
			2.2 lb 90% DF	When the herbicide carrier is water, add ½ pt surfactant
	+	+	+	per 100 gal of spray solution.
	atrazine	1	1 qt 4L	• If weeds are small, the rate of *Gramoxone Extra* or
	(commercial product)		OR	*Roundup* may be reduced. See label for details.
			1.1 lb 90% DG	• Adjust *Bladex* rate according to surface residue and
	+	+	+	soil type. Refer to *Bladex* label for details.
	paraquat	0.78	2½ pt	• Do not use on sands or loamy sands with less than 1%
	(Gramoxone Extra)			organic matter.
	OR	OR	OR	• Will not control yellow nutsedge.
	glyphosate	1⅛	1½ qt	• Prepackaged mix of *Bladex* plus atrazine (*Extraxine II*
	(Roundup)			[3:1]) is available.

(Continued on next page)

NO-TILL — GRAIN STUBBLE or ROW CROP RESIDUE (continued)

(Without a cover crop)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves **Annual grasses**	cyanazine *(Bladex)* + alachlor (Lasso, Arena, *Micro-Tech Lasso)* OR metolachlor *(Dual)* + crop oil concentrate	2.2 + 2½ OR 2 + 1 qt	2.2 qt 4L + 2½ qt OR 1 qt + 1 qt	• Applied preemergence. • Use *Bladex 4L* only. • For small annual weeds *no more than* 3 in. tall. • Adjust *Bladex* rate according to surface residue and soil type. Refer to *Bladex* label for details. • Use a minimum of 25 gal of spray/A. • 28% liquid nitrogen used as the herbicide carrier will add to the effectiveness of the treatment for burndown. When this carrier is used, substitute ½% surfactant for crop oil concentrate. • 2,4-D ester (½ lb/A or 1 pt/A) may be included if perennial broadleaves are present. • Prepackaged mix of *Dual* plus cyanazine (*Cycle* [1:17]) is available.
	cyanazine *(Bladex)* + atrazine (commercial product) + alachlor *(Lasso, Arena,* *Micro-Tech Lasso)* OR metolachlor *(Dual)* + crop oil concentrate	1½ + ¾ + 2½ OR 2 + 1 qt	1½ qt 4L + ¾ qt 4L + 2½ qt OR 1 qt + 1 qt	• Applied preemergence. • Use *Bladex 4L* only. • For small annual weeds *no more than* 3 in. tall. • Adjust *Bladex* rate according to surface residue and soil type. Refer to *Bladex* label for details. • Use a minimum of 25 gal of spray/A. • 28% liquid nitrogen used as the herbicide carrier will add to the effectiveness of the treatment for burndown. When this carrier is used, substitute ½% surfactant for crop oil concentrate. • 2,4-D ester (½ lb/A or 1 pt/A) may be included if perennial broadleaves are present. • Prepackaged mixes of alachlor plus atrazine *(Bullet, Lariat)* are available. • Prepackaged mix of atrazine plus *Dual (Bicep)* is available. • Prepackaged mix of *Bladex* plus atrazine (*Extrazine II* [3:1]) is available.
	cyanazine *(Bladex)* + atrazine (commercial product) + crop oil concentrate	2 + 1 + 1 qt	2 qt 4L + 1 qt 4L + 1 qt	• Applied preemergence. • Use *Bladex 4L* only. • For small annuals *no more than* 3 in. tall. • Adjust *Bladex* rate according to surface residue and soil type. Refer to *Bladex* label for details. • Use a minimum of 25 gal of spray/A. • 28% liquid nitrogen used as the herbicide carrier will add to the effectiveness of the treatment for burndown. When this carrier is used, substitute ½% surfactant for crop oil concentrate. • 2,4-D ester (½ lb/A or 1 pt/A) may be included if perennial broadleaves are present. • Will not control yellow nutsedge. • Prepackaged mix of *Bladex* plus atrazine (*Extrazine* [3:1]) is available.

TABLE 2—SOYBEANS

PREPLANT

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses **Annual broadleaves** **Nutsedge**	metribuzin *(Lexone* or *Sencor)* + alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)* OR metolachlor *(Dual)*	⅜ + 2 OR 2	¾ pt 4L OR ½ lb 75% DF + 2 qt OR 2 pt	• Alachlor is a **restricted use** pesticide. • Good control of velvetleaf. Fair control of jimsonweed and cocklebur. Additional velvetleaf and other broadleaf weed control if preplant incorporated metribuzin is followed with a preemergence metribuzin application. See pg. 59 or metribuzin label. • DO NOT use on sands or soils with less than ½% organic matter. DO NOT use on loamy sand or sandy loam soils with less than 1% organic matter. • Reduce metribuzin rate if soil pH is above 7.0. See label. • If soil pH is above 7.4, DO NOT apply metribuzin. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • Note label for rotational crop restrictions. • *Lasso* rate should be increased to 3 qt/A and *Dual* to 2½ pt/A for effective nutsedge control. • Prepackaged mix of *Sencor* plus *Dual (Turbo)* is available. See Table 11.
	metribuzin + chlorimuron-ethyl *(Preview)* + alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)* OR metolachlor *(Dual)*	⅜ + 2 OR 2	½ lb 75% DG + 2 qt OR 2 pt	• Alachlor is a **restricted use** pesticide. • SEE *PREVIEW* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • DO NOT use if soil pH is greater than 6.8. Soybean stunting and injury to labeled rotation crops can occur. • Use caution to avoid misapplication or spray overlap as carryover may occur to labeled rotation crops. • DO NOT use on sands. DO NOT use on soils with less than ½% organic matter. • Use on soils with organic matter from ½ to 5%. See *Preview* label for specific rates for soil type and organic matter. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • Better control of velvetleaf, cocklebur, and jimsonweed than metribuzin. • *Lasso* rate should be increased to 3 qt/A and *Dual* to 2½ pt/A for effective nutsedge control. • **Special precaution:** A special sprayer clean-out procedure is required for *Preview.* See label for specific instructions.
Annual grasses **Annual broadleaves** (including nightshade) **Nutsedge**	chloramben *(Amiben)* + alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)* OR metolachlor *(Dual)*	2 + 2 OR 2	1 gal 2L OR 2½ lb 75% DS + 2 qt OR 2 pt	• Alachlor is a **restricted use** pesticide. • *Lasso* rate should be increased to 3 qt/A and *Dual* to 2½ pt/A for effective nutsedge control.

(Continued on next page)

SOYBEANS — PREPLANT (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual grasses **Annual broadleaves** (including nightshade) **Nutsedge**	imazaquin *(Scepter)* + alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)* OR metolachlor *(Dual)*	0.125 + 2 OR 2	⅔ pt OR 0.18 lb 70% DG + 2 qt OR 2 pt	• Alachlor is a **restricted use** pesticide. • ONLY SOYBEANS OR DRY EDIBLE BEANS CAN BE PLANTED THE YEAR FOLLOWING *SCEPTER* APPLICATION. SEE *SCEPTER* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • Soybean stunting (shortening of internodes) may occur on sandy soils. • Increase *Lasso* rate to 3 qt/A and *Dual* to 2½ pt/A for effective nutsedge control. • Velvetleaf and black nightshade control are best when *Scepter* is incorporated. Common ragweed control is better when *Scepter* is applied preemergence.
	imazethapyr *(Pursuit)* + alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)* OR metolachlor *(Dual)*	0.063 + 2 OR 2	¼ pt 2L + 2 qt OR 2 pt	• Alachlor is a **restricted use** pesticide. • SEE *PURSUIT* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • Two pass incorporation is suggested for weed control. • COMMON RAGWEED may only be suppressed, and an additional preplant-incorporated herbicide such as metribuzin or a postemergence herbicide application for common ragweed control may be necessary. • *Lasso* rate should be increased to 3 qt/A and *Dual* to 2½ pt/A for effective nutsedge control. • Velvetleaf and black nightshade control are best when *Pursuit* is preplant incorporated.
Annual grasses	trifluralin *(Treflan)*	¾	1½ pt	• Incorporate or mix thoroughly into top 2 or 3 in. of soil within 24 hr after application. • On sandy and sandy loam soils low in organic matter, use ½ lb a.i./A (1 pt/A). • Most effective control if application is made 10 days to 2 weeks ahead of planting and field is reworked just prior to planting.
	pendimethalin *(Prowl)*	1	2 pt	• Incorporate in top 2 to 3 in. of soil. • Incorporate within 7 days of application unless rainfall occurs.
	ethalfluralin *(Sonalan)*	0.9	2½ pt	• Incorporate in top 2 to 3 in. of soil. • Incorporate within 2 days of application.
Annual grasses **Annual broadleaves** (except nightshade)	Combine any of the above dinitroanilines *(Treflan, Sonalan,* or *Prowl)* with metribuzin *(Lexone* or *Sencor)*	⅜	¾ pt 4L OR ½ lb 75% DF	• Good control of velvetleaf. Fair control of jimsonweed and cocklebur. Additional velvetleaf and other broadleaf weed control if preplant-incorporated metribuzin is followed with a preemergence metribuzin application. see pg. 59 or metribuzin label. • *Pursuit* may be added at ⅛ pt/A for black nightshade control. See labels. • See specific remarks for each dinitroaniline herbicide. • Reduce rate if soil pH is above 7.0. See label. • If soil pH is above 7.4, DO NOT apply metribuzin. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • Note label for rotational crop restrictions. • Prepackaged mix of *Sencor* plus *Treflan (Salute)* is available. See Table 21.

(Continued on next page)

SOYBEANS — PREPLANT (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued) **Annual grasses** **Annual broadleaves** (except nightshade)	Combine any of the above dinitroanilines *(Treflan, Sonalan,* or *Prowl)* with metribuzin + chlorimuron-ethyl *(Preview)*	3/8	½ lb 75% DG	• SEE *PREVIEW* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • DO NOT use if soil pH is greater than 6.8. Soybean stunting and injury to labeled rotation crops may occur. • DO NOT use on sands. DO NOT use on soils with less than ½% organic matter. • Use on soils with organic matter from ½ to 5%. See *Preview* label for specific rates for soil type and organic matter. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • Better control of velvetleaf, cocklebur, and jimsonweed than metribuzin. • See specific remarks for each dinitroaniline herbicide. • This tank mix will not provide nutsedge suppression. • **Special precaution:** A special sprayer clean-out procedure is required for *Preview.* See label for special instructions.
Annual grasses **Annual broadleaves** (including nightshade)	Combine any of the above dinitroanilines *(Treflan, Sonalan,* or *Prowl)* with chloramben *(Amiben)*	2	1 gal 2L OR 2½ lb 75% DS	• See specific remarks for each dinitroaniline herbicide. • Fair control of velvetleaf. Poor control of jimsonweed and cocklebur. • Preferred on sandy soils low in organic matter where injury from metribuzin or linuron is a problem.
	Combine any of the above dinitroanilines *(Treflan, Sonalan,* or *Prowl)* with imazaquin *(Scepter)*	0.125	⅔ pt 1.5L OR 0.18 lb 70% DG	• ONLY SOYBEANS OR DRY EDIBLE BEANS CAN BE PLANTED THE YEAR FOLLOWING *SCEPTER* APPLICATION. SEE *SCEPTER* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • Soybean stunting (shortening of internodes) may occur on sandy soils. • See specific remarks for each dinitroaniline herbicide. • *Scepter* will suppress nutsedge. • Velvetleaf and black nightshade control are good when *Scepter* is incorporated. Common ragweed control is better when *Scepter* is applied preemergence. • Prepackaged mix of *Prowl* plus *Scepter (Squadron)* is available. Prepackaged mix of trifluralin plus *Scepter (Tri-Scept)* is available. See Table 21.
Annual grasses **Annual broadleaves** (including nightshade; except common ragweed)	Combine any of the above dinitroanilines *(Treflan, Sonalan,* or *Prowl)* with imazethapyr *(Pursuit)*	0.063	¼ pt 2L	• SEE *PURSUIT* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • Two-pass incorporation is suggested for weed control. • COMMON RAGWEED WILL ONLY BE SUPPRESSED. An additional preplant-incorporated herbicide such as metribuzin or a postemergence herbicide application for common ragweed control may be necessary. • See specific remarks for each dinitroaniline herbicide. • *Pursuit* will suppress nutsedge. • Cocklebur and velvetleaf control are better when *Pursuit* is incorporated. • Prepackaged mix of *Prowl* plus *Pursuit* is available *(Pursuit Plus).* Prepackaged mix of trifluralin plus *Pursuit* is available *(Passport).* See Table 21.

(Continued)

SOYBEANS — PREPLANT (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses **Annual broadleaves** (except yellow nutsedge and black nightshade)	clomazone *(Command)* + metribuzin *(Sencor* or *Lexone)*	¾ + ⅜	1½ pt 4L + ¾ pt 4L OR ½ lb 75% DF	• Excellent control of velvetleaf. Fair control of cocklebur and jimsonweed. • SEE *COMMAND* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Use a drift additive to reduce spray drift. • Consult *Command* label for buffer zones to prevent off-site drift to sensitive areas. • DO NOT apply to very moist soils. • Preplant incorporate immediately on moist soils and within 8 hours on dry soils. • If soil pH is above 7.4, DO NOT apply metribuzin. • If soil pH is above 7.0, reduce the metribuzin rate to ¼ lb a.i./A. See label. • On sandy loam soils or loamy sand soils with greater than 1% organic matter, reduce the metribuzin rate to ¼ lb a.i./A. • DO NOT use on soils with less than ½% organic matter or on sands or loamy sands with less than 1% organic matter. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • Use care to avoid misapplication or overlap or carryover may occur to labeled rotation crops. • **Special precaution:** A special sprayer clean-out procedure is required for *Command.* See label for specific instructions.
Annual grasses **Annual broadleaves** (except black nightshade)	clomazone *(Command)* + metribuzin + chlorimuron-ethyl *(Preview)*	¾ + ⅜	1½ pt 4L + ½ lb 75% DG	• *SEE BOTH COMMAND* AND *PREVIEW* LABELS OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • DO NOT use if soil pH is greater than 6.8. Soybean stunting and injury to labeled rotation crops will occur. • DO NOT use on sands. DO NOT use on soils with less than ½% organic matter. • Use on soils with organic matter from ½ to 5%. Reduce *Preview* rate on soils with less than 3% organic matter. See label. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • Excellent control of velvetleaf and cocklebur. Good control of jimsonweed. • Use a drift additive to reduce spray drift. • Consult label for buffer zones to prevent off-site drift to sensitive areas. • DO NOT apply to very moist soils. Preplant incorporate immediately on moist soils and within 8 hours on dry soils. • **Special precaution:** A special sprayer clean-out procedure is required for *Command* and *Preview.* See labels for specific instructions.

(Continued)

SOYBEANS — PREPLANT (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses **Annual broadleaves** (including yellow nutsedge and black nightshade)	clomazone *(Command)* + alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)* OR metolachlor *(Dual)*	1 + 2 OR 2	2 pt 4L + 2 qt OR 2 pt	• Alachlor is a **restricted use** pesticide. • SEE *COMMAND* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Increase *Lasso* rate to 3 qt/A and *Dual* to 2½ pt/A for effective nutsedge control. • Excellent control of velvetleaf. Fair control of cocklebur and jimsonweed. • Do not reduce *Command* rate below 1½ pt/A or poor control of common ragweed can occur. • Do not reduce *Lasso* rate below 2 qt or *Dual* rate below 2 pt or poor control of redroot pigweed will occur. • Avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • Do not apply *Command* to moist soils. • *Command* must be incorporated immediately on moist soils and within 8 hours on dry soils. • Consult *Command* label for buffer zones to prevent off-site drift to sensitive areas. • **Special precaution:** A special sprayer clean-out procedure is required for *Command.* See label for specific instructions.
Annual grasses **Annual broadleaves** (including yellow nutsedge and black nightshade)	clomazone *(Command)* + imazaquin *(Scepter)*	¾ + 0.125	1½ pt 4L + ⅔ pt 1.5L OR 0.18 lb 70% DG	• ONLY SOYBEANS OR DRY EDIBLE BEANS CAN BE PLANTED THE YEAR FOLLOWING *SCEPTER* APPLICATION. SEE BOTH *COMMAND* AND *SCEPTER* LABELS OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • DO NOT use on soils with less than ½% organic matter. • Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • Excellent control of velvetleaf and cocklebur. Good control of jimsonweed. • Use a drift additive to reduce spray drift. • Consult label for buffer zones to prevent off-site drift to sensitive areas. • DO NOT apply to very moist soils. Preplant incorporate immediately on moist soils and within 8 hours on dry soils. • Apply 2 pt/A of *Command* if annual grass pressure is heavy. • Soybean stunting (shortening of internodes) may occur on sandy soils. • Common ragweed control is best when *Scepter* is applied preemergence. However, black nightshade control is better when *Scepter* is preplant incorporated. • **Special precaution:** A special sprayer clean-out procedure is required for *Command.* See label for specific instructions.

SOYBEANS — PREPLANT FOLLOWED BY PREEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses **Annual broadleaves** (including nightshade and nutsedge)	*Command*, as listed above, preplant incorporated FOLLOWED BY: alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)* OR metolachlor *(Dual)*	 2 OR 2	 2 qt OR 2 pt	• Alachlor is a **restricted use** pesticide. • SEE *COMMAND* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • See remarks for *Command* plus alachlor or metolachlor above. • Alachlor or metolachlor applied preemergence. DO NOT APPLY *COMMAND* PREEMERGENCE. • Nutsedge control is better from alachlor and *Dual* when they are incorporated. • Excellent control of velvetleaf. Fair control of cocklebur and jimsonweed.
Annual broadleaves **Annual grasses**	*Treflan, Sonalan, Prowl, Lasso, Arena,* or *Dual* as listed above, preplant incorporated FOLLOWED BY: linuron *(Lorox* or *Linex)*	 ¾	 ¾ qt 4L OR 1½ lb 50% DF	• Applied preemergence. • If heavy rainfall occurs soon after application, injury to crop may result. • DO NOT use on coarse-textured sandy or loamy sand soils or on soils with less than 1% organic matter. • Plant soybeans at least 1¾ in. deep. • Fair control of velvetleaf, jimsonweed, nightshade, and cocklebur. • For yellow nutsedge control, preplant incorporate *Dual* or alachlor. • For improved black nightshade control, apply linuron with alachlor.
	linuron + chlorimuron-ethyl *(Lorox Plus,* *New Lorox Plus)*	0.6	1 lb 60% DG	• Applied preemergence. • SEE *LOROX PLUS* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • DO NOT use if soil pH is greater than 6.8. Soybean stunting and injury to labeled rotation crops will occur. • Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • DO NOT use on sands. DO NOT use on soils with less than ½% organic matter. • DO NOT use on soils with organic matter greater than 3%. • Plant soybeans at least 1¾ in. deep. • Better control of velvetleaf, nightshade, jimsonweed, and cocklebur than linuron. • For yellow nutsedge control, preplant incorporate *Dual* or alachlor. • For improved black nightshade control, apply *Lorox Plus* with alachlor. • **Special precaution:** A special sprayer clean-out procedure is required for *Lorox Plus.* See label for specific instructions.
Annual broadleaves **Annual grasses**	*Command, Treflan, Sonalan, Prowl, Lasso, Arena,* or *Dual,* as listed above, preplant incorporated FOLLOWED BY: chloramben *(Amiben)*	 2	 1 gal 2L OR 2½ lb 75% DS	• Preferred on sandy soils low in organic matter where injury from metribuzin or linuron is a problem. • Applied preemergence. • Better ragweed control with *Amiben* applied preemergence than when incorporated. • Fair control of velvetleaf. Poor control of jimsonweed and cocklebur. • For yellow nutsedge control,preplant incorporate *Dual* or alachlor. • Control of black nightshade.

(Continued on next page)

SOYBEANS — PREPLANT FOLLOWED BY PREEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued) **Annual broadleaves** **Annual grasses**	metribuzin *(Lexone or Sencor)*	3/8	3/4 pt 4L OR 1/2 lb 75% DF	• Applied preemergence. • Good control of velvetleaf. Fair control of jimsonweed and cocklebur. Additional velvetleaf and other broadleaf weed control if preplant incorporated metribuzin is followed with a preemergence metribuzin application. See pg. 59 or metribuzin label. • For yellow nutsedge control, preplant incorporate *Dual* or alachlor. • For black nightshade control, apply with alachlor. • Reduce rate if soil pH is above 7.0. See label. • If soil pH is above 7.4, DO NOT apply metribuzin. • DO NOT use on sands. DO NOT use on soil with less than 1/2% organic matter. DO NOT use on loamy sand or sandy loam soils with less than 1% organic matter. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • See label for crop rotation restrictions.
	metribuzin + chlorimuron-ethyl *(Preview)*	3/8	1/2 lb 75% DG	• Applied preemergence. • SEE LABELS OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • DO NOT use if soil pH is greater than 6.8. Soybean stunting and injury to labeled rotation crops will occur. • Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • DO NOT use on sands. DO NOT use on soils with less than 1/2% organic matter. • Use on soils with organic matter from 1/2 to 5%. See *Preview* label for specific rates for soil type and organic matter. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • Better control of velvetleaf, cocklebur, and jimsonweed than metribuzin. • For yellow nutsedge control, preplant incorporate *Dual* or alachlor. • For black nightshade control, apply with alachlor. • **Special precaution:** A special sprayer clean-out procedure is required for *Preview.* See label for specific instructions.
	imazaquin *(Scepter)*	0.125	2/3 pt 1.5 L OR 0.18 lb 70% DG	• Applied preemergence. • ONLY SOYBEANS OR DRY EDIBLE BEANS CAN BE PLANTED THE YEAR FOLLOWING *SCEPTER* APPLICATION. SEE *SCEPTER* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • Soybean stunting (shortening of internodes) may occur on sandy soils. • Common ragweed control is best when *Scepter* is applied preemergence. However, velvetleaf and black nightshade control are better when *Scepter* is preplant incorporated. • For yellow nutsedge control, preplant incorporate *Dual* or alachlor.

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SOYBEANS — PREPLANT FOLLOWED BY PREEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves **Annual grasses**	imazethapyr *(Pursuit)*	0.063	¼ pt 2L	• DO NOT apply *Command* followed by *Pursuit.* • Applied preemergence. Rotary hoe if no rainfall occurs within 7 days. • SEE *PURSUIT* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • *Pursuit* will ONLY SUPPRESS COMMON RAGWEED. An additional soil-applied herbicide such as metribuzin or linuron or a postemergence herbicide may be necessary for common ragweed control. • *Pursuit* will suppress nutsedge. Incorporate alachlor or *Dual* for optimum nutsedge control. • *Pursuit* will control nightshade. Incorporate alachlor for optimum black nightshade control.

SOYBEANS — PREEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves **Annual grasses**	linuron *(Lorox* or *Linex)*	¾	¾ qt 4L OR 1½ lb 50% DF	• Alachlor is a **restricted use** pesticide. • If heavy rainfall occurs soon after application, injury to the crop may result. • DO NOT use on coarse-textured sandy or loamy sand soils or on soils with less than 1% organic matter. • Plant soybeans at least 1¾ in. deep. • Fair control of velvetleaf. Poor control of jimsonweed and cocklebur. • For black nightshade control, apply with alachlor. • A reduced rate of both linuron plus metribuzin can be applied. See labels.
	+ alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)* OR metolachlor *(Dual)*	+ 2 OR 2	+ 2 qt OR 2 pt	
	chloramben *(Amiben)*	2	1 gal 2L OR 2½ lb 75% DS	• Alachlor is a **restricted use** pesticide. • Preferred on sandy soils low in organic matter where injury from metribuzin or linuron has been a problem. • Fair control of velvetleaf. Poor control of jimsonweed and cocklebur. • Control of black nightshade.
	+ alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)* OR metolachlor *(Dual)*	+ 2 OR 2	+ 2 qt OR 2 pt	
	metribuzin *(Lexone* or *Sencor)*	⅜	¾ pt 4L OR ½ lb 75% DF	• Alachlor is a **restricted use** pesticide. • Good control of velvetleaf. Fair control of jimsonweed and cocklebur. Additional velvetleaf and other broadleaf weed control if metribuzin is preplant incorporated, followed by a preemergence metribuzin application. See pg. 59 or metribuzin label. • Reduce metribuzin rate if soil pH is above 7.0. See label. • If soil pH is above 7.4, DO NOT apply metribuzin. • DO NOT use on sands or soils with less than ½% organic matter. DO NOT use on loamy sand or sandy loam soils with less than 1% organic matter. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • A reduced rate of both metribuzin plus linuron may be applied. See labels. • See label for crop rotation restrictions. • Prepackaged mix of *Sencor* plus *Dual (Turbo)* is available. See Table 21.
	+ alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)* OR metolachlor *(Dual)*	+ 2 OR 2	+ 2 qt OR 2 pt	

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SOYBEANS — PREEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves **Annual grasses**	imazaquin *(Scepter)* + alachlor *(Lasso, Arena, or Micro-Tech Lasso)* OR metolachlor *(Dual)*	0.125 + 2 OR 2	⅔ pt 1.5L OR 0.18 lb 70% DG + 2 qt OR 2 pt	• Alachlor is a **restricted use** pesticide. • Good control of cocklebur and jimsonweed. Fair control of velvetleaf. • ONLY SOYBEANS OR DRY EDIBLE BEANS CAN BE PLANTED THE YEAR FOLLOWING *SCEPTER* APPLICATION. SEE *SCEPTER* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • Soybean stunting (shortening of internodes) may occur on sandy soils. • Common ragweed control is best when *Scepter* is applied preemergence. However, black nightshade and velvetleaf control are better when *Scepter* is preplant incorporated.
	imazethapyr *(Pursuit)* + alachlor *(Lasso, Arena, or Micro-Tech Lasso)* OR metolachlor *(Dual)*	0.063 + 2 OR 2	¼ pt 2L + 2 qt OR 2 pt	• Alachlor is a **restricted use** pesticide. • SEE *PURSUIT* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Fair control of cocklebur, jimsonweed, and velvetleaf. • COMMON RAGWEED MAY ONLY BE SUPPRESSED, and an additional preemergence herbicide or a postemergence herbicide application for common ragweed control may be necessary. • Rotary hoe if no rainfall occurs within 7 days. • Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • Preplant incorporation of alachlor or *Dual* would provide better yellow nutsedge control.
	linuron + chlorimuron-ethyl *(Lorox Plus, New Lorox Plus)* + alachlor *(Lasso, Arena, or Micro-Tech Lasso)* OR metolachlor *(Dual)*	0.6 + 2 OR 2	1 lb 60% DG + 2 qt OR 2 pt	• Alachlor is a **restricted use** pesticide. • Applied preemergence. • SEE *LOROX PLUS* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • DO NOT use if soil pH is greater than 6.8. Soybean stunting and injury to labeled rotation crops will occur. • Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • DO NOT use on sands. DO NOT use on soils with less than ½% organic matter. • DO NOT use on soils with organic matter greater than 3%. • See *Lorox Plus* label for specific rates for soil type and organic matter. • A reduced rate of both *Lorox Plus* plus *Preview* can be applied. See labels. • Plant soybeans at least 1¾ in. deep. • Better control of velvetleaf, jimsonweed, and cocklebur than linuron. • **Special precaution:** A special sprayer clean-out procedure is required for *Lorox Plus*. See label for specific instructions.

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SOYBEANS — PREEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves **Annual grasses**	metribuzin + chlorimuron-ethyl *(Preview)* + alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)* OR metolachlor *(Dual)*	3/8 + 2 OR 2	½ lb 75% DG + 2 qt OR 2 pt	• Alachlor is a **restricted use** pesticide. • Applied preemergence. • SEE *PREVIEW* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • DO NOT use if soil pH is greater than 6.8. Soybean stunting and injury to labeled rotation crops will occur. • Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • DO NOT use on sands. DO NOT use on soils with less than ½% organic matter. • Use on soils with organic matter from ½ to 5%. See *Preview* label for specific rates for soil type and organic matter. • A reduced rate of both *Preview* and *Lorox Plus* can be applied. See labels. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • Better control of velvetleaf, cocklebur, and jimsonweed than metribuzin. • **Special precaution:** A special sprayer clean-out procedure is required for *Preview.* See label for specific instructions.

SOYBEANS — PREPLANT OR PREEMERGENCE, FOLLOWED BY POSTEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves **Annual grasses**	*Treflan, Sonalan, Prowl, Lasso, Arena, Dual,* or *Command,* as listed above, preplant incorporated, or *Lasso, Arena,* or *Dual* preemergence. FOLLOWED BY: *Blazer, Basagran, Classic, Cobra, Amiben, Scepter, Pursuit, Reflex,* and/or *Pinnacle.* For specific broadleaf weed control, see "Soybean — Postemergence" section.			
	Amiben, Pursuit, Scepter, Preview, or metribuzin as listed above, preplant incorporated, or *Amiben,* linuron, metribuzin, *Preview, Lorox Plus, New Lorox Plus, Pursuit* or *Scepter* preemergence. FOLLOWED BY: *Assure, Poast, Fusilade 2000,* or *Option.* For annual grass control, see "Soybean — Postemergence" section.			

SOYBEANS — POSTEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves (EXCEPT pigweed and nightshade) **Yellow Nutsedge**	bentazon *(Basagran)* + crop oil concentrate	1 + 1 qt	2 pt + 1 qt	• Most effective on small weeds. Apply 1½ pt/A if weeds are smaller than maximum growth stage on the label. See label. • Use a minimum of 40 psi and 20 gal of water/A. Do not use flood nozzles. • Do not apply if soybeans are under stress from herbicide injury, cold or dry weather, or hail damage. • Use 1 gal/A of 28% liquid nitrogen (urea ammonium nitrate) *INSTEAD OF* crop oil concentrate for improved velvetleaf control. DO NOT use 28% liquid nitrogen if common lambsquarters is present. • DO NOT apply both 28% liquid nitrogen and crop oil concentrate or increased crop injury may occur. • Poor control of pigweed and black nightshade. Fair to good control of common ragweed and lambsquarters. • *Basagran* can be tank mixed with acifluorfen *(Blazer, Tackle), Cobra, Reflex,* and *Scepter* for redroot pigweed control. *Basagran* can be tank mixed with acifluorfen, *Cobra,* or *Reflex* for black nightshade control. • *Basagran* can be tank mixed for postemergence grass control. See *Poast, Fusilade 2000, Assure,* or *Option* labels for further information. • Delay 7 days between *Basagran* application and *Assure, Fusilade 2000, Poast,* or *Hoelon* treatments.
Annual broadleaves (EXCEPT black nightshade and lambsquarters) **Yellow Nutsedge** **Jerusalem Artichoke**	chlorimuron-ethyl *(Classic)* + surfactant	0.0106 + ¼%	⅔ oz. 25% DF + ¼%	• DO NOT APPLY TO SOILS WITH A pH GREATER THAN 7.0. • CHECK LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Most effective on small weeds. Labeled rates of ½ to ¾ oz/A, depending on weed size. • ¾ oz/A required for Jerusalem artichoke. • DO NOT apply to soybeans at the cotyledon stage. • DO NOT apply to soybeans or weeds under stress from herbicide injury or cold or dry weather—crop injury or poor weed control may result. • Under hot, dry conditions, surfactant may be replaced with crop oil concentrate at 1%. However, increased crop injury may result. • Addition of 1 gal/A of 28% liquid nitrogen (urea ammonium nitrate) or 1 qt/A of 10-34-0 (diammonium phosphate) IN ADDITION TO crop oil concentrate OR surfactant IS REQUIRED for control of velvetleaf. • Use a minimum of 25 psi and 10 gal of water/A. For heavy weed pressure, increase volume to 15 gal/A. Do not use flood nozzles. • Cultivation 14 days after treatment will improve weed control. • A second application may be made 2 to 3 weeks after initial application, if needed. Do not exceed 1½ oz/A in one growing season. • Allow 60 days between *Classic* application and soybean harvest. • *Classic* can be tank mixed with *Pinnacle* for lambsquarters control. See the *Pinnacle* label for application rates of *Classic.* • *Classic* can be tank mixed with *Assure* for control of grasses OTHER THAN barnyardgrass, crabgrass, or quackgrass.

(Continued)

SOYBEANS — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves (ONLY lambsquarters, smartweed, pigweed, and velvetleaf)	thifensulfuron methyl *(Pinnacle)* + surfactant	0.004 + ⅛%	¼ oz 25% DF + ⅛%	• No soil pH or crop rotation restrictions. • Control of lambsquarters up to 3 in., pigweed up to 12 in., and smartweed and velvetleaf up to 5 in. in height. • For velvetleaf control, add 4% v/v of 28% liquid nitrogen/A in addition to surfactant. • Use a minimum of 25 psi and 10 gal of water/A. For heavy weed pressure, increase volume to 15 gal/A. Do not use flood nozzles. • Apply after the first trifoliate leaf of soybeans has fully expanded. • Allow a minimum of 60 days between *Pinnacle* application and soybean harvest. • DO NOT tank mix *with* postemergence grass herbicides or poor grass control will result. • *Pinnacle* can be tank mixed with *Basagran* or *Classic* for additional weed control. Add *Basagran* at 1½ pt/A for cocklebur, jimsonweed and mustard control. Add *Classic* at ¼ oz/A for cocklebur, jimsonweed, and mustard control and common ragweed suppression ON SOILS WITH A pH OF 7.2-7.6. CROP ROTATION RESTRICTIONS OCCUR IF *CLASSIC* IS TANK MIXED. SEE *PINNACLE* OR *CLASSIC* LABELS OR TABLE 22. • *Pinnacle* can be tankmixed with *Assure* for annual grass control. See labels. • **Special precaution:** A special sprayer clean-out procedure using chlorine bleach is required. See label.
Annual broadleaves (EXCEPT lambs-quarters) **Jerusalem artichoke**	imazethapyr *(Pursuit)* + 28% liquid nitrogen OR ammonium sulfate + surfactant	0.063 + 1 qt OR 17 lb/100 gal + ¼%	¼ pt 2L + 1 qt OR 17 lb/100 gal + ¼%	• SEE *PURSUIT* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • DO NOT apply without both surfactant AND fertilizer or control will be reduced. • Excellent control of cocklebur, pigweed. Good control of smartweed, velvetleaf, and black nightshade. Fair control of ragweed. • Will control foxtails, barnyardgrass, and crabgrass up to 3 inches tall. • *Pursuit* will suppress yellow nutsedge. • Use a minimum of 20 psi and 10 gal of water/A. • Apply after the first trifoliate leaf of soybeans has fully expanded. • For maximum effectiveness, cultivate 7-10 days following postemergence herbicide application. • Allow a minimum of 85 days between *Pursuit* application and soybean harvest. • *Pursuit* can be tankmixed with *Basagran* for additional lambsquarters, jimsonweed, and ragweed control. • DO NOT tank mix *Pursuit* with postemergence grass herbicides or poor grass control will result. • Delay application of postemergence grass herbicides such as *Poast, Fusilade 2000,* or *Assure* for 3 days following *Pursuit* application.

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SOYBEANS — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves	acifluorfen *(Blazer 2L)* + surfactant	½ + ⅛%	1 qt + ⅛%	• Most effective on small weeds. See label. • Use a minimum of 40 psi and 20 gal of water/A. Do not use flood nozzles. • Do not apply if soybeans are under stress from herbicide injury, cold or dry weather, or hail damage. • Addition of 1 qt/A of 10-34-0 (diammonium phosphate) INSTEAD OF crop oil concentrate will improve velvetleaf control. • DO NOT apply both 10-34-0 and crop oil concentrate. • Increased crop injury may occur with the addition of a surfactant to acifluorfen. • Fair control of cocklebur, velvetleaf, and lambsquarters. • Acifluorfen can be tank mixed with *Scepter* for additional cocklebur control, and with *Basagran* for additional cocklebur, velvetleaf, and lambsquarters control. • Acifluorfen can be tank mixed with *Poast* or *Fusilade 2000* for postemergence grass control. See *Poast* or *Fusilade 2000* labels for further information. • Delay 7 days between acifluorfen application and *Assure, Fusilade 2000, Poast,* or *Hoelon* treatments. • Allow 50 days between acifluorfen application and soybean harvest.
Annual broadleaves (EXCEPT velvetleaf, smartweed, lambs-quarters and cocklebur)	fomesafen *(Reflex)* + surfactant OR crop oil concentrate	0.25 + ¼% OR 1%	1 pt 2L + ¼% OR 1%	• Small grains can be planted 4 months following application; corn, 10 months. DO NOT PLANT ALFALFA, SUGAR BEETS, OR DRY BEANS FOR 18 MONTHS FOLLOWING APPLICATION. • *Reflex* can be reduced to ¾ pt/A for smaller jimsonweed, mustard, nightshade, pigweed, and ragweed. See label. • DO NOT apply more than 1 pt/A of *Reflex* over a 2-year period. • DO NOT apply beyond 3 weeks after soybean emergence. • Rainfall within 4 hours of application will reduce control. • *Reflex* can be tank mixed with *Fusilade 2000* for postemergence grass control. See *Fusilade 2000* label. • *Reflex* can be tank mixed with *Basagran* for velvetleaf, smartweed, lambsquarters and cocklebur control. *Reflex* can be tank mixed with *Scepter* for cocklebur control, and with *Classic* for cocklebur and smartweed control.

(Continued)

SOYBEANS — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves (EXCEPT velvetleaf, smartweed, and lambsquarters)	lactofen *(Cobra)* + crop oil concentrate	0.195 + 1 pt	0.78 pt + 1 pt	• Poor on smartweed and lambsquarters. Fair on velvetleaf. • Most effective on small weeds. See label. • DO NOT apply to soybeans in the cotyledon stage. • DO NOT apply if soybeans are under stress from herbicide injury, cold or dry weather, or hail damage. • When weather conditions are good and weeds growing vigorously, a surfactant at ¼% or 28% liquid nitrogen (urea ammonium nitrate) at 1 gal/A may be substituted for crop oil concentrate. • Use a minimum of 40 psi and 20 gal of water/A. Do not use flood nozzles. • A timely cultivation one week following application will assist in weed control. • Allow 90 days between *Cobra* application and soybean harvest. • *Cobra* can be tank mixed with *Basagran* to control velvetleaf, smartweed, and lambsquarters. Apply 1.5 to 2 pt/A of *Basagran* plus 1 pt/A of crop oil concentrate plus 0.4 to 0.5 pt/A of *Cobra.*
Annual broadleaves (ONLY redroot pigweed and cocklebur)	imazaquin *(Scepter)* + crop oil concentrate OR surfactant	0.063 + 1 qt OR ¼%	⅓ pt OR 0.09 lb 70% DG + 1 qt OR ¼%	• For redroot pigweed and cocklebur control ONLY. • Apply ⅔ pt/A if soil activity to stop germinating weed seeds is desired or to control redroot pigweed from 4 to 12 in. tall. Only soybeans or dry edible beans can be planted the year following a ⅔ pt/A application. • SEE LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • Use a minimum of 40 psi and 20 gal of water/A. Do not use flood nozzles. • Allow 90 days between *Scepter* application and soybean harvest. • *Scepter* can be tank mixed with *Basagran* for control of other broadleaf weeds except black nightshade and large common ragweed. • DO NOT tank mix *Scepter* with *Poast, Fusilade 2000, Assure,* or *Option* or poor grass control will result.
Annual broadleaves (ONLY ragweed, pigweed, smartweed, and velvetleaf)	chloramben *(Amiben)* + crop oil concentrate	3 + 1 qt	6 qt 2L OR 3.6 lb 75% DS + 1 qt	• For postemergence control of common ragweed, redroot pigweed, and smartweed less than 3 in., and velvetleaf less than 5 in. ONLY. • Provides soil activity for later germinating weeds. • Timing is critical for effectiveness. • Do not apply later than 33 days after planting. DO NOT apply at cracking. • Recommended only where preemergence application of *Amiben* is not possible.

(Continued)

SOYBEANS — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Canada thistle **Yellow nutsedge**	bentazon *(Basagran)* + crop oil concentrate	¾ + ¾ + 1 qt + 1 qt	1½ pt + 1½ pt + 1 qt + 1 qt	• Increase *Basagran* rate to 1 qt/A for each application for more effective Canada thistle control. • Treat when nutsedge is 4 to 6 in. and again 10 days later. • See nutsedge remarks under "Special Weed Problems." • Use a minimum of 40 psi and 20 gal of water/A. Do not use flood nozzles. • Delay 7 days between *Basagran* application and *Assure, Fusilade 2000, Poast, Option,* or *Hoelon* treatments.
Annual grasses	sethoxydim *(Poast)* + crop oil concentrate OR *Dash*	0.19 + 1 qt OR 1 qt	1 pt + 1 qt OR 1 qt	• No soil activity. Controls only grasses present when sprayed. • Treat actively growing grass up to a maximum of 4 in. tall. See label. • *Poast* can be reduced to ¾ pt/A for 1- to 4-in. barnyardgrass, green and giant foxtail, and fall panicum. • Use 5 to 20 gal of water/A and a minimum of 40 psi. • Addition of 2.5 lb ammonium sulfate/A in *Poast* applications increases large crabgrass control. • *Poast* can be tank mixed with *Basagran* and/or acifluorfen *(Blazer, Tackle)*. Increase *Poast* to 1.5 pt/A for yellow-foxtail, barnyardgrass, and crabgrass when tank mixing. See *Poast* label for additional information. • Wait 1 day after *Poast* application before applying *Basagran* or acifluorfen. Wait 7 days after *Basagran* or acifluorfen application before applying *Poast.* • Avoid drift onto corn, sorghum, small grains, and turf. • Rainfall within 1 hr of application may reduce control. • Prepackaged mixture of *Poast* plus *Dash (Poast Plus)* is available. Additional crop oil concentrate must be added to the application of *Poast Plus.*
	fluazifop-P-butyl *(Fusilade 2000)* + crop oil concentrate	0.188 + 1 qt	1½ pt + 1 qt	• No soil activity. Controls only grasses present when sprayed. • Treat actively growing grasses up to a maximum of 4 in. tall. See label. • Use 5 to 40 gal of water/A and 40 to 60 psi. • *Fusilade 2000* can be reduced to 1¼ pt/A for certain conditions. See label. • *Fusilade 2000* can be tank mixed with *Basagran, Reflex,* and acifluorfen *(Blazer, Tackle)*. However, the minimum rate for *Fusilade 2000* would be 1½ pt/A. See *Fusilade 2000* label. • Wait 3 days after *Fusilade 2000* application before applying *Basagran* or acifluorfen. Wait 7 days after *Basagran* or acifluorfen application before applying *Fusilade 2000.* • Avoid drift onto corn, small grains, and turf. • Rainfall within 1 hr of application may reduce control.

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SOYBEANS — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual grasses	quizalofop *(Assure)* + crop oil concentrate OR surfactant	0.088 + 1% OR ¼%	0.88 pt + 1% OR ¼%	• No soil activity. Controls only grasses present when sprayed. • Treat actively growing grasses up to a maximum of 4 in. tall. See label. • Use 10 to 40 gal of water/A and a minimum of 40 psi. • 1 pt/A required for barnyardgrass and crabgrass control. • DO NOT cultivate for 7 days before or 7 days after treatment. • Wait 1 day after *Assure* application before applying *Basagran* or acifluorfen. Wait 7 days after *Basagran* or acifluorfen before applying *Assure.* • Avoid drift onto corn, small grains, or turf. • Rainfall within 1 hr of application may reduce control. • Allow 80 days between *Assure* application and soybean harvest. • *Assure* can be tank mixed with *Basagran, Pinnacle* or *Classic,* but should NOT be tank mixed when the target grass is barnyardgrass, crabgrass, or quackgrass. If tank mixing for other grasses except giant foxtail and broadleaf weeds, increase the rate of *Assure* by ¼ pt/A and reduce the surfactant rate to ⅛%.
	fenoxaprop *(Option)* + crop oil concentrate	1.2 + 1 qt	1.2 pt 4L + 1 qt	• No soil activity. Controls only grasses present when sprayed. • Treat actively growing yellow foxtail, witchgrass, fall panicum, and barnyardgrass 3 to 6 in., and crabgrass 1 to 2 in. tall. • *Option* can be reduced to 0.8 pt/A for green and giant foxtail 3 to 6 in. tall. • Apply in a minimum of 10 gal of water/A at 40 psi. Increase spray pressure for dense canopies. • Rainfall within 1 hr of application may reduce control. • Do NOT cultivate for 4 days following application. • Apply a minimum of 90 days before soybean harvest. • Small grains may be planted 4 months following application. • *Option* can be tank mixed with *Basagran* and/or acifluorfen for broad spectrum weed control. However *Option* should be increased to 1.6 pt/A with acifluorfen and 1.2 to 1.6 pt/A with *Basagran*. See *Option* label.
Volunteer corn	fluazifop-P-butyl *(Fusilade 2000)* + crop oil concentrate	0.094 + 1 qt	¾ pt + 1 qt	• Refer to above remarks on annual grass control. • Treat volunteer corn up to 24 in.
	sethoxydim *(Poast)* + crop oil concentrate OR *Dash* + 28% liquid nitrogen OR ammonium sulfate	0.24 + 1 qt OR 1 qt + 1 gal OR 2½ lb	1 pt + 1 qt OR 1 qt + 1 gal OR 2½ lb	• Refer to remarks on annual grass control. • Treat volunteer corn up to 20 in. • *Poast* can be reduced to ¾ pt/A if volunteer corn is less than 12 in. tall. • Prepackaged mixture of *Poast* plus *Dash (Poast Plus)* is available. Additional crop oil concentrate must be added to the application of *Poast Plus.*

(Continued on next page)

SOYBEANS — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Volunteer corn	quizalofop *(Assure)* + crop oil concentrate OR surfactant	0.063 + 1% OR ¼%	0.63 pt + 1% OR ¼%	• Refer to remarks on annual grass control. • Treat volunteer corn up to 18 in.
	fenoxaprop *(Option)* + crop oil concentrate	0.8 + 1 qt	0.8 pt 1L + 1 qt	• Refer to remarks on annual grass control. • Treat volunteer corn from 10 to 16 in.
Volunteer corn **Weed escapes** **Perennials**	glyphosate *(Roundup)*	Rate varies	See label	• Use with ropewick applicator, wipe-on applicator, or recirculating sprayer.
Quackgrass	quizalofop *(Assure)* + crop oil concentrate OR surfactant	0.125 + 1% OR ¼%	1¼ pt + 1% OR ¼%	• Make application when quackgrass is 6 to 10 in. tall. • Two applications may be needed for best quackgrass control. Make second application of 0.88 pt/A 14 to 21 days later when quackgrass has reached 4 to 8 in. Cultivation may replace second application. • Use 10 to 40 gal of water/A and a minimum of 40 psi.
	fluazifop-P-butyl *(Fusilade 2000)* + crop oil concentrate	0.188 + 1 qt	1½ pt + 1 qt	• Make application when quackgrass is 6 to 10 in. tall. • Two applications may be needed for best quackgrass control. Make a second application of 1 pt/A 14 to 21 days later before quackgrass reaches 10 in. Cultivation may replace second application. • Use 5 to 40 gal of water/A and 40 to 60 psi.
	sethoxydim *(Poast)* + crop oil concentrate OR *Dash* + 28% liquid nitrogen OR ammonium sulfate	0.29 + 0.24 + 1 qt + 1 qt OR 1 qt + 1 qt + 1 gal + 1 gal OR 2½lb + 2½lb	1½ pt + 1 pt + 1 qt + 1 qt OR 1 qt + 1 qt + 1 gal + 1 gal OR 2½lb + 2½lb	• Make application when quackgrass is 6 to 8 in. tall. • Two applications will be needed for best quackgrass control. Make the second application of 1 pt/A 14 to 21 days later when quackgrass has regrown. Cultivation may replace second application. • Use 5 to 20 gal of water/A and a minimum of 40 psi. • Prepackaged mixture of *Poast* plus *Dash (Poast Plus)* is available. Additional crop oil concentrate must be added to the application of *Poast Plus.*

SOYBEANS — SPECIAL WEED PROBLEMS — VELVETLEAF

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Preplant incorporated				
Velvetleaf	clomazone *(Command)*	¾	1½ pt 4L	• SEE *COMMAND* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS.
	+	+	+	• Preplant incorporate immediately on moist soils and within 8 hr on dry soils.
	metribuzin *(Lexone* or *Sencor)*	⅜	¾ pt 4L OR ½ lb 75% DF	• Do not apply to very moist soils. • Use a drift additive to avoid spray drift. • Consult *Command* label for buffer zones to prevent off-site drift to sensitive areas. • Excellent velvetleaf control. • Reduce metribuzin rate to ¼ lb a.i./A if soil pH is above 7.0. • On sandy loam soils or loamy sand soils with greater than 1% organic matter, reduce the metribuzin rate to ¼ lb a.i./A. • If soil pH is above 7.4, DO NOT apply metribuzin. • DO NOT use on soils with less than ½% organic matter, or on sands or loamy sands with less than 1% organic matter. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • Avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • **Special precaution:** A special sprayer clean-out procedure is required for *Command.* See label for specific instructions.
	clomazone *(Command)*	¾	1½ pt 4L	• SEE BOTH *COMMAND* AND *PREVIEW* LABELS OR TABLE 22 FOR CROP ROTATION RESTRICTIONS.
	+	+	+	• DO NOT use if soil pH is greater than 6.8. Soybean stunting and injury to labeled rotation crops will occur.
	metribuzin + chlorimuron-ethyl *(Preview)*	⅜	½ lb 75% DG	• DO NOT use on sands. DO NOT use on soils with less than ½% organic matter. • Use on soils with organic matter from ½ to 5%. Reduce *Preview* rate on soils with less than 3% organic matter. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • Excellent control of velvetleaf and cocklebur. Good control of jimsonweed. • Use a drift additive to reduce spray drift. • Consult label for buffer zones to prevent off-site drift to sensitive areas. • DO NOT apply to very moist soils. Preplant incorporate immediately on moist soils and within 8 hours on dry soils. • **Special precaution:** A special sprayer clean-out procedure is required for *Command* and *Preview.* See labels for specific instructions.

(Continued on next page)

SOYBEANS — SPECIAL WEED PROBLEMS — VELVETLEAF (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Preplant incorporated				
Velvetleaf	clomazone *(Command)*	¾	1½ pt 4L	• ONLY SOYBEANS OR DRY EDIBLE BEANS CAN BE PLANTED THE YEAR FOLLOWING *SCEPTER* APPLICATION. SEE BOTH *COMMAND* AND *SCEPTER* LABELS OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • DO NOT use on soils with less than ½% organic matter. • Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • Excellent control of velvetleaf and cocklebur. Good control of jimsonweed. • Use a drift additive to reduce spray drift. • Consult label for buffer zones to prevent off-site drift to sensitive areas. • DO NOT apply to very moist soils. Preplant incorporate immediately on moist soils and within 8 hr on dry soils. • Apply 2 pt/A of *Command* if annual grass pressure is heavy. • Soybean stunting (shortening of internodes) may occur on sandy soils. • Common ragweed control is best when *Scepter* is applied preemergence. However, black nightshade control is better when *Scepter* is preplant incorporated. • **Special precaution:** A special sprayer clean-out procedure is required for *Command*. See label for specific instructions.
	+	+	+	
	imazaquin *(Scepter)*	0.125	⅔ pt 1.5L OR 0.18 lb 70% DG	
	clomazone *(Command)*	1	2 pt 4L	• Alachlor is a **restricted** pesticide. • SEE *COMMAND* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Preplant incorporate immediately on moist soils and within 8 hr on dry soils. • Do not apply to very moist soils. • Use a drift additive to avoid spray drift. • Consult *Command* label for buffer zones to prevent off-site drift to sensitive areas. • Avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • **Special precaution:** A special sprayer clean-out procedure is required for *Command*. See label for specific instructions.
	+	+	+	
	alachlor *(Lasso, Arena,* or *Micro-tech Lasso)*	2	2 qt	
	OR	OR	OR	
	metolachlor *(Dual)*	2	2 pt	

(Continued on next page)

SOYBEANS — SPECIAL WEED PROBLEMS — VELVETLEAF (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Preplant incorporated				
Velvetleaf	trifluralin *(Treflan)*	¾	1½ pt	• Alachlor is a **restricted use** pesticide. • SEE *COMMAND* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • This application rate of *Command* controls only velvetleaf. Other weed control relies on metribuzin plus the third herbicide. • Preplant incorporate immediately on moist soils and within 8 hr on dry soils. • Do not apply to very moist soils. • Use a drift additive to avoid spray drift. • If soil pH is above 7.4, DO NOT apply metribuzin. • Reduce metribuzin rate to ¼ lb a.i./A if soil pH is above 7.0, or if the soil is a sandy loam or loamy sand with 1% or more organic matter. • DO NOT use on soils with less than ½% organic matter, or on sands or loamy sands with less than 1% organic matter. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • Avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • Consult label for buffer zones to prevent off-site drift to sensitive areas. • **Special precaution:** A special sprayer clean-out procedure is required for *Command*. See label for specific instructions. • Prepackaged mix of *Sencor* plus *Dual (Turbo)* is available. See Table 21. • Prepackaged mix of *Sencor* plus *Treflan (Salute)* is available. See Table 21. • Prepackaged mix of *Command* plus *Treflan (Commence)* is available. The *Command* rate in this mix is 0.56 lb a.i./A when *Treflan* is applied at ¾ lb. a.i./A. See Table 21.
	OR	OR	OR	
	pendimethalin *(Prowl)*	1	1 qt	
	OR	OR	OR	
	ethalfluralin *(Sonalan)*	0.9	2½ pt	
	OR	OR	OR	
	alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)*	2	2 qt	
	OR	OR	OR	
	metolachlor *(Dual)*	2	2 pt	
	+	+	+	
	metribuzin *(Lexone* or *Sencor)*	⅜	¾ pt 4L OR ½ lb 75% DF	
	+	+	+	
	clomazone *(Command)*	⅜	¾ pt	
Preplant incorporated followed by preemergence				
Velvetleaf	trifluralin *(Treflan)*	¾	1½ pt	• Alachlor is a **restricted use** pesticide. • Preplant-incorporated tank mix of a grass herbicide plus metribuzin, followed by a second application of metribuzin preemergence. • Both metribuzin treatments needed for effective control, unless *Command* is applied. • Some soybean injury may occur. • Reduce metribuzin rate if soil pH is above 7.0. See label. • DO NOT apply if soil pH is greater than 7.4. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties.
	OR	OR	OR	
	pendimethalin *(Prowl)*	1	1 qt	
	OR	OR	OR	
	ethalfluralin *(Sonalan)*	0.9	2½ pt	
	OR	OR	OR	
	alachlor *(Lasso)*	2	2 qt	
	OR	OR	OR	
	metolachlor *(Dual)*	2	2 pt	
	OR	OR	OR	
	clomazone *(Command)*	¾	1½ pt	
	+	+	+	
	metribuzin *(Lexone* or *Sencor)*	0.3	0.6 pt 4L OR 0.4 lb 75% DF	
FOLLOWED BY: ***Preemergence***	metribuzin *(Lexone* or *Sencor)*	0.15	0.3 pt 4L OR 0.2 lb 75% DF	

(Continued)

SOYBEANS — SPECIAL WEED PROBLEMS — VELVETLEAF (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Preemergence				
Velvetleaf	alachlor *(Lasso, Arena, or Micro-Tech Lasso)*	2	2 qt	• Alachlor is a **restricted use** pesticide. • SEE *PREVIEW* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS.
	OR	OR	OR	• DO NOT use if soil pH is greater than 6.8 — injury to rotation crops will occur.
	metolachlor *(Dual)*	2	2 pt	• More effective when preplant incorporated.
	+	+	+	• Good to excellent velvetleaf control.
	metribuzin + chlorimuron-ethyl *(Preview)*	3/8	½ lb 75% DG	• Use caution to avoid misapplication or overlap or carryover may occur to labeled rotation crops. • DO NOT use on sands. DO NOT use on soils with less than ½% organic matter. • Use on soils with organic matter from ½ to 5%. See *Preview* label for specific rates for soil type and organic matter. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • **Special precaution:** A special sprayer clean-out procedure is required for *Preview*. See label for specific instructions.
	alachlor *(Lasso, Arena, or Micro-Tech Lasso)*	2	2 pt	• Alachlor is a **restricted use** pesticide. • SEE *LOROX PLUS* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS.
	OR	OR	OR	• DO NOT use if soil pH is greater than 6.8 — injury to rotation crops will occur.
	metolachlor *(Dual)*	2	2 pt	• Use for velvetleaf control when organic matter is less than 3% and a preemergence treatment is desired.
	+	+	+	• Good velvetleaf control.
	linuron + chlorimuron-ethyl *(Lorox Plus, New Lorox Plus)*	0.6	1 lb 60% DG	• Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • DO NOT use on sands. DO NOT use on soils with less than ½% organic matter. • See *Lorox Plus* label for specific rates for soil type and organic matter. • Plant soybeans at least 1¾ in. deep. • **Special precaution:** A special sprayer clean-out procedure is required for *Lorox Plus*. See label.
Postemergence				
Velvetleaf	bentazon *(Basagran)*	1	2 pt	• For velvetleaf control up to 5 in. (4- to 6-leaf). • For suppression of velvetleaf up to 12 in. tall, 3 pt of *Basagran*/A plus 1 gal of 28% liquid nitrogen plus 1 qt of crop oil concentrate/A can be applied.
	+	+	+	
	28% liquid nitrogen	1 gal	1 gal	• Use a minimum of 40 psi and 20 gal of water/A. Do not use flood nozzles. • Crop oil concentrate can be applied in addition to the 28% liquid nitrogen with some increased risk of crop injury. • DO NOT APPLY 28% liquid nitrogen (urea ammonium nitrate) without crop oil concentrate if lambsquarters and/or common ragweed are also target weeds.
	chlorimuron-ethyl *(Classic)*	0.012	¾ oz 25% DF	• For velvetleaf control up to 6 in. (8-leaf). • DO NOT APPLY TO SOILS WITH A pH GREATER THAN 7.0.
	+	+	+	
	28% liquid nitrogen	1 gal	1 gal	• SEE *CLASSIC* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS.
	OR	OR	OR	
	10-34-0	2 qt	2 qt	• DO NOT apply without both surfactant AND fertilizer or control will be reduced.
	+	+	+	• Use a minimum of 25 psi and 10 gal of water/A. For heavy weed pressure, increase volume to 15 gal/A. Do not use flood nozzles.
	surfactant	¼%	¼%	
				• Allow a minimum of 60 days between *Classic* application and soybean harvest.

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SOYBEANS — SPECIAL WEED PROBLEMS — VELVETLEAF (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Postemergence				
Velvetleaf	thifensulfuron methyl *(Pinnacle)*	0.004	¼ oz 25% DF	• For velvetleaf control up to 6 in. (4- to 6-leaf). • No soil pH or crop rotation restrictions
	+	+	+	• DO NOT apply without both surfactant AND fertilizer or control will be reduced.
	28% liquid nitrogen	4%	4%	• Use a minimum of 25 psi and 10 gal of water/A. For heavy weed pressure, increase volume to 15 gal/A. Do not use flood nozzles.
	+	+	+	• Apply after the first trifoliate leaf of soybeans has fully expanded.
	surfactant	⅛%	⅛%	• Allow a minimum of 60 days between *Pinnacle* application and soybean harvest. • **Special precaution:** A special sprayer clean-out procedure using *chlorine* bleach is required. See label.
	imazethapyr *(Pursuit)*	0.063	¼ pt 2L	• For velvetleaf control up to 3 in. (4-leaf). • SEE *PURSUIT* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS.
	+	+	+	
	28% liquid nitrogen	1 qt	1 qt	• DO NOT apply without both surfactant AND fertilizer or control will be reduced.
	OR			
	ammonium sulfate	17 lb/100 gal	17 lb/100 gal	• Apply at a minimum of 20 psi and in 10 gal of water/A.
	+	+	+	• Apply after the first trifoliate leaf of soybeans has fully expanded.
	surfactant	¼%	¼%	• For maximum effectiveness cultivate 7-10 days following postemergence herbicide application. • Allow a minimum of 85 days between *Pursuit* application and soybean harvest.

SOYBEANS — SPECIAL WEED PROBLEMS — COCKLEBUR

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Preplant incorporated				
Cocklebur	trifluralin *(Treflan)*	¾	1½ pt	• Alachlor is a **restricted use** pesticide. • Excellent cocklebur control.
	OR	OR	OR	• ONLY SOYBEANS OR DRY EDIBLE BEANS CAN BE PLANTED THE YEAR FOLLOWING *SCEPTER* SOIL-APPLIED AT ⅔ PT/A. SEE LABELS OR TABLE 22 FOR CROP ROTATION RESTRICTIONS.
	pendimethalin *(Prowl)*	1	1 qt	
	OR	OR	OR	• Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops.
	ethalfluralin *(Sonalan)*	0.9	2½ pt	
	OR	OR	OR	• Prepackaged mix of *Prowl* plus *Scepter (Squadron)* is available. See Table 21.
	alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)*	2	2 qt	
	OR	OR	OR	
	metolachlor *(Dual)*	2	2 pt	
	OR			
	clomazone *(Command)*	¾	1½ pt	
	+	+	+	
	imazaquin *(Scepter)*	0.125	⅔ pt OR 0.18 lb 70% DG	

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SOYBEANS — SPECIAL WEED PROBLEMS — COCKLEBUR (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Preplant incorporated				
Cocklebur	trifluralin *(Treflan)*	¾	1½ pt	• Alachlor is a **restricted use** pesticide. • Excellent cocklebur control. • SEE LABELS OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • DO NOT use if soil pH is greater than 6.8. Injury to labeled rotation crops will occur. • DO NOT use on sands. DO NOT use on soils with less than ½% organic matter. • Use on soils with organic matter from ½% to 5%. See *Preview* label for specific rates for soil type and organic matter. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • **Special precaution:** A special sprayer clean-out procedure is required for *Preview.* See label for specific instructions.
	OR	OR	OR	
	pendimethalin *(Prowl)*	1	1 qt	
	OR	OR	OR	
	ethalfluralin *(Sonalan)*	0.9	2½ pt	
	OR	OR	OR	
	alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)*	2	2 qt	
	OR	OR	OR	
	metolachlor *(Dual)*	2	2 pt	
	OR	OR	OR	
	clomazone *(Command)*	¾	1½ pt	
	+	+	+	
	metribuzin + chlorimuron-ethyl *(Preview)*	⅜	½ lb 75% DG	
	trifluralin *(Treflan)*	¾	1½ pt	• Alachlor is a **restricted use** pesticide. • SEE *SCEPTER* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Excellent cocklebur control. • This application rate of *Scepter* controls only cocklebur. Other weed control relies on metribuzin and the third herbicide. • Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • Reduce metribuzin rate to ¼ lb a.i./A if soil pH is above 7.0, or if soil is a sandy loam or loamy sand with less than 1% organic matter. • DO NOT use on sands or soils with less than ½% organic matter. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • Prepackaged mix of *Squadron (Prowl* plus *Scepter)* or *Tri-Scept* (trifluralin plus *Scepter*) contains *Scepter* at a ⅔ pt/A rate. See Table 21. • Prepackaged mix of *Dual* plus *Sencor (Turbo)* is available. See Table 21. • Prepackaged mix of *Treflan* plus *Sencor (Salute)* is available. See Table 21.
	OR	OR	OR	
	pendimethalin *(Prowl)*	1	1 qt	
	OR	OR	OR	
	ethalfluralin *(Sonalan)*	0.9	2½ pt	
	OR	OR	OR	
	alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)*	2	2 qt	
	OR	OR	OR	
	metolachlor *(Dual)*	2	2 pt	
	+	+	+	
	metribuzin *(Lexone* or *Sencor)*	⅜	¾ pt 4L OR ½ lb 75% DF	
	+	+	+	
	imazaquin *(Scepter)*	0.063	⅓ pt OR 0.09 lb 70% DG	
Preemergence				
Cocklebur	alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)*	2	2 qt	• Alachlor is a **restricted use** pesticide. • Good cocklebur control. • ONLY SOYBEANS OR DRY EDIBLE BEANS CAN BE PLANTED THE YEAR FOLLOWING *SCEPTER* SOIL APPLIED AT ⅔ PT/A. SEE *SCEPTER* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Use caution to avoid misapplication or spray overlap as carryover may occur to labeled rotation crops.
	OR	OR	OR	
	metolachlor *(Dual)*	2	2 pt	
	+	+	+	
	imazaquin *(Scepter)*	0.125	⅔ pt OR 0.18 lb 70% DG	

(Continued on next page)

SOYBEANS — SPECIAL WEED PROBLEMS — COCKLEBUR (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued) **Preemergence** **Cocklebur**	alachlor *(Lasso, Arena, or Micro-Tech Lasso)*	2	2 qt	• Alachlor is a **restricted use** pesticide. • SEE *SCEPTER* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS.
	OR	OR	OR	• Good cocklebur control.
	metolachlor *(Dual)*	2	2 pt	• This application rate of *Scepter* controls only cocklebur. Other weed control relies on metribuzin and the third herbicide.
	+	+	+	• Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops.
	metribuzin *(Lexone* or *Sencor)*	⅜	¾ pt 4L OR ½ lb 75% DF	• Reduce metribuzin to ¼ lb a.i./A rate if soil pH is above 7.0, or if soil is a sandy loam or loamy sand soils with less than 1% organic matter.
	+	+	+	• DO NOT use on sands or soils with less than ½% organic matter.
	imazaquin *(Scepter)*	0.063	⅓ pt OR 0.09 lb 70% DG	• Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • Prepackaged mix of *Dual* plus *Sencor (Turbo)* is available. See Table 21.
	alachlor *(Lasso, Arena, or Micro-tech Lasso)*	2	2 qt	• Alachlor is a **restricted use** pesticide. • SEE *PREVIEW* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS.
	OR	OR	OR	• More effective when preplant incorporated.
	metolachlor *(Dual)*	2	2 pt	• Good cocklebur control. • DO NOT use if soil pH is greater than 6.8 — injury to rotation crops will occur.
	+	+	+	• DO NOT use on sands. DO NOT use on soils with less than ½% organic matter.
	metribuzin + chlorimuron-ethyl *(Preview)*	⅜	½ lb 75% DG	• Use on soils with organic matter ½ to 5%. See *Preview* label for specific rates for soil type and organic matter. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • Use caution to avoid misapplication or overlap or carryover may occur to labeled rotation crops. • **Special precaution:** A special sprayer clean-out procedure is required for *Preview.* See label for specific instructions.
	alachlor *(Lasso, Arena, or Micro-tech Lasso)*	2	2 qt	• Alachlor is a **restricted use** pesticide. • Good cocklebur control. • SEE *LOROX PLUS* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS.
	OR	OR	OR	
	metolachlor *(Dual)*	2	2 pt	• DO NOT use if soil pH is greater than 6.8 — injury to rotation crops will occur.
	+	+	+	• DO NOT use on sands. DO NOT use on soils with less than ½% organic matter.
	linuron + chlorimuron-ethyl *(Lorox Plus, New Lorox Plus)*	0.6	1 lb 60% DG	• Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • **Special precaution:** A special sprayer clean-out procedure is required for *Lorox Plus.* See label for specific instructions.

(Continued)

SOYBEANS — SPECIAL WEED PROBLEMS — COCKLEBUR (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Postemergence				
Cocklebur	bentazon *(Basagran)* + crop oil concentrate	¾ + 1 qt	1½ pt + 1 qt	• For control of cocklebur up to 6 in. • Apply 2 pt/A for control up to 12 in. • Use a minimum of 40 psi and 20 gal of water/A. Do not use flood nozzles.
	chlorimuron-ethyl *(Classic)* + surfactant	.0078 + ¼%	½ oz 25% DF + ¼%	• For control of cocklebur up to 6 in. • Apply ¾ oz/A for control up to 12 in. • DO NOT APPLY TO SOILS WITH A pH GREATER THAN 7.0. • SEE *CLASSIC* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Use a minimum of 25 psi and 10 gal of water/A. For heavy weed pressure, increase volume to 15 gal/A. Do not use flood nozzles.
	imazaquin *(Scepter)* + surfactant OR crop oil concentrate	0.063 + ¼% OR 1 qt	⅓ pt OR 0.09 lb 70% DG + ¼% OR 1 qt	• For control of cocklebur up to 6 in. • ⅔ pt/A will control cocklebur of up to 12 in, but **crop rotation will be restricted.** • SEE *SCEPTER* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Use a minimum of 40 psi and 20 gal of water/A. Do not use flood nozzles.
	imazethapyr *(Pursuit)* + 28% liquid nitrogen OR ammonium sulfate + surfactant	0.063 + 1 qt 17 lb/100 gal + ¼%	¼ pt 2L + 1 qt 17 lb/100 gal + ¼%	• For cocklebur control up to 8 in. (8 leaf). • SEE *PURSUIT* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • DO NOT apply without both surfactant AND fertilizer or control will be reduced. • Use a minimum of 20 psi and 10 gal of water/A. • Apply after the first trifoliate leaf of soybeans has fully expanded. • For maximum effectiveness cultivate 7-10 days following postemergence herbicide application. • Allow a minimum of 85 days between *Pursuit* application and soybean harvest.

SOYBEANS — SPECIAL WEED PROBLEMS — NUTSEDGE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Preplant incorporated				
Nutsedge	metolachlor *(Dual)*	2½	2½ pt	• Preplant incorporate to a depth of 2 to 3 in. • Shallow incorporation will improve control under conditions of limited moisture. • Tank mix with *Preview, Scepter* or *Pursuit,* or follow preemergence with *Lorox Plus* for optimum yellow nutsedge control. SEE LABELS OR TABLE 22 FOR CROP ROTATION RESTRICTIONS FOR THESE HERBICIDES.

(Continued)

SOYBEANS — SPECIAL WEED PROBLEMS — NUTSEDGE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Postemergence				
Nutsedge	bentazon *(Basagran)* + crop oil concentrate	¾ + ¾ + 1 qt + 1 qt	1½ pt + 1½ pt + 1 qt + 1 qt	• TWO 1½ pt/A APPLICATIONS REQUIRED FOR BEST NUTSEDGE CONTROL. • Use a minimum of 40 psi and 20 gal of water/A. Do not use flood nozzles. • Postemergence. • Treat when nutsedge is 4 to 6 in. tall and again 10 days later.
	chlorimuron-ethyl *(Classic)* + surfactant	0.0106 + ¼%	⅔ oz 25% DF + ¼%	• Treat when nutsedge is 3 to 4 in. tall. • Rate varies with nutsedge height. See label. • SEE *CLASSIC* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • DO NOT APPLY *CLASSIC* IF SOIL pH IS GREATER THAN 7.0. • Under hot dry conditions, surfactant may be replaced with crop oil concentrate at 1%. However, injury may result. • Use a minimum of 25 psi and 10 gal of water/A. For heavy weed pressure, increase volume to 15 gal/A. • Avoid misapplication or spray overlap or carryover may occur to labeled rotation crops. • **Special precaution:** A special sprayer clean-out procedure is required for *Classic*. See label for specific instructions.

SOYBEANS — PREEMERGENCE — ORGANIC SOILS

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses **Annual broadleaves**	chloramben *(Amiben)* + alachlor *(Lasso, Arena)*	3 + 4	1½ gal 2L OR 3.6 lb 75% DS + 1 gal	• Alachlor is a **restricted use** pesticide. • May require postemergence applications for complete control.
Annual grasses	alachlor *(Lasso, Arena)*	4	1 gal	• Alachlor is a **restricted use** pesticide.
FOLLOWED BY:				
Annual broadleaves	*Blazer, Basagran, Classic, Cobra, Amiben, Scepter, Pursuit, Reflex,* and/or *Pinnacle*. For specific broadleaf weed control, see "Soybean — Postemergence" section. Note that alachlor controls grasses, redroot pigweed, and black nightshade only.			

SOYBEANS — POSTEMERGENCE — ORGANIC SOILS

See "Soybeans — Postemergence" Pages 48–54.

SOYBEANS — NO-TILL

(Following corn or small grains, or with rye or wheat cover crop)

Effective weed control in no-tillage soybean production requires complete control of all weeds and cover crops present at the time of planting. This is usually accomplished with a burndown herbicide such as paraquat *(Gramoxone Extra)* or glyphosate *(Roundup)* added to the tank mix for control of existing plants. Either of these herbicides can be used alone before planting to avoid excessive cover crop growth. *Gramoxone Extra* provides a faster kill. *Roundup* may provide better control if weed or cover crop growth is dense and is preferred for perennial weeds or seedling grasses prior to completion of tillering. Use ½ pt non-ionic surfactant/100 gal of water with paraquat. Double the surfactant rate if liquid fertilizer is used as the carrier. Do not use suspension fertilizers as carriers for *Gramoxone Extra.* The best carrier for *Roundup* is water. Reduced control may occur if *Roundup* is used in tank mixtures containing fluid fertilizer. Carefully follow the mixing instructions for *Gramoxone Extra* and *Roundup.*

Many situations may require little or no adjustment in application rates. However, dense plant residue and the total reliance on herbicides for weed control may require that herbicides be used at the high end of the labelled rate range for the soil type. Postemergence herbicides listed in the "Soybean — Postemergence" section (p. 48) may be used in no-till soybeans and may be needed to provide adequate control. Fields should be scouted routinely (weekly) for weed escapes.

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves **Annual grasses**	metribuzin *(Lexone* or *Sencor)*	⅜	¾ pt 4L OR ½ lb 75% DF	• Alachlor and paraquat are **restricted use** pesticides. • Applied preemergence. • Reduce metribuzin rate if soil pH is above 7.0. See label.
	+	+	+	• If soil pH is above 7.4, do not apply metribuzin.
	alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)*	2½	2½ qt	• See label for crop rotation restrictions. • To avoid excessive cover crop growth, paraquat or *Roundup* may be applied prior to planting.
	OR	OR	OR	• Use 3 qt *Lasso* with heavy annual grass (especially fall panicum and crabgrass) infestations.
	metolachlor *(Dual)*	2	2 pt	• Use 20 to 60 gal of water/A with paraquat and 20 to 30 gal water/A with *Roundup.*
	+	+	+	• Always add non-ionic surfactant with *Gramoxone Extra.* When the herbicide carrier is water, add ½ pt surfactant per 100 gal of spray solution.
	paraquat *(Gramoxone Extra)*	0.78	2½ pt	• Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties.
	OR	OR	OR	• May need follow-up treatment with a postemergence herbicide for weed escapes. See "Soybeans — Postemergence" for weeds controlled and use directions.
	glyphosate *(Roundup)*	1⅛	1½ qt	• If no cover crop is present and weeds are small, the rate of *Gramoxone Extra* or *Roundup* may be reduced (see label for details). • Prepackaged mix of *Lasso* plus *Roundup (Bronco)* is available. See Table 21.

(Continued on next page)

SOYBEANS — NO-TILL

(Following corn or small grains, or with rye or wheat cover crop)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves	linuron	¾	¾ qt 4L	• Alachlor and paraquat are **restricted use** pesticides.
Annual grasses	*(Lorox or Linex)*		OR	• Applied preemergence.
			1½ lb 50% DF	• Do not use on coarse-textured sands or loamy sand soils or on soils with less than 1% organic matter.
	+	+	+	• If heavy rainfall occurs soon after application, injury to crop may result.
	alachlor	2½	2½ qt	• Plant soybeans at least 1¾ in. deep.
	(Lasso, Arena, or Micro-Tech Lasso)			• To avoid excessive cover crop growth, paraquat or *Roundup* may be applied prior to planting.
	OR	OR	OR	• Use 3 qt *Lasso* with heavy annual grass (especially fall panicum and crabgrass) infestations.
	metolachlor	2	2 pt	• Use 20 to 60 gal of water/A with paraquat and 20 to 30 gal of water/A with *Roundup*.
	(Dual)			• Always add non-ionic surfactant with *Gramoxone Extra*. When the herbicide carrier is water, add ½ pt surfactant per 100 gal of spray solution.
	+	+	+	• If no cover crop is present and weeds are small, the rate of *Gramoxone Extra* or *Roundup* may be reduced (see label for details).
	paraquat	0.78	2½ pt	• May need follow-up treatment with a postemergence herbicide for weed escapes (see "Soybeans — Post-emergence" for weeds controlled and use directions).
	(Gramoxone Extra)			• Prepackaged mix of *Lasso* plus *Roundup (Bronco)* is available. See Table 21.
	OR	OR	OR	
	glyphosate	1⅛	1½ qt	
	(Roundup)			
	metribuzin + chlorimuron ethyl	⅜	½ lb 75% DG	• Alachlor and paraquat are **restricted use** pesticides.
	(Preview)			• Applied preemergence.
	+	+	+	• SEE LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS.
	alachlor	2½	2½ qt	• DO NOT USE IF SOIL pH IS GREATER THAN 6.8 or soybean stunting and injury to labelled rotation crops will occur.
	(Lasso, Arena, or Microtech-Lasso)			• Do not use on sands. Do not use on soils with less than ½% organic matter.
	OR	OR	OR	• Do not use on soils with organic matter greater than 5%.
	metolachlor	2	2 pt	• Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties.
	(Dual)			• To avoid excessive cover crop growth, paraquat or *Roundup* may be applied prior to planting.
	+	+	+	• Use caution to avoid misapplication or spray overlap or carryover may occur to labelled rotation crops.
	paraquat	0.78	2½ pt	• **Special precaution:** A special sprayer clean-out procedure is required for *Preview*. See label for specific instructions.
	(Gramoxone Super)			• Use 3 qt *Lasso* with heavy annual grass (especially fall panicum and crabgrass) infestations.
	OR	OR	OR	• Use 20 to 60 gal of water/A with paraquat and 20 to 30 gal of water/A with *Roundup*.
	glyphosate	1⅛	1½ qt	• Always add non-ionic surfactant with *Gramoxone Extra*. When the herbicide carrier is water, add ½ pt surfactant per 100 gal of spray solution.
	(Roundup)			• May need follow-up treatment with a postemergence herbicide for weed escapes. See "Soybeans — Post-

(Continued on next page)

SOYBEANS — NO-TILL

(Following corn or small grains, or with rye or wheat cover crop)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves				emergence" section for weeds controlled and use directions.
Annual grasses				• If no cover crop is present and weeds are small, the rate of *Gramoxone Extra* or *Roundup* may be reduced (see label for details).
				• Prepacked mix of *Lasso* plus *Roundup (Bronco)* is available. See Table 21.
				• Better control of velvetleaf, cocklebur, and jimsonweed than with metribuzin.
	linuron + chlorimuron ethyl *(Lorox Plus, New Lorox Plus)*	0.6	1 lb 60% DG	• Alachlor and paraquat are **restricted use** pesticides. • Applied preemergence. • SEE LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS.
	+	+	+	• DO NOT use if soil pH is greater than 6.8 as soybean stunting and injury to labelled rotation crops will occur.
	alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)*	2½	2½ qt	• Do not use on sands. Do not use on soils with less than ½% organic matter.
	OR	OR	OR	• DO NOT use on soils with organic matter greater than 3%.
	metolachlor *(Dual)*	2	2 pt	• To avoid excessive cover crop growth, paraquat or *Roundup* may be applied prior to planting.
	+	+	+	• Plant soybeans at least 1¾ inches deep.
	paraquat *(Gramoxone Extra)*	0.78	2½ pt	• Use caution to avoid misapplication or spray overlap as carryover may occur to labelled rotation crops.
	OR	OR	OR	• If heavy rainfall occurs soon after application, injury to crop may result.
	glyphosate *(Roundup)*	1⅛	1½ qt	• **Special precaution:** A special sprayer clean-out procedure is required for *Lorox Plus*. See label for specific instructions. • Use 3 qt *Lasso* with heavy annual grass (especially fall panicum and crabgrass) infestations. • Use 20 to 60 gal of water/A with paraquat and 20 to 30 gal of water/A with *Roundup*. • Always add non-ionic surfactant with *Gramoxone Extra*. When the herbicide carrier is water, add ½ pt surfactant per 100 gal of spray solution. • If no cover crop is present and weeds are small, the rate of *Gramoxone Extra* or *Roundup* may be reduced (see label for details). • May need follow-up treatment with a postemergence herbicide for weed escapes. See "Soybeans — Post-emergence" for weeds controlled and use directions. • Prepackaged mix of *Lasso* plus *Roundup (Bronco)* is available. See Table 21. • Better control of velvetleaf, jimsonweed, and cocklebur than with linuron.

(Continued on next page)

SOYBEANS — NO-TILL

(Following corn or small grains, or with rye or wheat cover crop)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves	imazaquin	0.125	⅔ pt	• Alachlor and paraquat are **restricted use** pesticides.
Annual grasses	*(Scepter)*			• Applied preemergence.
	+	+	+	• ONLY SOYBEANS OR DRY EDIBLE BEANS CAN BE PLANTED THE YEAR FOLLOWING SCEPTER APPLICATION. SEE LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS.
	alachlor	2½	2½ qt	
	(Lasso, Arena, or *Micro-Tech Lasso)*			
	OR	OR	OR	• To avoid excessive cover crop growth, paraquat or *Roundup* may be applied prior to planting.
	metolachlor	2	2 pt	• Use caution to avoid misapplication or spray overlap or carryover may occur to labelled rotation crops.
	(Dual)			
	+	+	+	• Soybean stunting (shortening of internodes) may occur on sandy soils.
	paraquat	0.78	2½ pt	• Use 20 to 60 gal of water/A with paraquat and 20 to 30 gal of water/A with *Roundup*.
	(Gramoxone Extra)			• Always add non-ionic surfactant with *Gramoxone Extra.* When the herbicide carrier is water, add ½ pt surfactant per 100 gal of spray solution.
	OR	OR	OR	• If no cover crop is present and weeds are small, the rate of *Gramoxone Extra* or *Roundup* may be reduced (see label for details).
	glyphosate	1⅛	1½ qt	• May need follow-up treatment with a postemergence herbicide for weed escapes. See "Soybeans — Post-emergence" for weeds controlled and use directions.
	(Roundup)			• Prepackaged mix of *Lasso* plus *Roundup* (Bronco) is available. See Table 21.
				• Good control of cocklebur and jimsonweed. Fair control of velvetleaf.

(Continued on next page)

SOYBEANS — NO-TILL (continued)

(Following corn or small grains, or with rye or wheat cover crop)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves	imazethapyr	0.063	¼ pt	• Alachlor and paraquat are **restricted use** pesticides.
Annual grasses	*(Pursuit)*			• Applied preemergence.
	+	+	+	• SEE *PURSUIT* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS.
	alachlor	2½	2½ qt	• Use caution to avoid misapplication or spray overlap or carryover may occur to labelled rotation crops.
	(Lasso, Arena, or *Micro-Tech Lasso)*			• To avoid excessive cover crop growth, paraquat or *Roundup* may be applied prior to planting.
	OR	OR	OR	• Use 20 to 60 gal of water/A with paraquat and 20 to 30 gal of water/A with *Roundup.*
	metolachlor	2	2 pt	• Always add non-ionic surfactant with *Gramoxone Extra.* When the herbicide carrier is water, add ½ pt surfactant per 100 gal of spray solution.
	(Dual)			• If no cover crop is present and weeds are small, the rate of *Gramoxone Extra* or *Roundup* may be reduced (see label for details).
	+	+	+	• May need follow-up treatment with a postemergence herbicide for weed escapes (see "Soybean — Post-emergence" section for weeds controlled and use directions).
	paraquat	0.78	2½ pt	• Prepackaged mix of *Lasso* plus *Roundup (Bronco)* is available. See Table 21.
	(Gramoxone Extra)			• Fair control of cocklebur, jimsonweed, and velvetleaf. Common ragweed may only be suppressed, and an additional preemergence herbicide or a postemergence herbicide may be needed.
	OR	OR	OR	
	glyphosate	1⅛	1½ qt	
	(Roundup)			
	metribuzin	⅜	¾ pt 4L	• Alachlor and paraquat are **restricted use** pesticides.
	(Lexone or *Sencor)*		OR	• Applied preemergence.
			½ lb 75% DF	• Reduce metribuzin rate if soil pH is above 7.0.
	+	+	+	• If soil pH is 7.4 or above, do not apply metribuzin.
	chloramben	2	4 qt 2L	• See label for crop rotation restrictions.
	(Amiben)		OR	• To avoid excessive cover crop growth, paraquat or *Roundup* may be applied prior to planting.
			2½ lb 75% DS	
	+	+	+	• Use 3 qt *Lasso* with heavy annual grass (especially fall panicum and crabgrass) infestations.
	alachlor	2½	2½ qt	• Use 20 to 60 gal of water/A with paraquat and 20 to 30 gal of water/A with *Roundup.*
	(Lasso, Arena, or *Micro-Tech Lasso)*			• Always add non-ionic surfactant with *Gramoxone Extra.* When the herbicide carrier is water, add ½ pt surfactant per 100 gal of spray solution.
	OR	OR	OR	• Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties.
	metolachlor	2	1 qt	• If no cover crop is present and weeds are small, the rate of *Gramoxone Extra* or *Roundup* may be reduced (see label for details).
	(Dual)			• May need follow-up treatment with a postemergence herbicide for weed escapes. See "Soybeans — Post-emergence" for weeds controlled and use directions.
	+	+	+	• Prepackaged mix of *Lasso* plus *Roundup (Bronco)* is available. See Table 21.
	paraquat	0.78	2½ pt	
	(Gramoxone Extra)			
	OR	OR	OR	
	glyphosate	1⅛	1½ qt	
	(Roundup)			

SOYBEANS — NO-TILL — MARESTAIL (HORSEWEED) CONTROL

(Following corn, soybeans, or small grains without a cover crop)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Early preplant				
Annual grasses	glyphosate	0.56	1½ pt	• Apply 10 to 14 days before planting.
Annual broadleaves	*(Roundup)*			• If marestail plants exceed 2 in., increase *Roundup* rate to 1 qt/A.
Marestail	+	+	+	• Must be followed by a sequential application preemergence.
	surfactant	½%	½%	• Do not treat when plants are under stress.
				• Apply when air temperature is at least 60°F.
				• Control will be maximized with spray volume of 5 to 10 gal/A.
				• Use flat fan nozzles.
FOLLOWED BY:	metribuzin	⅜	¾ pt 4L	• Alachlor and paraquat are **restricted use** pesticides.
Preemergence	*(Lexone* or *Sencor)*		OR	• Apply preemergence.
			½ lb 75% DF	• If annual weeds exceed 3 in., increase *Gramoxone Extra* or *Roundup* rate. See labels.
	OR	OR	OR	• If no green weeds are present, paraquat or *Roundup* may be omitted.
	metribuzin + chlorimuron-ethyl *(Preview)*	⅜	½ lb 75% DG	• Fields must be scouted closely before paraquat or *Roundup* is omitted.
	OR	OR	OR	• Always add non-ionic surfactant with *Gramoxone Extra*. When the herbicide carrier is water, add ½ pt surfactant per 100 gal of spray solution.
	linuron	¾	¾ qt 4L	
	(Lorox or *Linex)*		OR	• See remarks and limitations for each herbicide under "Soybeans — No-Till."
			1½ lb 50% DF	
	OR	OR	OR	
	linuron + chlorimuron-ethyl *(Lorox Plus, New Lorox Plus)*	0.6	1 lb 60% DG	
	+	+	+	
	alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)*	2½	2½ qt	
	OR	OR	OR	
	metolachlor *(Dual)*	2	2 pt	
	+	+	+	
	paraquat *(Gramoxone Extra)*	0.47	1½ pt	
	OR	OR	OR	
	glyphosate *(Roundup)*	¾	1 qt	

(Continued on next page)

SOYBEANS — NO-TILL — MARESTAIL (HORSEWEED) CONTROL

(Following corn, soybeans, or small grains without a cover crop)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Early preplant				
Annual grasses	metribuzin	¼	½ pt 4L	• Alachlor and paraquat are **restricted use** pesticides.
Annual broadleaves	*(Lexone* or *Sencor)*		OR	• Apply 10 to 14 days before planting.
Marestail			⅜ lb 75% DF	• Apply before marestail plants exceed 3 in.
	+	+	+	• Must be followed by a sequential application preemergence.
	alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)*	1½	1½ qt	
	OR	OR	OR	
	metolachlor *(Dual)*	1½	1½ pt	
FOLLOWED BY:	metribuzin	⅛	¼ pt 4L	• Apply preemergence.
Preemergence	*(Lexone* or *Sencor)*		OR	• If no green weeds are present, paraquat or *Roundup* may be omitted.
			3/16 lb 75% DF	
	+	+	+	• Fields must be scouted closely before paraquat or *Roundup* is omitted.
	alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)*	1	1 qt	• If annual weeds exceed 3 in., increase *Gramoxone Extra* or *Roundup* rate. See labels.
	OR	OR	OR	• See remarks and limitations for each herbicide under "Soybeans — No-Till."
	metolachlor *(Dual)*	½	½ pt	
	+	+	+	
	paraquat *(Gramoxone Extra)*	.47	1½ pt	
	OR	OR	OR	
	glyphosate *(Roundup)*	¾	1 qt	
Early preplant				
	metribuzin + chlorimuron-ethyl *(Preview)*	¼	⅜ lb 75% DG	• Alachlor and paraquat are **restricted use** pesticides.
				• Apply 10 to 14 days before planting.
				• Apply before marestail plants exceed 3 in.
	+	+	+	• Must be followed by a sequential application preemergence.
	alachlor *(Lasso, Arena,* or *Micro-Tech Lasso)*	1½	1½ qt	
	OR	OR	OR	
	metolachlor *(Dual)*	1½	1½ pt	
FOLLOWED BY:	metribuzin + chlorimuron-ethyl *(Preview)*	⅛	3/16 lb 75% DG	• Apply preemergence.
Preemergence				• If no green weeds are present, paraquat or *Roundup* may be omitted.
	+	+	+	• Fields must be scouted closely before paraquat or *Roundup* is omitted.
	alachlor *(Lasso, Arena,* or *Micro-Tech Lasso*	1	1 qt	• If annual weeds exceed 3 in., increase *Gramoxone Extra* or *Roundup* rate. See labels.
	OR	OR	OR	• See remarks and limitations for each herbicide under "Soybeans — No-Till."
	metolachlor *(Dual)*	½	½ pt	
	+	+	+	
	paraquat *(Gramoxone Extra)*	.47	1½ pt	
	OR	OR	OR	
	glyphosate *(Roundup)*	¾	1 qt	

(Continued on next page)

SOYBEANS — NO-TILL — MARESTAIL (HORSEWEED) CONTROL

(Following corn, soybeans, or small grains without a cover crop)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Early preplant				
Annual grasses **Annual broadleaves** **Marestail**	linuron + chlorimuron-ethyl *(Lorox Plus, New Lorox Plus)* + alachlor *(Lasso, Arena, or Micro-Tech Lasso)* OR metolachlor *(Dual)*	0.4 + 1½ OR 1½	⅔ lb 60% DG + 1½ qt OR 1½ pt	• Alachlor and paraquat are **restricted use** pesticides. • Apply 10 to 14 days before planting. • Apply before marestail exceed 3 in. • Must be followed by sequential application preemergence.
FOLLOWED BY: ***Preemergence***	linuron + chlorimuron-ethyl *(Lorox Plus, New Lorox Plus)* + alachlor *(Lasso, Arena, or Micro-Tech Lasso* OR metolachlor *(Dual)* + paraquat *Gramoxone Extra)* OR glyphosate *(Roundup)*	0.2 + 1 OR ½ + .47 OR ¾	⅓ lb 60% DG + 1 qt OR ½ pt + 1½ pt OR 1 qt	• Apply preemergence. • If no green weeds are present, paraquat or *Roundup* may be omitted. • Fields must be scouted closely before paraquat or *Roundup* is omitted. • If annual weeds exceed 3 in., increase *Gramoxone Extra* or *Roundup* rate. See labels. • See remarks and limitations for each herbicide under "Soybeans — No-Till."
Preemergence	metribuzin *(Lexone* or *Sencor)* OR metribuzin + chlorimuron-ethyl *(Preview)* OR linuron + chlorimuron-ethyl *(Lorox Plus, New Lorox Plus)* + alachlor *(Lasso, Arena, or Micro-Tech Lasso)* OR metolachlor *(Dual)* + glyphosate *(Roundup)*	⅜ OR ⅜ OR 0.6 + 2½ OR 2 + 1⅛	¾ pt 4L OR ½ lb 75% DF OR ½ lb 75% DG OR 1 lb 60% DG + 2½ qt OR 2 pt + 1½ qt	• Alachlor is a **restricted use** pesticide. • Apply preemergence. • Apply before marestail plants exceed 3 in. • If other weeds are small (3 in. or less), *Roundup* rate may be reduced to 1qt/A. • Do not treat when plants are under stress. • Apply when air temperature is at least 60°F. • Use a maximum of 40 gal of water/A. • Requires rainfall following application for adequate control. • See remarks and limitations for each herbicide under "Soybeans — No-Till.".

TABLE 3—SMALL GRAINS

DIRECT-DRILLED SMALL GRAINS (NO-TILL)
(fall or spring seedings following soybeans, corn or dry edible beans)

In general, complete control of all plants present at the time of planting is required for successful weed control. With direct drilling (no-till), vegetation control is accomplished before planting with burndown herbicides such as paraquat *(Gramoxone Extra)* or glyphosate *(Roundup)*. The required application rate varies depending on weed species and size. Refer to the product labels for details. *Gramoxone Extra* provides faster kill. *Roundup* is preferred if perennial weeds are present, but fields with serious perennial weed problems should not be direct drilled with a small grain until the perennial weeds have been controlled.

The need for a burndown herbicide depends on the species of weeds present. If no weeds are present, a burndown herbicide is not needed. For fall-seeded small grains, fields with small seedlings of species that do not overwinter (summer annuals only) and are present at low densities do not need a burndown herbicide. If the weeds are large, however, or capable of overwintering (winter annuals, biennials, or perennials) or if identification of the weeds cannot be confirmed, a burndown herbicide should be used. For spring-seeded small grains, a burndown herbicide should be used if any weeds are present at planting time, regardless of species or size.

Herbicides applied after small grain emergence are not affected by the tillage system used. All of the herbicides listed below can be used in all tillage systems including direct drilling. No weed problems are unique to no-till small grain production. Therefore, no-till small grain production does not present any special weed control concerns.

BARLEY AND WHEAT WITHOUT LEGUME SEEDINGS — ALL TILLAGE SYSTEMS

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves	2,4-D amine	½	1 pt	• Apply at or after full tillering but before the boot stage (the first node is detectable and the grain is usually 6 to 8 in. tall at full tillering, and the boot stage is when the upper sheath is beginning to swell with the enlarging head). • Do not apply in the fall. • Most effective when weeds are small (less than 4 in.) • Not effective on smartweed and wild buckwheat.
	bromoxynil *(Buctril)*	⅜	1½ pt 2E	• May be applied from emergence up to boot stage. • Good coverage is essential. • Bromoxynil must be applied to small weeds for effective control (see label). • Redroot pigweed and mustard must be controlled when very small (refer to label for details). • Very good crop safety.
	dicamba *(Banvel)*	⅛	¼ pt	• Do not apply to spring-seeded barley. • May be applied from early spring until full tillering (the first node is detectable and the grain is usually 6 to 8 in. tall at this stage). • Most effective when weeds are small (less than 4 in.). • See remarks and limitations for dicamba *(Banvel)* in "Corn—Postemergence" section. • More effective than 2,4-D on smartweed, wild buckwheat, and perennials.

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BARLEY AND WHEAT WITHOUT LEGUME SEEDINGS (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves	thifensulfuron methyl + tribenuron methyl *(Harmony Extra)* + surfactant	0.023 + ¼%	½ oz. + ¼%	• Apply to winter wheat after the 2-leaf stage but before the third node is detectable. • Apply to barley after the 2-leaf stage but before the first node is detectable (full tillering). • Most effective if weeds are small (4 in. or less). • Addition of surfactant is essential for adequate results. • *Harmony Extra* may be tank mixed with 2,4-D Amine, MCPA, or *Buctril* for more rapid weed kill and improved control of ragweed. Tank mixes with 2,4-D may improve thistle control but also carry a greater risk of crop injury. To reduce this risk apply 2,4-D at no more than ½ pt. per acre and reduce surfactant concentration to ⅛%. The lower surfactant concentration may reduce velvetleaf control. Observe the timing restrictions for 2,4-D, MCPA, and *Buctril* when tank mixing with *Harmony Extra*. Do not tank mix with *Banvel*. • With ground equipment, use a minimum of 5 gal of water/A and 30 psi. • Uniform coverage is essential. • For severe infestation, increase *Harmony Extra* rate to 0.6 oz. per acre. • For mayweed (dogfennel) control, *Harmony Extra* rate may be reduced to 0.3 oz. per acre. • Control of common ragweed is inconsistent. • Do not exceed 1 oz. product per acre to any one crop during one growing season. • Do not graze or feed forage or hay from treated areas to livestock. (Dry-harvested straw may be used for bedding and/or feed.) • Do not plant treated area to any crop other than wheat or barley for 60 days after application. • Do not apply to wheat or barley underseeded with another crop. • Injury symptoms will appear on weeds in 1 to 3 weeks after application. • Very good crop safety. • Special sprayer clean-out procedure required (see *Harmony Extra* label). • **Caution:** If liquid nitrogen fertilizer is used as the herbicide carrier, leaf burn, yellowing, and stunting are likely. With favorable growing conditions the symptoms are temporary, but this practice is not recommended.
ONLY ragweed, cocklebur, jimsonweed, and mayweed	clopyralid *(Stinger)*	0.125	⅓ pt.	• Apply to wheat or barley from the 3-leaf stage to boot stage. See label for details. • Do not graze dairy or meat animals within 1 week after treatment. • Do not harvest hay from treated grain fields. • Do not apply to small grains underseeded with a legume. • May be tank mixed with 2,4-D, *Banvel,* or *Buctril* for control of additional weeds.

(Continued)

BARLEY AND WHEAT WITHOUT LEGUME SEEDINGS (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Perennials (bindweed, thistles)	2,4-D ester	¾	1½ pt	• Use when grain is fully tillered but before the boot stage (the first node is detectable and the grain is usually 6 to 8 in. tall at full tillering; the boot stage is when the upper sheath is beginning to swell with the enlarging head). • Will provide suppression only. • Injury may occur. • Some control of wild onion and wild garlic.
	dicamba *(Banvel)*	⅛	¼ pt	• Do not apply to spring-seeded barley. • May be applied from early spring until full tillering (the first node is detectable and the grain is usually 6 to 8 in. tall at this stage). • Will provide suppression only. • See remarks and limitations for *Banvel* in "Corn—Postemergence" section. • Some control of wild onion and wild garlic.
Perennials (Canada thistle, sowthistle)	tribenuron methyl *(Express)* + surfactant	0.016 + ¼%	⅓ oz. + ¼%	• Apply after the crop has reached the 2-leaf stage but before the flag leaf is visible. • Apply when thistles are actively growing and 4 to 8 in. tall with 2 to 6 in. of new growth. • Addition of surfactant is essential for adequate results. • *Express* may be tank mixed with 2,4-D Amine, MCPA, or *Buctril* for more rapid weed kill and improved control of ragweed. Tank mixes with 2,4-D may improve thistle control but also carry a greater risk of crop injury. To reduce this risk apply 2,4-D at no more than ½ pt. per acre and reduce surfactant concentration to ⅛%. The lower surfactant concentration may reduce velvetleaf control. Observe the timing restrictions for 2,4-D, MCPA, and *Buctril* when tank mixing with *Express*. Do not tank mix with *Banvel*. • With ground equipment, use a minimum of 5 gal of water/A and 30 psi. • Spectrum of annual weeds controlled is narrower than with *Harmony Extra*. • Do not harvest sooner than 45 days after application. • Do not graze or feed forage or hay from treated areas to livestock (dry-harvested straw may be used for bedding and/or feed). • Do not exceed ⅓ oz. product per acre to any one crop during one growing season. • Do not plant treated area to any crop other than wheat or barley for 60 days after application. • Do not apply to wheat or barley underseeded with another crop. • Injury symptoms will appear on weeds in 1 to 3 weeks after application. • Very good crop safety. • Special sprayer clean-out procedure required (see *Express* label). • **Caution:** If liquid nitrogen fertilizer is used as the herbicide carrier, leaf burn, yellowing, and stunting are likely. With favorable growing conditions the symptoms are temporary, but this practice is not recommended.

(Continued on next page)

BARLEY AND WHEAT WITHOUT LEGUME SEEDINGS (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Perennials (Canada thistle, sowthistle)	thifensulfuron methyl + tribenuron methyl *(Harmony Extra)* + surfactant	0.028 + ¼%	0.6 oz. + ¼%	• See remarks and limitations on *Harmony Extra* for control of annual broadleaves, pg. 73. • Apply when thistles are actively growing and 4 to 8 in. tall with 2 to 6 in. of new growth. • *Harmony Extra* controls a wider spectrum of annual weeds than *Express*. • *Harmony Extra* may be tank mixed with 2,4-D Amine, MCPA, or *Buctril* for more rapid weed kill and improved control of ragweed. Tank mixes with 2,4-D may improve thistle control but also carry a greater risk of crop injury. To reduce this risk apply 2,4-D at no more than ½ pt. per acre and reduce surfactant concentration to ⅛%. The lower surfactant concentration may reduce velvetleaf control. Observe the timing restrictions for 2,4-D, MCPA, and *Buctril* when tank mixing with *Harmony Extra*. Do not tank mix with *Banvel*.
	clopyralid *(Stinger)*	0.125	⅓ pt	• Treat thistles between rosette stage (at least 4 in.) and bud stage for suppression. • Apply to wheat and barley from the 3-leaf stage to boot stage. See label for details. • See remarks and limitations for *Stinger* for annual broadleaves, pg. 73.
Wild garlic **Wild onion**	thifensulfuron methyl + tribenuron methyl *(Harmony Extra)* + surfactant	0.028 + ¼%	0.6 oz + ¼%	• See remarks and limitations of *Harmony Extra* for control of annual broadleaves, pg. 73. • Apply when wild garlic plants are less than 12 in. tall with 2 to 4 in. of new growth. • For best results, treat actively growing wild garlic when air temperature is at least 60°F. • Less effective for wild onion control.
	dicamba *(Banvel)* + 2,4-D	⅛ + ½	¼ pt + 1 pt	• Do not apply to spring-seeded barley. • May use either ester or amine 2,4-D. • Provides suppression only. • Should be applied at full tillering (the first node is detectable and the grain is usually 6 to 8 in. tall at this stage). • See remarks and limitations for *Banvel* in "Corn — Post-emergence" section.

OATS WITHOUT LEGUME SEEDINGS — ALL TILLAGE SYSTEMS

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves	2,4-D amine	⅜	¾ pt	• Use when grain is fully tillered but before boot stage (the first node is detectable and the grain is usually 6 to 8 in. tall at full tillering; the boot stage is when the upper sheath is beginning to swell with the enlarging head). • Most effective when weeds are small (less than 4 in.). • Some yield reduction may occur but generally less than that caused by weeds.
	MCPA	⅜	¾ pt	• Less injurious and less effective than 2,4-D • Most effective when weeds are small (less than 4 in.). • Apply at or after full tillering but before the boot stage (the first node is detectable and the grain is usually 6 to 8 in. tall at full tillering; the boot stage is when the upper sheath is beginning to swell with the enlarging head).

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OATS WITHOUT LEGUME SEEDINGS — ALL TILLAGE SYSTEMS (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued) **Annual broadleaves**	bromoxynil *(Buctril)*	3/8	1½ pt 2E	• May be applied from emergence up to boot stage. • Good coverage essential. • Bromoxynil must be applied to small weeds for effective control (see label). • Redroot pigweed and mustard must be controlled when very small (refer to label for details). • Very good crop safety.
ONLY ragweed, cocklebur, and jimsonweed	clopyralid *(Stinger)*	0.125	⅓ pt	• Apply to oats from the 3-leaf stage to boot stage. See label for details. • Do not graze dairy or meat animals within 1 week after treatment. • Do not harvest hay from treated grain fields. • Do not apply to oats underseeded with a legume. • May be tank mixed with *Buctril* for control of additional weeds.

SMALL GRAINS SEEDED TO LEGUMES — ALL TILLAGE SYSTEMS

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves	MCPA	3/8	¾ pt	• Apply at or after full tillering but before the boot stage (the first node is detectable and the grain is usually 6 to 8 in. tall at full tillering; the boot stage is when the upper sheath is beginning to swell with the enlarging head). • A canopy of grain and weeds over the seeding will reduce the possibility of injury to the legume. • Apply in 5 to 6 gal of water/A to minimize crop injury. • Sweet clover is very sensitive to MCPA.
	bromoxynil *(Buctril)*	3/8	1½ pt 2E	• SMALL GRAINS SEEDED WITH ALFALFA ONLY. • Apply after alfalfa has reached at least the 4 trifoliate stage and between emergence and boot stage of wheat or barley. • Do not treat when air temperatures exceed 70°F at and for 3 days following application or unacceptable alfalfa injury may occur. • Do not use any spray additives or increased injury may occur. • Alfalfa leaf burn following application is likely, but plants recover rapidly in favorable growing conditions. • Warm, humid conditions enhance leaf burn. • Less injurious than MCPA. • Do not treat when plants are under stress. • Rate may be reduced to 1 pt per acre for greater crop safety (see label for weed sizes). • With ground application, use a minimum of 20 gal of water/A and 30 psi. • For best results, weeds must be small (see label for details). • Redroot pigweed and wild mustard must be controlled when very small (refer to label for details). • Weak on common chickweed. • Do not graze or cut for feed for 30 days after application.

TABLE 4—
HARVEST RESTRICTIONS FOR SMALL GRAIN HERBICIDES
(as indicated on the product labels)

Herbicide	Restrictions
Banvel	Do not graze or harvest for livestock feed prior to crop maturity.
Buctril	Do not graze treated fields for 30 days following application.
Express	Do not graze or feed forage or hay from treated areas to livestock (dry-harvested straw may be used for bedding and/or feed).
Harmony Extra	Do not graze or feed forage or hay from treated areas to livestock (dry-harvested straw may be used for bedding and/or feed).
MCPA	Do not allow livestock to forage or graze treated areas within 7 days of slaughter.
Stinger	Do not permit dairy animals or meat animals being finished for slaughter to forage or graze treated grain fields within 1 week after treatment. Do not harvest hay from treated fields.
2,4-D	Do not permit dairy animals or meat animals being finished for slaughter to forage treated grain fields within 2 weeks after treatment. Do not feed treated straw to livestock if a preharvest or emergency treatment is used. See label.

TABLE 5—FORAGES

DIRECT-DRILLED FORAGE LEGUMES (NO-TILL)
(spring seedings following soybeans, corn, or dry edible beans)

In general, complete control of all plants present at the time of planting is required for successful weed control. With direct seeding (no-till), vegetation control is accomplished before planting with burndown herbicides such as paraquat *(Gramoxone Extra)* or glyphosate *(Roundup)*. The required application rate varies depending on weed species and size. Refer to the product labels for details. *Gramoxone Extra* provides faster kill. *Roundup* is preferred if perennial weeds are present, however, fields with serious perennial weed problems should not be direct drilled with a forage legume. Perennial weeds should be controlled in the previous crop or in the fall prior to a spring seeding. Herbicide options in the fall include *Roundup*, 2,4-D ester, or a combination of *Roundup* plus 2,4-D amine.

The need for a burndown herbicide depends on the presence of weeds at planting time. If no weeds are present, a burndown herbicide is not needed. However, a burndown herbicide should be used if any weeds are present at planting time, regardless of species or size.

Herbicides applied after crop emergence are not affected by the tillage system used. All of the herbicides listed for postemergence application can be used in all tillage systems including direct drilling.

ALFALFA, TREFOIL AND CLOVER SEEDINGS
(clear seedings without small grain companion crops)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Preplant Incorporated				
Annual broadleaves **Annual grasses**	EPTC *(Eptam)*	3	3½ pt	• Incorporate into soil immediately after application. • Seed may be planted immediately after this operation. • Do not use when grass is seeded with legumes.
	benefin *(Balan)*	1⅛	3 qt	• See remarks above for EPTC.
Postemergence — all tillage systems				
Annual broadleaves	4-(2,4-DB) amine *(Butoxone 200* or *Butyrac 200)*	1	2 qt	• Apply postemergence when legume seedlings are at or beyond the 1 to 2 trifoliate leaf stage. • Can be used if an annual broadleaf problem develops after using *Eptam*, or *Balan*. • This treatment is not labeled for use with small grain companion crops. • Do not apply to sweet clover or established clovers grown for seed. • Do not graze or feed hay from forage for 60 days after application. • Do not apply when crop is under stress. • Do not apply when the daytime temperature is expected to exceed 90°F within the next 3 days. Do not apply if temperature is expected to fall below 40°F shortly after treatment.
Postemergence — all tillage systems				
Common Chickweed **Volunteer Cereals**	Pronamide *(Kerb)*	¾	1½ lb 50W	• Apply in the fall following spring or summer seeding. • Apply after soil temperature has dropped below 55°F. • Do not graze for 120 days after application.

ALFALFA (Only) — POSTEMERGENCE — ALL TILLAGE SYSTEMS

(Clear seedings without small grain companion crops)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses	sethoxydim *(Poast)* + crop oil concentrate	0.19 + 1 qt	1 pt + 1 qt	• Use on spring seedings. • Apply postemergence prior to first cutting. • Treat small, actively growing grasses (crabgrass up to 4 in.; foxtail, fall panicum, witchgrass, barnyardgrass up to 8 in.). • Use 5 to 20 gal of water/A and 40 to 60 psi. • Avoid spray drift onto corn, sorghum, small grains, and turf. • Rainfall within 1 hr of application will reduce control. • Does not control nutsedge or broadleaved weeds. • Do not apply within 7 days of feeding, grazing, or harvesting forage, or within 20 days of feeding or harvesting for hay. • Do not apply more than 5 pt/A in one season. • Poast rate can be reduced to ¾ pt/A for 1- to 4-in. barnyardgrass, green and giant foxtail, and fall panicum. • Addition of liquid nitrogen fertilizer (28% N) at 1 gal/A or ammonium sulfate at 2½ lb/A will improve large crabgrass control.
Volunteer corn	sethoxydim *(Poast)* + crop oil concentrate + 28% liquid nitrogen OR ammonium sulfate	0.19 + 1 qt + 1 gal OR 2½ lb	1 pt + 1 qt + 1 gal OR 2½ lb	• Use on spring seedings. • Apply postemergence prior to first cutting. • Treat actively growing corn up to a maximum of 20 in. tall. • Use 5 to 20 gal of water/A and 40 to 60 psi. • Avoid spray drift onto corn, sorghum, small grains, and turf. • Rainfall within 1 hr of application will reduce control. • Does not control nutsedge or broadleaved weeds. • Do not apply within 7 days of feeding, grazing, or harvesting forage, or within 20 days of feeding or harvesting for hay. • Do not apply more than 5 pt/A in one season.
Volunteer cereals (wheat, barley, oats, rye)	sethoxydim *(Poast)* + crop oil concentrate + 28% liquid nitrogen OR ammonium sulfate	0.29 + 1 qt + 1 gal OR 2½ lb	1½ pt + 1 qt + 1 gal OR 2½ lb	• Use on spring or summer seedings. • Apply postemergence prior to first cutting. • Treat actively growing grass up to a maximum of 4 in. tall. • Use 5 to 20 gal of water/A and 40 to 60 psi. • Avoid spray drift onto corn, sorghum, small grains, and turf. • Rainfall within 1 hr of application will reduce control. • Does not control nutsedge or broadleaved weeds. • Do not apply within 7 days of feeding, grazing, or harvesting forage, or within 20 days of feeding or harvesting for hay. • Do not apply more than 5 pt/A in one season.

(Continued)

ALFALFA (Only) — POSTEMERGENCE — ALL TILLAGE SYSTEMS

(Clear seedings without small grain companion crops)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves	bromoxynil *(Buctril)*	3/8	1½ pt 2E	• Apply postemergence to spring or summer seedings. • Apply after alfalfa has reached at least the 4 trifoliate leaf stage. • Do not treat when air temperatures exceed 70°F at the time of application or for 3 days following application or unacceptable crop injury may occur. • Do not use any spray additives or increased injury will occur. • Leaf burn following application is likely, but plants recover rapidly in favorable growing conditions. • Warm, humid conditions enhance leaf burn. • Do not treat when plants are under stress. • Rate may be reduced to 1 pt per acre for greater crop safety (see label for weed sizes). • With ground application, use a minimum of 20 gal of water/A and 30 psi. • For best results, weeds must be small; see label for details. • Redroot pigweed and wild mustard must be controlled when very small (refer to label for details.) • Weak on common chickweed. • Do not graze or cut for feed for 30 days after application.

ALFALFA (ESTABLISHED STAND — AT LEAST 1 YEAR OLD)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Yellow rocket and broadleaved winter annuals	metribuzin *(Lexone* or *Sencor)*	½	1 pt 4L OR ⅔ lb 75% DF	• Apply to alfalfa established for one year or more. • Apply to *dormant* alfalfa in late fall or early spring. • Non-dormant alfalfa may be severely injured. • Application rate varies, depending on soil type (see label).
	terbacil *(Sinbar)*	1	1¼ 80W	• Apply to alfalfa established for one year or more. • Apply to *dormant* alfalfa in late fall or early spring. • See label for crop rotation restrictions. • Early spring applications will control other broadleaf weeds and suppress quackgrass infestations. • Application rate varies, depending on soil type (see label).

(Continued on next page)

ALFALFA (ESTABLISHED STAND – AT LEAST 1 YEAR OLD)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Yellow rocket and broadleaved winter annuals	hexazinone *(Velpar)*	½	.6 lb 90W OR 1 qt 2L	• Apply to alfalfa established for one year or more. • Alfalfa plants should be healthy, vigorous, and not under stress by weather, insects, diseases, or extreme weed competition. The crop root system should be well established. • Apply in late fall or early spring before alfalfa growth exceeds 2 in. Applications to *dormant* alfalfa provide the greatest crop safety. • Application can be made between cuttings before regrowth exceeds 2 in. in height, but alfalfa injury may result if plants are under stress. Do not make more than one application in one growing season. • Do not apply to seedling alfalfa or alfalfa-forage grass mixtures. • Do not apply to snow-covered or frozen ground. • Use at least 20 gal water/A for ground application. • Do not graze or feed treated forage to livestock for 30 days following application. • **Rotational restriction:** Corn may be planted 12 mo. following the last application, provided the soil is moldboard plowed prior to planting. Do not plant any other crop for 2 years after application. • Application rate varies, depending on soil type (see label).
Dandelions	metribuzin *(Lexone* or *Sencor)*	1	1 qt 4L OR 1⅓ lb 75% DF	• Apply to alfalfa established for one year or more. • Apply in spring *before* alfalfa breaks dormancy. • Non-dormant alfalfa may be severely injured. • Perennial grasses may also be suppressed. • Early spring applications will control other broadleaf weeds and suppress quackgrass infestations. • Application rate varies, depending on soil type (see label).
	hexazinone *(Velpar)*	1	1.1 lb 90W OR 2 qt 2L	• Apply to alfalfa established for one year or more. • Alfalfa plants should be healthy, vigorous, and not under stress by weather, insects, diseases, or extreme weed competition. The crop root system should be well established. • Apply in spring before alfalfa growth exceeds 2 in. Spring applications to *dormant* alfalfa provide the greatest crop safety. • Application can be made between cuttings before regrowth exceeds 2 in. in height, but alfalfa injury may result if plants are under stress. Do not make more than one application in one growing season. • Do not apply to seedling alfalfa or alfalfa-forage grass mixtures. • Do not apply to snow-covered or frozen ground. • Use at least 20 gal of water/A for ground application. • Do not graze or feed treated forage to livestock for 30 days following application. • **Rotational restriction:** Corn may be planted 12 mo. following the last application, provided the soil is moldboard plowed prior to planting. Do not plant any other crop for 2 years after application. • Will also provide partial control of quackgrass. • Application rate varies, depending on soil type (see label).

(Continued)

ALFALFA (ESTABLISHED STAND – AT LEAST 1 YEAR OLD) (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Hoary alyssum Annual broadleaves	4-(2,4-DB) amine *(Butoxone 200 or Butyrac 200)*	1	2 qt	• Apply in early April. • Spray when hoary alyssum seedlings are in the 2- to 4-leaf stage. • Do not graze or feed hay from forage for 30 days after application. • Do not apply when crop is under stress. • Do not apply when the daytime temperature is expected to exceed 90°F within the next 3 days. Do not apply if the temperature is expected to fall below 40°F shortly after treatment.
Quackgrass	pronamide *(Kerb)*	1½	3 lb	• Apply in late fall when soil temperatures are below 55°F. • For light to moderate quackgrass infestations, rate can be reduced to 1 lb a.i./A (2 lb/A of formulated product).

BIRDSFOOT TREFOIL (ESTABLISHED STAND)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Quackgrass	pronamide *(Kerb)*	1½	3 lb	• Apply in late fall when soil temperatures are below 55°F. • For light to moderate quackgrass infestations, rate can be reduced to 1 lb a.i./A (2 lb/A of formulated product).

RED CLOVER (CURRENT YEAR SEEDING)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Yellow rocket and broadleaved winter annuals	MCPA	½	1 pt	• Spray after killing frost when legumes are dormant.

GRASS PASTURE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Perennial broadleaves	2,4-D ester	1	1 qt	• Apply in fall or spring to actively growing weeds. • Legumes will be injured or killed. • Do not graze animals on treated areas within 7 days after treatment.
	dicamba *(Banvel)*	1	1 qt	• Legumes will be injured or killed. • Apply in fall or spring to actively growing weeds. • Treat when biennials are in the rosette stage. • Remove meat animals from treated areas 30 days prior to slaughter. • See label for timing restrictions for lactating dairy animals following treatment. • Remove meat animals from treated areas 30 days before slaughter.
	2,4-D ester + dicamba *(Banvel)*	¾ + ¼	1½ pt + ½ pt	• Legumes will be injured or killed. • Apply in fall or spring to actively growing weeds. • Observe harvest and grazing restrictions for both herbicides (see remarks and limitations above).

TABLE 6—
HARVEST RESTRICTIONS FOR FORAGE LEGUME HERBICIDES
(as indicated on the product label)

Herbicide	Restrictions
Balan	None.
Buctril	Do not cut for feed or graze spring-treated alfalfa within 30 days following treatment.
Eptam	None for preplant application.
Kerb	Do not graze or harvest for forage or dehydration within 120 days of application.
Lexone/Sencor	Do not graze or harvest within 28 days after application.
MCPA.	Do not allow livestock to forage or graze treated areas within 7 days of slaughter.
Poast	Do not apply within 7 days of feeding, grazing, or harvesting forage, or within 20 days of feeding or harvesting for hay.
Sinbar	None.
2,4-DB	Do not graze established alfalfa or feed straw or hay from treated crops to livestock within 30 days after application. Do not graze or feed seedling alfalfa, clover or birdsfoot trefoil within 60 days after application.
Velpar	Do not graze or feed forage or hay to livestock within 30 days after application.

TABLE 7—DRY EDIBLE BEANS

PREPLANT

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves (including nightshade) **Annual grasses**	alachlor *(Lasso, Arena)*	2	2 qt	• Alachlor is a **restricted use** pesticide. • Incorporate to 2-in. depth. • DO NOT use *Lasso* on sands or loamy sands—injury can occur. • REDUCE *Dual* rate on coarse-textured soils low in organic matter (see label). • This treatment is used for black nightshade control. • *Lasso, Arena,* or *Dual* should be preplant incorporated to minimize danger of bean injury. • *Amiben* may be applied preplant incorporated or preemergence. • *Lasso* will provide better nightshade control than *Dual.* • *Dual* will provide better yellow nutsedge suppression than *Lasso.*
	OR	OR	OR	
	metolachlor *(Dual)*	2	1 qt	
	+	+	+	
	chloramben *(Amiben)*	2	4 qt 2L OR 2½ lb 75% DS	
Annual broadleaves (except common ragweed) **Annual grasses**	alachlor *(Lasso, Arena)*	2	2 qt	• Alachlor is a restricted use pesticide. • Incorporate to a 2-in. depth. • DO NOT use on sands or loamy sands—injury can occur. • For use on navy, black turtle, kidney, and cranberry beans ONLY. • SEE *PURSUIT* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Apply BEFORE JUNE 20. • AVOID DRIFT AND SPRAY OVERLAP. • This treatment is used for black nightshade control. • *Pursuit* will only suppress common ragweed. • *Dual* will provide better yellow nutsedge suppression than *Lasso.*
	OR	OR	OR	
	metolachlor *(Dual)*	2	1 qt	
	+	+	+	
	imazethapyr *(Pursuit)*	0.047	0.188 pt	

(Continued)

PREPLANT (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves (except nightshade) **Annual grasses**	EPTC *(Eptam)*	2¼	1¼ qt	• Incorporate immediately after application. • If there is heavy redroot pigweed, common ragweed, or black nightshade pressure, *Amiben* should also be applied (see next page).
	+	+	+	
	trifluralin *(Treflan)*	½	1 pt	
	OR	OR	OR	
	pendimethalin *(Prowl)*	¾	1½ pt	
	OR	OR	OR	
	ethalfluralin *(Sonalan)*	¾	2 pt	
Annual broadleaves (including nightshade) **Annual grasses**	EPTC *(Eptam)*	2¼	1¼ qt	• Incorporate immediately after application. • Rainfall isn't critical for activation of *Amiben* when it is applied preplant incorporated as when it is surface applied. • Provides some nightshade control. • Black nightshade and common ragweed control is improved when *Amiben* is applied as a preemergence overlay (see below).
	+	+	+	
	chloramben *(Amiben)*	2	4 qt 2L	
			OR	
			2½ lb 75% DS	
	+	+	+	
	trifluralin *(Treflan)*	½	1 pt	
	OR	OR	OR	
	pendimethalin *(Prowl)*	¾	1½ pt	
	OR	OR	OR	
	ethalfluralin *(Sonalan)*	¾	2 pt	
	EPTC *(Eptam)*	2¼	1¼ qt	• Incorporate immediately after application. • DO NOT use on sands or loamy sands. • For use on navy, black turtle, kidney, and cranberry beans ONLY. • SEE *PURSUIT* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Apply BEFORE JUNE 20. • Avoid DRIFT AND SPRAY OVERLAP. • If *Eptam* is NOT applied, common ragweed control will be reduced. • If *Treflan, Sonalan,* or *Prowl* is NOT applied, lambsquarters control will be reduced. • Yellow nutsedge will not be controlled by this treatment.
	+	+	+	
	imazethapyr *(Pursuit)*	0.047	0.188 pt	
	+	+	+	
	trifluralin *(Treflan)*	½	1 pt	
	OR	OR	OR	
	pendimethalin *(Prowl)*	¾	1½ pt	
	OR	OR	OR	
	ethalfluralin *(Sonalan)*	¾	2 pt	

PREPLANT FOLLOWED BY PREEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Preplant incorporated				
Annual broadleaves (including nightshade) **Annual grasses**	EPTC *(Eptam)*	2¼	1¼ qt	• Incorporate immediately after application. • Follow with preemergence herbicide *Amiben or Pursuit* for complete control.
	+	+	+	
	trifluralin *(Treflan)*	½	1 pt	
	OR	OR	OR	
	pendimethalin *(Prowl)*	¾	1½ pt	
	OR	OR	OR	
	ethalfluralin *(Sonalan)*	¾	2 pt	
FOLLOWED BY ***Preemergence***	chloramben *(Amiben)*	2	4 qt 2L OR 2½ lb 75% DS	• Requires rainfall for activation. Rotory hoe if no rainfall occurs within 7 days.
	imazethapyr *(Pursuit)*	0.047	0.188 pt	• Requires rainfall for activation. Rotary hoe if no rainfall occurs within 7 days. • DO NOT use on sands or loamy sands. • For use on navy, black turtle, kidney, and cranberry beans ONLY. • SEE *PURSUIT* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • Apply BEFORE JUNE 20. • Avoid DRIFT AND SPRAY OVERLAP. • Yellow nutsedge will not be controlled by this treatment.

PREEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves (including nightshade) **Annual grasses**	metolachlor *(Dual)*	2	1 qt	• Reduce *Dual* rate on coarse-textured soils low in organic matter (see label). • Danger of bean injury is greater when *Dual* is applied preemergence. • This treatment is used for black nightshade control. • Requires rainfall for activation. Rotary hoe if no rainfall occurs within 7 days.
	+	+	+	
	chloramben *(Amiben)*	2	4 qt 2L OR 2½ lb 75% DS	
Annual broadleaves (except common ragweed) **Annual grassses**	metolachlor *(Dual)*	2	1 qt	• Reduce *Dual* rate on coarse-textured soils low in organic matter (see label). • Danger of bean injury is greater when *Dual* is applied preemergence. • This treatment is used for black nightshade control. • Requires rainfall for activation. Rotary hoe if no rainfall occurs within 7 days. • For use on navy, black turtle, kidney, and cranberry beans ONLY. • SEE *PURSUIT* LABEL OR TABLE 22 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE on sands and loamy sands. • AVOID DRIFT. AVOID SPRAY OVERLAP. Sensitive crops may be injured. • Apply BEFORE JUNE 20. • *Pursuit* will ONLY SUPPRESS COMMON RAGWEED.
	+	+	+	
	imazethapyr *(Pursuit)*	0.047	0.188 pt	

DRY EDIBLE BEANS — POSTEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves (including cocklebur, velvetleaf, and jimsonweed)	bentazon *(Basagran)* + crop oil concentrate	¾ + 1 qt	1½ pt + 1 qt	• Controls only certain broadleaves. Poor control of redroot pigweed or black nightshade. Fair control of common ragweed and common lambsquarters. • Check the *Basagran* drybean label for specific rate and proper weed growth stage. • Beans MUST HAVE 1 to 2 trifoliate leaves before application. • Use a minimum of 40 psi and 20 gal of water/A. Do not use flood nozzles. • Use 1 gal of 28% liquid nitrogen (urea ammonium nitrate)/A INSTEAD OF crop oil concentrate for improved velvetleaf control. Do not use 28% liquid nitrogen if lambsquarters is present. • Do not apply if dry beans are under stress from herbicide injury, cold or dry weather, or hail damage.
Annual grasses	sethoxydim *(Poast)* + crop oil concentrate	0.19 + 1 qt	1 pt + 1 qt	• Apply to annual grasses up to 8 in. (crabgrass up to 6 in.) • *Poast* can be reduced to ¾ pt/A for 1- to 4-in. barnyardgrass, green and giant foxtails, and fall panicum. • Do not apply to grasses under stress or poor weed control may result. • Use a minimum of 5 gal of water/A and a maximum of 20 gal or water/A, and 40 to 60 psi. • No soil activity. • Do not cultivate within 5 days prior to and 7 days following application. • Do not apply within 30 days of harvest.
Quackgrass	sethoxydim *(Poast)* + crop oil concentrate + 28% liquid nitrogen OR ammonium sulfate	0.29 + 0.19 + 1 qt + 1 qt + 1 gal + 1 gal OR 2½ lb + 2½ lb	1½ pt + 1 pt + 1 qt + 1 qt + 1 gal + 1 gal OR 2½ lb + 2½ lb	• TWO APPLICATIONS MAY BE NECESSARY FOR QUACKGRASS CONTROL. Make a second application of 1 pt/A 14 to 21 days following initial treatment. Cultivation may replace second application. • Do not cultivate within 5 days prior to and 14 to 21 days following application. • Use a minimum of 5 gal of water/A and a maximum of 20 gal of water/A, and 40 to 60 psi. • Treat actively growing quackgrass 6 to 8 in. tall. • Do not apply to quackgrass under stress or poor control may result. • Do not apply within 30 days of harvest.
Nutsedge **Canada thistle**	bentazon *(Basagran)* + crop oil concentrate	¾ + ¾ + 1 qt + 1 qt	1½ pt + 1½ pt + 1 qt + 1 qt	• See remarks for nutsedge control in "Soybeans — Postemergence." • Beans must have 1 to 2 trifoliate leaves before application.

DRY BEANS — VINE DESICCATION

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Dry bean vine desiccation	sodium chlorate *(Defol 6)*	6	1 gal 6L	• Crop should be fully mature at the time of application. • Add non-ionic surfactant (½%) or crop oil concentrate (1%) to enhance results. • DO NOT add any *other* chemicals to the spray tank — a fire or explosion may result. • Apply 1 gal/A by air in 5 to 10 gal of water/A or 1 gal/A by ground in 10 to 20 gal of water/A. • Apply on a clear, sunny day with high temperatures and humidity for best results. • Harvest 7 to 10 days following application or regrowth may occur.
	paraquat *(Gramoxone Extra)* + non-ionic surfactant	0.31-0.47 + ¼%	1-1½ pt + ¼%	• *Gramoxone Extra* is a restricted use pesticide. • For use on navy, pinto, and kidney beans only. • Apply when crop is mature and at least 80% of the pods are yellowing and mostly ripe. No more than 40% (bush-type beans) or 30% (vine-type beans) of the leaves still green in color. • Apply by air in 5 gal of water/A or by ground in 20 to 40 gal of water/A. • If growth is lush and vigorous, make either a single application of 1½ pt/A or a split application of ¾ pt/A followed by ¾ pt/A. Do not exceed 1½ pt/A. • Do not harvest within 7 days of application.
	urea sulfuric acid *(Enquik)* + non-ionic surfactant	– + ⅛%	5 to 10 gal + ⅛%	• **DANGER — CORROSIVE. Protective clothing and eyewear required.** • **Special spray equipment required. SEE LABEL.** • Apply at 50 to 60 psi in 5 to 20 gal of water/A with ground equipment ONLY. • Application effect will be evident within 24 hours. • Make a second application two days later, if necessary. Do not exceed a total of 10 gal of Enquik per season. • Will desiccate some broadleaf weeds.

TABLE 8—SUNFLOWERS

PREPLANT

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses **Annual broadleaves**	chloramben *(Amiben)*	2	1 gal 2L OR 2½ lb 75% DS	• Incorporate *Treflan* thoroughly into top 2 or 3 in. of soil within 24 hours after application. *Prowl* incorporation may be delayed 7 days. • On light soils (sandy and sandy loam) low in organic matter, use ½ lb *Treflan* or ¾ lb *Prowl*. • Use 6 qt of *Amiben* for heavy ragweed, mustard, or nightshade populations.
	+	+	+	
	trifluralin *(Treflan)*	¾	1½ pt	
	OR	OR	OR	
	pendimethalin *(Prowl)*	1	2 pt	
	OR	OR	OR	
	ethalfluralin *(Sonalan)*	0.9	2½ pt	
	chloramben *(Amiben)*	2	1 gal 2L OR 2½ lb 75% DS	• May be applied either preplant incorporated or pre-emergence.
	+	+	+	
	alachlor *(Lasso, Arena)*	2½	2½ qt	
Annual grasses **Annual broadleaves** (except ragweed, smartweed, mustard, and nightshade)	trifluralin *(Treflan)*	¾	1½ pt	• Incorporate *Treflan* within 24 hours or *Prowl* within 7 days into top 2 or 3 in. of soil. • On light soils (loamy sands) low in organic matter, use ½ lb *Treflan* or ¾ lb *Prowl*.
	OR	OR	OR	
	pendimethalin *(Prowl)*	1	2 pt	
	OR	OR	OR	
	ethalfluralin *(Sonalan)*	0.9	2½ pt	

SUNFLOWERS — PREEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses **Annual broadleaves**	chloramben *(Amiben)*	2	1 gal 2L OR 2½ lb 75% DS	• Do not graze or feed sunflower forage from *Amiben*-treated areas. • *Amiben* may follow preplant treatments of *Treflan* or *Prowl*. • Use 6 qt of *Amiben* for heavy ragweed, mustard, or nightshade populations.
	chloramben *(Amiben)*	2	1 gal 2L OR 2½ lb 75% DS	• May be applied either preplant incorporated or pre-emergence.
	+	+	+	
	alachlor *(Lasso, Arena)*	2½	2½ qt	

SUNFLOWERS — POSTEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses	sethoxydim *(Poast)* + crop oil concentrate	0.19 + 1 qt	1 pt + 1 qt	• No soil activity from *Poast.* Controls only grasses present when sprayed. • Treat small, actively growing grasses (crabgrass up to 4 in; foxtail, fall panicum, witchgrass, barnyardgrass up to 8 in.) • Addition of liquid nitrogen fertilizer (28% N) at 1 gal/A or ammonium sulfate at 2½ lb/A will improve large crabgrass control. • *Poast* can be reduced to ¾ pt/A for 1- to 4-in. barnyardgrass, green and giant foxtails, and fall panicum. • Use 5 to 20 gal of water/A and 40 to 60 psi. • Avoid drift onto corn, sorghum, small grains, or turf. • Rainfall within 1 hour of application will reduce control. • Does not control nutsedge.
Quackgrass	sethoxydim *(Poast)* + ammonium sulfate OR 28% liquid nitrogen + crop oil concentrate	0.29 + 0.19 + 2½ lb + 2½ lb OR 1 gal + 1 gal + 1 qt + 1 qt	1½ pt + 1 pt + 2½ lb + 2½ lb OR 1 gal + 1 gal + 1 qt + 1 qt	• TWO APPLICATIONS ARE NEEDED FOR BEST QUACKGRASS CONTROL. MAKE SECOND APPLICATION 14 TO 21 DAYS FOLLOWING INITIAL TREATMENT. CULTIVATION MAY REPLACE SECOND APPLICATION. • Addition of ammonium sulfate or liquid nitrogen is necessary for these *Poast* application rates. Apply 2½ pt of *Poast* followed by 1½ pt of *Poast* per acre if only crop oil concentrate is added. • No soil activity from *Poast.* Controls only grass present when sprayed. • Treat actively growing quackgrass 6 to 8 in. tall. • Use a minimum of 5 gal of water/A and 40 psi for *Poast* application. • Avoid drift onto corn, sorghum, small grains, or turf. • Rainfall within 1 hour of application will reduce control. • Addition of other herbicides to spray tank may reduce quackgrass control.
Volunteer corn	sethoxydim *(Poast)* + crop oil concentrate + 28% liquid nitrogen OR ammonium sulfate	0.19 + 1 qt. + 1 gal. OR 2½ lb.	1 pt. + 1 qt. + 1 gal. OR 2½ lb.	• Use on spring seedings. • Apply postemergence prior to first cutting. • Treat actively growing corn up to a maximum of 4 in. tall. • Use 5 to 20 gal of water/A and 40 to 60 psi. • Avoid spray drift onto corn, sorghum, small grains, and turf. • Rainfall within 1 hr of application will reduce control. • Does not control nutsedge or broadleaved weeds. • Do not apply within 7 days of feeding, grazing, or harvesting forage, or within 20 days of feeding or harvesting for hay. • Do not apply more than 5 pt/A in one season.

TABLE 9—POTATOES

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Quackgrass	dalapon *(Dowpon M)*	10	13½ lb	• Spray in spring when quackgrass is 4 to 6 in. tall. Wait 1 week before plowing. • Use in 30 to 40 gal of water/A. • Control of quackgrass will be reduced when heavy stand of rye cover is present.
	glyphosate *(Roundup)*	1½	2 qt	• Apply to actively growing quackgrass at least 8 in. tall. • Use 15 to 20 gal of water/A. • No soil residue. • Can plow or till and plant crop 3 days after application. • Do not plow or till prior to treatment. • *Emerged* potatoes are very sensitive to *Roundup* damage. Do not use near growing potato plants. • Heavy stand of rye cover may reduce quackgrass control. • *Roundup* rate of 1 qt may be used for *single season* quackgrass control. Apply 1 qt in 5 to 10 gal of water/A with ½% non-ionic surfactant.

POTATO — PREPLANT FOLLOWED BY DELAYED PREEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses **Annual broadleaves** ***Preplant incorporated***	EPTC *(Eptam)*	4	4½ pt	• Work into soil immediately after application. • Use 6¾ pt/A if nutsedge is a problem. • Preplant incorporated.
FOLLOWED BY: ***Delayed preemergence***				
	linuron *(Lorox or Linex)*	1	1 qt 4L OR 2 lb 50% DF	• Delayed preemergence. • Treatment should be made prior to potato emergence and to germinating weeds or weeds that have emerged but are very small.
	OR metribuzin *(Lexone or Sencor)*	OR ½	OR 1 pt 4L OR ⅔ lb 75% DF	• A preemergence application of metribuzin to Atlantic and Shepody varieties is not recommended because injury can occur, especially under adverse weather conditions and when high metribuzin rates are used.

POTATOES — EARLY PREEMERGENCE FOLLOWED BY DELAYED PREEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses (especially barnyardgrass) **Annual broadleaves** ***Early preemergence***	metolachlor *(Dual)*	2	2 pt	• If field leveling is necessary, it should be done soon after planting.
	OR pendimethalin *(Prowl)*	OR ¾	OR 1½ pt	• Apply ***early preemergence*** — make application soon after planting. • Most effective on germinating grasses that have *not* emerged. • Do not use *Prowl* on muck soils or loamy sands with less than 1½% organic matter. • Follow with *Lexone* or *Sencor*, or *Lorox* or *Linex*.

(Continued on next page)

POTATOES — EARLY PREEMERGENCE FOLLOWED BY DELAYED PREEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
FOLLOWED BY:				
Delayed preemergence				
	metribuzin *(Lexone or Sencor)*	½	1 pt 4L OR ⅔ lb 75% DF	• These treatments follow *Prowl or Dual* preemergence. • Delayed preemergence. • Apply before potato emergence. • Most effective on germinating and small emerged weeds. • A preemergence application of metribuzin to Atlantic or Shepody varieties is not recommended because injury can occur, especially under adverse weather conditions and where high metribuzin rates are used.
	OR	OR	OR	
	linuron *(Lorox or Linex)*	1	1 qt 4L OR 2 lb 50% DF	

POTATOES — DELAYED PREEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves	linuron *(Lorox or Linex)*	1½	1½ qt 4L OR 3 lb 50% DF	• If field leveling is necessary, it should be done soon after planting to allow weed emergence before spraying. • Apply delayed preemergence before grasses are 2 in. and broadleaves are 4 in., but BEFORE POTATOES EMERGE. • On soils with greater than 5% organic matter, apply 2 lb a.i./A to emerged weeds.
	metribuzin *(Lexone or Sencor)*	½	1 pt 4L OR ⅔ lb 75% DF	• Use up to 1 lb a.i. metribuzin/A on high organic (muck) soil. • If field leveling is necessary, it should be done soon after planting to allow weed emergence before spraying. • Apply delayed preemergence before weeds are 1 in. and before potatoes emerge. • A preemergence application of metribuzin because Atlantic or Shepody varieties is not recommended since injury can occur, especially under adverse weather conditions and where high metribuzin rates are used.

POTATOES — POSTEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves **Annual grasses**	metribuzin *(Lexone or Sencor)*	¼	½ pt 4L OR ⅓ lb 75% DF	• Do not make postemergence applications following 3 days of cool, wet or cloudy weather or crop injury may occur. • Treat when weeds are less than 1 in. tall. • Greater possibility of injury to potatoes when sprayed at 12- to 15-in. stages. • Not recommended on Atlantic, Shepody, Chip Belle, Bell Chip, or Centennial varieties. • Not recommended for early-maturing varieties. • Not recommended for red skinned varieties. • Do not apply postemergence within 60 days of harvest.
	metolachlor *(Dual)*	2	2 pt	• Will not control emerged weeds. • Do not apply within 40 days of harvest. • Do not apply to potatoes at green tip (cracking).

(Continued on next page)

POTATOES — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued) **Annual broadleaves** **Annual grasses**	metolachlor *(Dual)* + metribuzin *(Lexone* or *Sencor)*	2 + ¼	2 pt + ½ pt 4L OR ⅓ lb 75% DF	• Refer to remarks for metribuzin postemergence. • APPLICATION should be made ONLY as a directed or semi-DIRECTED spray to avoid chlorosis, minor necrosis, and leaf distortion.
Annual grasses	sethoxydim *(Poast)* + crop oil concentrate	0.19 + 1 qt	1 pt + 1 qt	• Apply to annual grasses up to 8 in. (crabgrass up to 6 in.) • *Poast* can be reduced to ¾ pt/A for 1- to 4-in. barnyardgrass, green and giant foxtails, and fall panicum. • Do not apply to grasses under stress or poor weed control may result. • Use a minimum of 5 gal of water/A and a maximum of 20 gal of water/A, and 40 to 60 psi. • No soil activity. • Do not cultivate within 5 days prior to and 7 days following application. • Wait 1 day after *Poast* application before applying metribuzin. Wait a minimum of 7 days after metribuzin before applying *Poast.* • Do not apply within 30 days of harvest.
Quackgrass	sethoxydim *(Poast)* + crop oil concentrate	0.29 + .19 + 1 qt + 1 qt	1½ pt + 1 pt + 1 qt + 1 qt	• TWO APPLICATIONS MAY BE NECESSARY FOR QUACKGRASS CONTROL. Make a second application of 1 pt/A 14 to 21 days following initial treatment. Cultivation may replace second application. • Do not cultivate within 5 days prior to and 14 to 21 days following application. • Use a minimum of 5 gal of water/A and a maximum of 20 gal of water/A, and 40 to 60 psi. • Treat actively growing quackgrass 6 to 8 in. tall. • Do not apply to quackgrass under stress or poor control may result. • Wait 1 day after *Poast* application before applying metribuzin. Wait a minimum of 7 days after metribuzin before applying *Poast.* • Do not apply within 30 days of harvest.
Volunteer cereals	sethoxydim *(Poast)* + crop oil concentrate	0.29 + 1 qt	1½ pt + 1 qt	• Apply before tillering (up to 4 in.) • See remarks for annual grass control with *Poast.* • *Poast* is NOT recommended for spring control of cereals that emerged the previous fall.

POTATOES — VINE KILL

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Potato vine desiccation	ametryn *(Evik)*	2.0-2.5	2½-3 lb 80W	• For vine kill of summer potatoes ONLY. • Apply 14 to 17 days before harvest. • Wait a minimum of 3 weeks before planting a rye cover crop. Use the lowest *Evik* rate for better rye establishment. • Apply in 50 to 100 gal of water/A at 50 psi. • *Evik* will not effectively vine-kill Russet Burbank.
	diquat *(Diquat)* + surfactant	¼ + ¼%	1 pt + ¼%	• Add a non-ionic surfactant (¼%). • Make a second application of 1 pt/A a minimum of 5 days later if vine growth is dense. • For Russet Burbank ONLY, a total of 3 pt/A may be applied, with not more than 2 pt/A at a single application. Allow 5 days between applications. • Apply at 50 psi or less in 20 to 100 gal of clean water/A. Greater water volumes will provide more thorough coverage of heavy vine growth. • Apply at least 7 days before harvest. • No soil persistence. A cover crop can be planted immediately.
	endothall *Des-i-cate* + crop oil concentrate	0.78 + ⅛%	1½ gal + ⅛%	• **DO NOT** add crop oil concentrate if temperatures are high and/or the field is moisture stressed. • Increase application rate to 2 gal/A if vine growth is lush and dense, or if weather conditions are cool and cloudy. • Apply at 50 psi or less in 20 to 100 gal of water/A. • Apply at least 10 days before harvest.
	urea sulfuric acid *(Enquik)*	–	20 gal	• **DANGER — CORROSIVE. Protective clothing and eyewear required.** • **Special spray equipment required. SEE LABEL.** • Apply in 20 gal of water/A (total spray volume of 40 gal/A) at 50 psi. • Split applications of 15 gal of *Enquik*/A in 25 gal of water/A for the first application and repeated two days later is suggested for dense vine canopies.

TABLE 10—SUGAR BEETS

PREPLANT

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses	cycloate *(Ro-Neet)*	3	2 qt	• Incorporate immediately to 2 to 3 in. • Must be followed preemergence by *Pyramin.* • DO NOT apply *Nortron* preemergence or post-emergence. • Injury may occur when *Betamix* or *Betanex* is applied postemergence before the 6 true leaf stage. • *Ro-Neet* provides good velvetleaf suppression.
Annual grasses	diethatyl ethyl *(Antor)*	2	2 qt	• Incorporate to 1 to 2 in. • Follow preemergence with *Pyramin* alone or *Nortron* plus *Pyramin.* • Apply 3 qt/A on clay loam soils.

PREEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves **Annual grasses**	pyrazon *(Pyramin)* + diethatyl ethyl *(Antor)*	4 + 3	4 qt + 3 qt	• *Antor* should be included even if grasses are not a problem because better control of annual broadleaves, especially redroot pigweed, will result. • Do not use *Pyramin* on sands or loamy sands or crop injury may occur. • Reduce the *Antor* rate to 2 qt/A on a sandy loam soil. • Reduce the *Pyramin* rate to 3 qt/A on a sandy loam soil and/or if soil organic matter is less than 3%. • If soils are high in clay and/or organic matter and velvetleaf is a problem, apply 5 qt/A of *Pyramin.* • *Pyramin* plus *Nortron* provides better velvetleaf suppression than either herbicide alone. These herbicides are not as effective as *Ro-Neet* preplant incorporated followed by *Pyramin* preemergence. • To approach 100% weed control, it will in most cases be necessary to follow with a postemergence application.
	pyrazon *(Pyramin)* + ethofumesate *(Nortron)* + diethatyl ethyl *(Antor)*	3 + 2 + 2	3 qt + 5⅓ qt EC + 2 qt	• See all remarks for *Pyramin* plus *Antor.* • *Pyramin* plus *Nortron* provides better velvetleaf suppression than either herbicide alone. These herbicides are not as effective as *Ro-Neet* preplant incorporated followed by *Pyramin* preemergence.

EARLY POSTEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves	desmedipham + phenmedipham *(Betamix)*	½	3 pt	• Split (low rate) applications of *Betamix* may be applied to sugar beets at early growth stages (less than 4 true leaf stage) to control early germinating weed seedlings at the cotyledon stage. Weeds not completely controlled by the first treatment will be checked and controlled by the second application.
	FOLLOWED BY:			
	desmedipham + phenmedipham *(Betamix)*	½	3 pt	• Second application should be made AT LEAST 7 days later and AFTER another flush of weeds germinate.
	+	+	+	• The rate of *Betamix* in the second application can be increased to ¾ lb a.i./A.
	endothall *(H-273)*	½	1⅓ pt	• For second application, see remarks under *Betamix* plus *H-273.*
				• DO NOT add crop oil concentrate in first application.

SUGAR BEETS — POSTEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves (including smartweed)	desmedipham + phenmedipham *(Betamix)*	1	6.2 pt	• Apply when the beets are in the 2 to 4 true leaf stage, (6 true leaf stage if *Ro-neet* was applied) and weeds have 4 leaves or less.
	+	+	+	• When cultivating the unsprayed area, be sure to cut away a portion of the sprayed area on the first cultivation and don't roll fresh, unsprayed soil back beyond the cut-away point.
	endothall *(H273)*	½	1⅓ pt	• When temperature is 75°F or greater, apply in late afternoon or early evening.
				• Do not apply when plants are under stress, such as from temperatures above 85°F, or when climate changes rapidly from cool, overcast days to hot, sunny days, or crop injury can occur.
				• Add 1 qt/A crop oil concentrate for hard to control large weeds or if plants are not vigorously growing. *Betamix* rate should then be reduced 25% to reduce injury.
				• Reduce *Betamix* rate 25% and do not add crop oil if high temperature and/or high humidity conditions have been prevalent.
	desmedipham *(Betanex)*	1	6.2 pt	• Refer to remarks under *Betamix* plus *H273.*
				• More effective pigweed control than *Betamix.*
	+	+	+	• Does not control green or yellow foxtail.
	endothall *(H273)*	½	1⅓ pt	• Less effective than *Betamix* on lambsquarters and common ragweed.

(Continued on next page)

SUGAR BEETS — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves (including smartweed)	ethofumesate *(Nortron)*	¾	4 pt EC	• Provides full season weed control because of soil persistence of *Nortron.*
	+	+	+	• Refer to remarks under *Betamix* plus *H273.*
	desmedipham *(Betanex)*	1	6.2 pt	• DO NOT add crop oil concentrate. • DO NOT apply if Ro-Neet was preplant incorporated.
	+	+	+	• Apply when beets are in the 4 true leaf stage or larger.
	endothall *(H273)*	½	1⅓ pt	• More effective pigweed control with *Betanex* than *Betamix.* • Less effective than *Betamix* on lambsquarters and common ragweed.
Annual broadleaves (including smartweed)	pyrazon *(Pyramin)*	2	2 qt	• *Pyramin* will provide residual weed control (stop germinating weed seeds).
	+	+	+	• Apply when the beets are in the 2 to 4 true leaf stage, (6 true leaf stage if *Ro-Neet* was applied) and weeds have 4 leaves or less.
	desmedipham + phenmedipham *(Betamix)*	1	6.2 pt	• Postemergence application of *Pyramin* will suppress velvetleaf if applied before the 2-leaf stage of velvetleaf. A second postemergence application may be necessary within 1 week for velvetleaf suppression.
	+	+	+	• When cultivating the unsprayed area, be sure to cut away a portion of the sprayed area on the first cultivation and don't roll fresh, unsprayed soil back beyond the cut-away point.
	endothall *(H273)*	½	1⅓ pt	• Maximum total amount of pyrazon that can be used for beets grown and processed in Michigan is 7¼ qt/A. • When temperature is 75°F or greater, apply in late afternoon or early evening. • Do not apply when plants are under stress, such as from temperatures above 85°F or when climate changes rapidly from cool, overcast days to hot, sunny days, or crop injury can occur. • Add 1 qt/A of crop oil concentrate for hard to control weeds or if plants aren't vigorously growing. *Betamix* rate should then be reduced 25% to reduce injury. • Reduce *Betamix* rate 25% and do not add crop oil concentrate if high temperature, and/or high humidity conditions have been prevalent.
	pyrazon *(Pyramin)*	2	2 qt	• Refer to remarks under *Pyramin* plus *Betamix* plus *H273.*
	+	+	+	• More effective pigweed control than *Betamix.*
	desmedipham *(Betanex)*	1	6.2 pt	• Does not control green or yellow foxtail. • Less effective than *Betamix* on lambsquarters and common ragweed.
	+	+	+	
	endothall *(H273)*	½	1⅓ pt	
Smartweed and buckwheat	endothall *(H273)*	1	2⅔ pt	• Refer to remarks under *Betamix* and *H273.* • Will control large smartweed and buckwheat.

(Continued)

SUGAR BEETS — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Cocklebur **Giant ragweed** **Common ragweed** **Jimsonweed** **Volunteer sweetclover** **Volunteer alfalfa**	clopyralid *(Stinger)* + crop oil concentrate	0.094 + 1 qt	¼ pt + 1 qt	• DO NOT use on sands or loamy sands, or permeable soils where water tables are shallow because of potential groundwater contamination • Increase rate to ½ pt under drought conditions or dense weed infestations. • Controls cocklebur, giant ragweed and volunteer alfalfa and sweet clover up to 6-leaf, common ragweed up to 5-leaf. • ½ pt/A will suppress smartweed, wild buckwheat and nightshade if less than 3-leaf. • DO NOT cultivate for 7 days following application. • Tank mix with other postemergence herbicides such as *Betamix, Betanex* or *H-273* to control other broadleaf weeds. • DO NOT plant dry beans or other broadleaf crops (except soybeans) for 18 months. • Allow 105 days between application and sugar beet harvest.
Perennial sowthistle **Canada thistle**	clopyralid *(Stinger)* + crop oil concentrate OR ammonium sulfate	0.188 + 1 qt OR 2½ lb	½ pt + 1 qt OR 2½ lb	• DO NOT use on sands or loamy sands or permeable soils where water tables are shallow because of potential groundwater contamination. • Use ⅓ pt/A for Canada thistle. • Increase rate to ⅔ pt under drought conditions. • Apply after sugar beets have reached the third leaf pair AND before thistles have reached the flowering stage. • DO NOT cultivate before OR for a minimum of 14 days after application. • DO NOT tank mix with other herbicides, if applying for thistle control, particularly perennial sowthistle. Tankmixing with *Betamix* and/or *H-273* requires the addition of crop oil concentrate for Canada thistle control with ⅓ pt/A of clopyalid. COC is NOT necessary for control of Canada thistle with ½ pt/A of clopyalid plus *Betamix* and/or *H-273.* • Banded applications are NOT recommended. Instead make a broadcast application over the thistle-infested area. • DO NOT plant dry beans or other broadleaf seed crops (except soybeans) for 18 months. • Allow 105 days between application and sugar beet harvest.
Annual grasses	sethoxydim *(Poast)* + crop oil concentrate OR *Dash*	0.19 + 1 qt OR 1 qt	1 pt + 1 qt OR 1 qt	• Treat actively growing grass. Treat foxtails, fall panicum, and barnyardgrass up to 8 in. and crabgrass up to 4 in. • *Poast* can be reduced to ¾ pt/A for 1- to 4-in. barnyardgrass, green and giant foxtails, and fall panicum. • Ammonium sulfate or 28% liquid nitrogen (urea ammonium nitrate) can be added at 2½ lb/A to enhance crabgrass control. • No soil activity from *Poast.* Controls only grasses present when sprayed. • Use a minimum of 5 gal of water/A and 40 psi. • Does not control yellow nutsedge. • Rainfall within 1 hr of application will reduce control.

(Continued)

SUGAR BEETS — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Volunteer corn	sethoxydim *(Poast)* + crop oil concentrate OR *Dash* + ammonium sulfate OR 28% liquid nitrogen	0.19 + 1 qt OR 1 qt + 2½ lb OR 1 gal	1 pt + 1 qt OR 1 qt + 2½ lb OR 1 gal	• For volunteer corn up to 20 in. tall. • Use ¾ pt/A *Poast* plus 2½ lb ammonium sulfate or 1 gal of 28% liquid nitrogen (urea ammonium nitrate) in addition to crop oil concentrate if the volunteer corn is less than 12 in. • Rainfall within 1 hr of application will reduce control.
Small grains	sethoxydim *(Poast)* + crop oil concentrate OR *Dash* + ammonium sulfate OR 28% liquid nitrogen	0.29 + 1 qt OR 1 qt + 2½ lb OR 1 gal	1½ pt + 1 qt OR 1 qt + 2½ lb OR 1 gal	• Apply before tillering (up to 4 in. tall). • Spring-seeded cereals only.
Quackgrass	sethoxydim *(Poast)* + ammonium sulfate OR 28% liquid nitrogen + crop oil concentrate OR *Dash*	0.29 + 0.19 + 2½lb + 2½lb OR 1 gal + 1 gal + 1 qt + 1 qt OR 1 qt + 1 qt	1½ pt + 1 pt + 2½lb + 2½lb OR 1 gal + 1 gal + 1 qt + 1 qt OR 1 qt + 1 qt	• TWO APPLICATIONS ARE NEEDED FOR BEST QUACKGRASS CONTROL. MAKE SECOND APPLICATION 14 TO 21 DAYS FOLLOWING INITIAL TREATMENT. CULTIVATION MAY REPLACE SECOND APPLICATION. • DO NOT TANK MIX with *Betamix, Betanex, Pyramin,* or *H-273*—crop injury or reduced quackgrass control may occur, especially with nitrogen additives. • Addition of ammonium sulfate or liquid nitrogen is necessary for these *Poast* application rates. Apply 2½ pt of *Poast* followed by 1½ pt of *Poast* if only crop oil concentrate is added. • No soil activity from *Poast*. Controls only grass present when sprayed. • Treat actively growing quackgrass 6 to 8 in. tall. • Use a minimum of 5 gal of water/A and 40 psi for *Poast* application. • Avoid drift onto corn, sorghum, small grains or turf. • Rainfall within 1 hr of application will reduce control.

TABLE 11 — FORAGE SORGHUM

FORAGE SORGHUM — PREEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves **Annual grasses** (EXCEPT fall panicum, green foxtail, giant foxtail, witchgrass, and crabgrass)	atrazine (commercial product)	2	2 qt 4L OR 2.2 lb 50% DG	• Do not use on sands, loamy sands, sandy clay loams, or any soil with less than 1% organic matter. • Heavy rains following application may cause injury. • May be applied preplant incorporated. • Do not apply to sudangrass. • See label for details.
Annual broadleaves **Annual grasses**	atrazine (commercial product) + metolachlor *(Dual)*	1 + 1½	1 qt 4L OR 1.1 lb 90% DG + 1½ pt	• CAUTION: Seed must be treated with CGA-92194 *(Concep II)* herbicide antidote. • See label for additional restrictions. • Commercial prepackaged mix *(Bicep)* is available. • May be applied preplant incorporated. • Do not apply to sudangrass or sorghum-sudangrass hybrids.

FORAGE SORGHUM — POSTEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves	atrazine (commercial product) + crop oil concentrate	1.2 + 1 qt	1.2 qt 4L OR 1.3 lb 90% DG + 1 qt	• Apply after sorghum has reached the 3-leaf stage. • Apply before common lambsquarters and redroot pigweed reach 6 in. and other broadleaf weeds 4 in. • Heavy rainfall following application may cause injury. • Do not apply on sands or loamy sands. • Do not graze or cut for feed for 21 days following application. • Do not apply to sudangrass.
	2,4-D amine	½	1 pt	• Apply when sorghum is 6 to 8 in. tall. • If sorghum is planted in rows, drop nozzles can be used when the crop is 8 to 15 in. tall. • Do not graze or harvest for forage for 14 days after treatment. • See remarks and limitations for 2,4-D under "Corn — Postemergence." • Do not apply to sudangrass or sorghum-sudangrass hybrids. • Consult the 2,4-D label for clearance on forage sorghum.
	bromoxynil *(Buctril)*	⅜	1½ pt 2E	• Apply to weeds less than 4 in. tall for effective control. • Do not mix with spray additives or liquid fertilizers. • Redroot pigweed and mustard must be controlled when very small (see label for details). • Some leaf burn may occur, especially under cool and cloudy or hot and humid conditions. • Do not cut for feed or graze for 30 days after application. • Do not apply to sudangrass or sorghum-sudangrass hybrids.

SORGHUM-SUDANGRASS HYBRIDS — POSTEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves	atrazine (commercial product)	1.2	1.2 qt 4L OR 1.3 lb 90% DG	• Apply after sorghum has reached the 3-leaf stage. • Apply before common lambsquarters and redroot pigweed reach 6 in. and other broadleaf weeds 4 in. • Heavy rainfall following application may cause injury. • Do not apply on sands or loamy sands. • Do not graze or cut for feed for 21 days following application. • Do not apply to sudangrass.
	+	+	+	
	crop oil concentrate	1 qt	1 qt	

TABLE 12—WEED RESPONSE TO HERBICIDES IN CORN*

	ANNUAL BROADLEAVES									ANNUAL GRASSES								PERENNIALS				
	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (BLACK)	PIGWEED (REDROOT)	RAGWEED	SMARTWEED	VELVETLEAF	WILD MUSTARD	BARNYARDGRASS	CRABGRASS	GIANT FOXTAIL	GREEN FOXTAIL	YELLOW FOXTAIL	FALL PANICUM	WITCHGRASS	WILD PROSO MILLET	BINDWEED (FIELD)	BINDWEED (HEDGE)	CANADA THISTLE	QUACKGRASS	YELLOW NUTSEDGE
Preplant incorporated																						
ATRAZINE	F	F	E	E	G	E	G	F	E	G	P	F	F	G	P	P	P	P	P	F	G	F
BLADEX	F	P	E	G	F	E	G	P	G	G	G	G	G	G	G	G	F	N	N	N	N	N
DUAL	N	N	P	F	G	P	P	N	P	E	E	E	E	E	E	E	F	N	N	N	N	E
ERADICANE	P	P	F	P	F	F	F	F	F	E	E	E	E	E	E	E	G	N	N	N	G	G
ERADICANE EXTRA	P	P	F	P	F	F	F	F	F	E	E	E	E	E	E	E	G	N	N	N	G	G
SUTAN +	P	P	P	N	P	P	P	F	P	E	E	E	E	E	E	E	F	N	N	N	P	G
LASSO	N	N	P	G	G	P	P	N	P	E	E	E	E	E	E	E	F	N	N	N	N	G
PRINCEP	G	F	E	E	E	E	G	F	E	G	F	F	F	G	P	P	P	P	P	P	F	F
Preemergence																						
ATRAZINE	F	F	E	E	G	E	G	F	E	G	P	F	F	G	P	P	P	P	P	F	G	F
BLADEX	F	P	E	G	F	E	G	P	G	G	G	G	G	G	G	G	F	N	N	N	N	N
DUAL	N	N	P	F	G	P	P	N	P	E	E	E	E	E	E	E	F	N	N	N	N	G
LASSO	N	N	P	G	G	P	P	N	P	E	E	E	E	E	E	E	F	N	N	N	N	F
PRINCEP	G	F	E	E	E	E	G	F	E	G	F	F	F	G	P	P	P	P	P	P	F	F
PROWL	N	N	G	P	F	P	P	F	P	E	E	E	E	E	E	E	F	N	N	N	N	N
RAMROD	N	P	P	N	F	P	P	P	P	G	E	E	E	E	G	G	F	N	N	N	N	N
Postemergence																						
ACCENT	F	G	F	P	E	P	G	F	—	E	F	E	E	E	E	E	G	—	—	—	G	—
ATRAZINE + OIL	G	G	E	G	E	E	G	E	E	F	P	F	G	G	P	P	P	P	P	G	G	G
BANVEL	G	G	G	G	G	G	E	G	F	N	N	N	N	N	N	N	N	F	G	F	N	N
BASAGRAN + OIL	E	G	F	P	P	F	G	G	E	N	N	N	N	N	N	N	N	N	N	G	N	G
BEACON	E	G	F	G	E	G	G	G	—	P	P	F	F	F	G	G	P	—	—	—	G	—
BLADEX	F	P	E	G	F	E	G	F	G	G	F	F	G	G	P	P	F	N	N	N	N	N
BUCTRIL	G	G	E	G	F	G	G	G	F	N	N	N	N	N	N	N	N	P	P	P	N	N
STINGER	E	G	P	P	P	G	F	P	P	N	N	N	N	N	N	N	N	P	P	G	P	N
2,4-D AMINE	F	F	G	G	G	G	P	F	G	N	N	N	N	N	N	N	N	P	F	F	N	N
2,4-D ESTER	F	F	G	G	G	G	P	G	G	N	N	N	N	N	N	N	N	F	G	G	N	N
Postemergence Directed																						
EVIK	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	F	F	F	P	F
GRAMOXONE EXTRA	E	E	E	E	E	E	F	E	E	E	E	E	E	E	E	E	E	P	P	P	P	P
LINEX/LOROX	F	F	G	G	G	G	G	G	G	F	F	F	F	F	F	F	F	N	N	N	N	N

P = Poor; F = Fair; G = Good; E = Excellent; N = None; — = Not enough information to rank

**The above ratings are a relative comparison of herbicide effectiveness. Weather conditions greatly influence the herbicide's effectiveness, and weed control may be better under favorable conditions or poorer under unfavorable conditions.*

TABLE 13—WEED RESPONSE TO HERBICIDES IN SOYBEANS*

	ANNUAL BROADLEAVES										ANNUAL GRASSES								PERENNIALS				
	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (BLACK)	PIGWEED (REDROOT)	RAGWEED	SMARTWEED	VELVETLEAF	WILD MUSTARD	HORSEWEED (MARESTAIL)	BARNYARDGRASS	CRABGRASS	GIANT FOXTAIL	GREEN FOXTAIL	YELLOW FOXTAIL	FALL PANICUM	WITCHGRASS	WILD PROSO MILLET	BINDWEED (FIELD)	BINDWEED (HEDGE)	CANADA THISTLE	QUACKGRASS	YELLOW NUTSEDGE
Preplant Incorporated																							
AMIBEN	P	P	G	G	G	F	G	F	F	—	P	P	P	P	P	P	P	P	N	N	N	N	N
COMMAND	F	F	G	P	P	G	G	E	P	—	G	E	E	E	G	G	G	F	N	N	N	N	N
DUAL	N	N	P	F	G	P	P	N	P	—	E	E	E	E	E	G	G	F	N	N	N	N	G
LASSO	N	N	P	G	G	P	P	N	P	—	E	E	E	E	E	G	G	F	N	N	N	N	F
LEXONE/SENCOR	G	F	E	N	E	G	E	G	E	—	F	F	F	G	G	F	F	P	N	N	N	N	N
PREVIEW	E	G	E	P	E	G	E	G	E	—	F	F	F	G	G	F	F	P	N	N	N	N	F
PROWL	N	N	G	P	F	P	P	F	P	—	E	E	E	E	E	E	E	F	N	N	N	N	N
PURSUIT	G	F	F	E	E	F	G	G	E	—	F	F	G	G	G	P	P	—	P	P	N	N	F
SCEPTER	E	G	G	G	E	F	G	G	G	—	F	P	G	G	G	P	P	P	N	N	N	N	F
SONALAN	N	N	G	F	G	P	P	N	P	—	E	E	E	E	E	E	E	F	N	N	N	N	N
TREFLAN	N	N	G	N	G	N	P	N	P	—	E	E	E	E	E	E	E	F	N	N	N	N	N
Preemergence																							
AMIBEN	P	P	G	G	E	G	G	P	F	P	F	F	F	F	F	F	F	F	N	N	N	N	N
DUAL	N	N	P	F	G	P	P	N	P	P	E	E	E	E	E	G	G	F	N	N	N	N	F
LASSO	N	N	P	G	G	P	P	N	P	P	E	E	E	E	E	G	G	F	N	N	N	N	P
LEXONE/SENCOR	F	F	E	N	E	G	E	G	E	G	F	F	F	G	G	F	F	P	N	N	N	N	N
LINEX/LOROX	P	P	G	F	G	G	G	F	G	P	F	F	F	F	F	F	F	P	N	N	N	N	N
LOROX PLUS	G	G	E	F	E	G	G	G	E	G	F	F	F	F	F	F	F	P	N	N	N	N	F
PREVIEW	G	G	E	P	E	G	E	G	E	E	F	F	F	G	G	F	F	P	N	N	N	N	F
PROWL	N	N	G	P	F	P	P	P	P	P	G	G	G	G	G	G	G	F	N	N	N	N	N
PURSUIT	F	F	P	G	E	F	G	F	G	P	F	F	F	F	F	P	P	—	N	N	N	N	F
SCEPTER	G	G	G	F	E	G	G	F	G	P	F	P	G	G	G	P	P	P	N	N	N	N	P
Postemergence																							
AMIBEN (foliar activity)	N	N	P	P	F	F	F	F	P	—	N	N	N	N	N	N	N	N	N	N	N	N	N
ASSURE	N	N	N	N	N	N	N	N	N	N	G	G	E	E	E	E	E	E	N	N	N	E	N
BASAGRAN	E	G	G	P	P	F	G	G	E	G	N	N	N	N	N	N	N	N	N	N	G	N	G
BLAZER 2L	F	G	F	G	E	G	G	F	E	P	N	N	F	F	F	F	N	N	P	P	P	N	N
CLASSIC	E	G	N	N	E	G	G	G	E	F	N	N	P	P	P	N	N	N	N	N	N	N	G
COBRA	G	G	P	G	E	G	P	F	E	P	N	N	N	N	N	N	N	N	P	P	P	N	N
FUSILADE 2000	N	N	N	N	N	N	N	N	N	N	E	E	E	E	E	E	E	E	N	N	N	G	N
OPTION	N	N	N	N	N	N	N	N	N	N	G	G	E	E	G	G	G	E	N	N	N	P	N
PINNACLE	F	F	G	N	E	P	G	G	P	N	N	N	N	N	N	N	N	N	N	N	N	N	N
POAST	N	N	N	N	N	N	N	N	N	N	E	G	E	E	E	E	E	E	N	N	N	F	N
PURSUIT	E	F	P	G	E	F	G	G	G	P	F	F	G	G	G	F	F	—	P	P	P-F	N	F
REFLEX	P	F	P	F	E	G	P	P	E	P	P	P	F	F	F	P	P	N	P	P	P	N	N
SCEPTER	E	P	N	P	E	P	P	P	P	P	N	N	F	F	F	N	N	N	N	N	N	N	N

P = Poor; F = Fair; G = Good; E = Excellent; N = None; — = Not enough information to rank

*The above ratings are a relative comparison of herbicide effectiveness. Weather conditions greatly influence the herbicide's effectiveness, and weed control may be better under favorable conditions or poorer under unfavorable conditions.

TABLE 14—WEED RESPONSE TO HERBICIDES IN FORAGES*

	ANNUAL BROADLEAVES												ANNUAL GRASSES							PERENNIALS					
	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (BLACK)	PIGWEED (REDROOT)	RAGWEED	SMARTWEED	VELVETLEAF	WILD MUSTARD	HOARY ALLYSUM	YELLOW ROCKET	CHICKWEED (COMMON)	BARNYARDGRASS	CRABGRASS	GIANT FOXTAIL	GREEN FOXTAIL	YELLOW FOXTAIL	FALL PANICUM	WITCHGRASS	BINDWEED (FIELD)	CANADA THISTLE	QUACKGRASS	YELLOW NUTSEDGE	DANDELION	CURLED DOCK
BALAN	N	N	G	N	G	N	P	N	P	P	P	P	E	E	E	E	E	E	G	N	N	N	P	N	N
BUCTRIL	G	G	E	G	F	G	G	G	F	P	F	P	N	N	N	N	N	N	N	P	P	N	N	P	P
EPTAM	P	P	G	P	F	F	F	F	F	F	F	F	E	E	E	E	E	E	E	N	N	F	P	N	P
KERB	P	P	P	P	P	P	P	P	P	P	P	G	F	F	P	F	F	P	P	N	N	G	N	N	P
LEXONE/SENCOR	E	G	E	N	E	E	E	E	E	E	E	E	G	G	G	E	E	G	G	N	N	P	P	G	P
MCPA	F	F	G	G	G	G	G	F	G	G	F	P	N	N	N	N	N	N	N	P	F	N	N	P	P
POAST	N	N	N	N	N	N	N	N	N	N	N	N	E	G	E	E	E	E	E	N	N	F	N	N	N
SINBAR	G	G	G	G	G	G	G	G	G	G	E	E	G	G	G	G	G	G	G	P	F	F	P	F	P
2,4-DB	P	P	G	F	G	F	P	F	F	G	F	P	N	N	N	N	N	N	N	P	P	N	N	N	F
VELPAR	G	G	E	F	E	E	E	G	E	E	E	E	G	G	E	E	E	E	E	F	F	F	F	E	P

P = Poor; F = Fair; G = Good; E = Excellent; N = None

*The above ratings are a relative comparison of herbicide effectiveness. Weather conditions greatly influence the herbicide's effectiveness, and weed control may be better under favorable conditions or poorer under unfavorable conditions.

TABLE 15—WEED RESPONSE TO HERBICIDES IN DRY EDIBLE BEANS*

	ANNUAL BROADLEAVES									ANNUAL GRASSES								PERENNIALS				
	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (BLACK)	PIGWEED (REDROOT)	RAGWEED	SMARTWEED	VELVETLEAF	WILD MUSTARD	BARNYARDGRASS	CRABGRASS	GIANT FOXTAIL	GREEN FOXTAIL	YELLOW FOXTAIL	FALL PANICUM	WITCHGRASS	WILD PROSO MILLET	BINDWEED (FIELD)	BINDWEED (HEDGE)	CANADA THISTLE	QUACKGRASS	YELLOW NUTSEDGE
Preplant Incorporated																						
AMIBEN	P	P	G	G	G	F	G	F	F	P	P	P	P	P	P	P	P	N	N	N	N	N
DUAL	N	N	P	F	G	P	P	N	P	E	E	E	E	E	G	G	F	N	N	N	N	G
EPTAM	P	P	G	P	F	F	F	F	F	E	E	E	E	E	E	E	F	N	N	N	F	F
LASSO	N	N	P	G	G	P	P	N	P	E	E	E	E	E	G	G	F	N	N	N	N	F
PROWL	N	N	G	P	F	P	P	F	P	E	E	E	E	E	E	E	F	N	N	N	N	N
PURSUIT	F	F	P	E	E	P	F	F	E	P	P	P	P	P	P	P	P	N	N	N	N	P
SONALAN	N	N	G	F	G	P	P	N	P	E	E	E	E	E	E	E	F	N	N	N	N	N
TREFLAN	N	N	G	N	G	N	P	N	P	E	E	E	E	E	E	E	F	N	N	N	N	N
Preemergence																						
AMIBEN	P	P	G	G	E	G	G	P	F	F	F	F	F	F	F	F	F	N	N	N	N	N
DUAL	N	N	P	F	G	P	P	N	P	E	E	E	E	E	G	G	F	N	N	N	N	F
PURSUIT	P	P	P	G	E	P	F	P	G	P	P	P	P	P	P	P	P	N	N	N	N	P
Postemergence																						
BASAGRAN	E	G	F	P	P	F	G	G	E	N	N	N	N	N	N	N	N	N	N	G	N	G
POAST	N	N	N	N	N	N	N	N	N	E	G	E	E	E	E	E	E	N	N	N	F	N

P = Poor; F = Fair; G = Good; E = Excellent; N = None

*The above ratings are a relative comparison of herbicide effectiveness. Weather conditions greatly influence the herbicide's effectiveness, and weed control may be better under favorable conditions or poorer under unfavorable conditions.

TABLE 16—WEED RESPONSE TO HERBICIDES IN POTATOES*

	ANNUAL BROADLEAVES									ANNUAL GRASSES								PERENNIALS				
	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (BLACK)	PIGWEED (REDROOT)	RAGWEED	SMARTWEED	VELVETLEAF	WILD MUSTARD	BARNYARDGRASS	CRABGRASS	GIANT FOXTAIL	GREEN FOXTAIL	YELLOW FOXTAIL	FALL PANICUM	WITCHGRASS	WILD PROSO MILLET	BINDWEED (FIELD)	BINDWEED (HEDGE)	CANADA THISTLE	QUACKGRASS	YELLOW NUTSEDGE
Preplant Incorporated																						
EPTAM	P	P	G	P	F	F	F	F	F	E	E	E	E	E	E	E	F	N	N	N	F	F
Preemergence																						
DUAL	N	N	P	F	G	P	P	N	P	E	E	E	E	E	G	G	F	N	N	N	N	F
LEXONE/SENCOR	F	F	E	N	E	E	E	G	E	F	F	F	G	G	F	F	P	N	N	N	N	N
LINEX/LOROX	P	P	G	F	G	G	G	F	G	F	F	F	F	F	F	F	P	N	N	N	N	N
PROWL	N	N	G	P	F	P	P	F	P	E	E	E	E	E	E	E	F	N	N	N	N	N
Delayed Preemergence																						
LEXONE/SENCOR	F	F	E	N	E	E	E	G	E	F	F	F	G	G	F	F	P	N	N	N	N	N
LINEX/LOROX	P	P	G	F	E	G	G	F	G	F	F	F	F	F	F	F	P	N	N	N	N	N
Postemergence																						
LEXONE/SENCOR	G	F	E	N	G	E	E	G	E	F	F	F	F	F	F	F	P	N	N	N	N	N
POAST	N	N	N	N	N	N	N	N	N	E	G	E	E	E	E	E	E	N	N	N	F	N

P = Poor; F = Fair; G = Good; E = Excellent; N = None

*The above ratings are a relative comparison of herbicide effectiveness. Weather conditions greatly influence the herbicide's effectiveness, and weed control may be better under favorable conditions or poorer under unfavorable conditions.

TABLE 17—WEED RESPONSE TO HERBICIDES IN SMALL GRAINS*

	ANNUAL BROADLEAVES													ANNUAL GRASSES	PERENNIALS						
	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (Black)	PIGWEED (Redroot)	RAGWEED	SMARTWEED	VELVETLEAF	WILD MUSTARD	HOARY ALLYSUM	YELLOW ROCKET	CHICKWEED (COMMON)	MAYWEED (DOGFENNEL)		BINDWEED (FIELD)	CANADA THISTLE	SOWTHISTLE	QUACKGRASS	YELLOW NUTSEDGE	WILD GARLIC	WILD ONION
BANVEL	G	G	G	G	G	G	E	G	F	G	G	G	F	N	F	F	P	N	N	F	F
BUCTRIL	G	G	E	G	F	G	G	G	F	—	—	P	F	N	P	P	N	N	N	N	N
EXPRESS	—	—	E	—	F	P	—	—	E	—	—	G	E	N	—	F	F	N	N	F	P
HARMONY EXTRA	—	—	E	—	E	F	E	—	E	—	—	G	E	N	—	F	F	N	N	G	F
MCPA	F	F	G	G	G	G	P	F	G	G	G	P	P	N	P	F	P	N	N	P	P
STINGER	E	G	P	P	P	G	F	P	P	P	P	P	G	N	P	F	F	P	N	N	N
2,4-D AMINE	F	F	G	G	G	G	P	F	G	G	G	P	P	N	P	F	P	N	N	P	P
2,4-D ESTER	F	F	G	G	G	G	P	G	G	G	G	P	P	N	F	F	P	N	N	F	F

P = Poor; F = Fair; G = Good; E = Excellent; N = None; — = Not enough information to rank

*The above ratings are a relative comparison of herbicide effectiveness. Weather conditions greatly influence the herbicide's effectiveness, and weed control may be better under favorable conditions or poorer under unfavorable conditions.

TABLE 18—WEED RESPONSE TO HERBICIDES IN SUGAR BEETS*

	ANNUAL BROADLEAVES									ANNUAL GRASSES							PERENNIALS				
	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (BLACK)	PIGWEED (REDROOT)	RAGWEED	SMARTWEED	VELVETLEAF	WILD MUSTARD	BARNYARDGRASS	CRABGRASS	GIANT FOXTAIL	GREEN FOXTAIL	YELLOW FOXTAIL	FALL PANICUM	WITCHGRASS	BINDWEED (FIELD)	BINDWEED (HEDGE)	CANADA THISTLE	QUACKGRASS	YELLOW NUTSEDGE
Preplant Incorporated																					
ANTOR	N	N	P	F	F	P	P	N	P	G	G	G	G	G	G	G	N	N	N	N	F
RO-NEET	P	P	F	F	G	F	P	F	P	G	G	G	G	G	G	G	N	N	N	F	G
Preemergence																					
ANTOR	N	N	P	F	F	P	P	N	P	G	G	G	G	G	G	G	N	N	N	N	F
NORTRON	F	F	G	G	G	P	G	F	G	P	G	P	F	F	P	P	N	N	N	N	P
PYRAMIN	P	P	E	G	G	G	G	F	G	F	F	F	F	F	F	F	N	N	N	N	N
Postemergence																					
BETAMIX	F	F	E	F	F	G	G	P	G	P	P	P	F	F	P	P	N	N	N	N	N
BETANEX	F	F	G	F	G	F	G	P	G	P	P	P	P	P	P	P	N	N	N	N	N
H273	P	P	P	P	P	P	E	P	P	N	N	N	N	N	N	N	N	N	P	N	N
NORTRON	F	F	G	G	G	P	G	P	G	P	G	P	F	F	P	P	N	N	N	N	P
POAST	N	N	N	N	N	N	N	N	N	E	G	E	E	E	E	E	N	N	N	F	N
PYRAMIN	P	P	F	F	F	F	F	F	F	P	P	P	P	P	P	P	N	N	N	N	N
STINGER	E	G	P	P	P	G	F	P	P	N	N	N	N	N	N	N	P	P	G	P	N

P = Poor; F = Fair; G = Good; E = Excellent; N = None

**The above ratings are a relative comparison of herbicide effectiveness. Weather conditions greatly influence the herbicide's effectiveness, and weed control may be better under favorable conditions or poorer under unfavorable conditions.*

TABLE 19—WEED RESPONSE TO MISCELLANEOUS AND NON-SELECTIVE HERBICIDES*

	ANNUAL BROADLEAVES									ANNUAL GRASSES								PERENNIALS				
	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (BLACK)	PIGWEED (REDROOT)	RAGWEED	SMARTWEED	VELVETLEAF	WILD MUSTARD	BARNYARDGRASS	CRABGRASS	GIANT FOXTAIL	GREEN FOXTAIL	YELLOW FOXTAIL	FALL PANICUM	WITCHGRASS	WILD PROSO MILLET	BINDWEED (FIELD)	BINDWEED (HEDGE)	CANADA THISTLE	QUACKGRASS	YELLOW NUTSEDGE
GRAMOXONE EXTRA	E	E	E	E	E	E	F	E	E	E	E	E	E	E	E	E	E	P	P	P	P	P
RANGER	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	F	F	F	E	P
ROUNDUP	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	G	G	G	E	P

P = Poor; F = Fair; G = Good; E = Excellent; N = None

**The above ratings are a relative comparison of herbicide effectiveness. Weather conditions greatly influence the herbicide's effectiveness, and weed control may be better under favorable conditions or poorer under unfavorable conditions.*

TABLE 20—GLOSSARY OF CHEMICAL NAMES

TRADE NAME** AND (MANUFACTURER)	COMMON NAME	CONCENTRATION AND COMMERCIAL FORMULATION†
ACCENT (DuPont)	NICOSULFURON	75% DF
AMIBEN (Rhone-Poulenc)	CHLORAMBEN	10% G; 2 lb/gal L; 75% DS
ANTOR (Nor-Am)	DIETHATYL ETHYL	4 lb/gal L
ASSURE (DuPont)	QUIZALOFOP	0.8 lb/gal L
*ATRAZINE Several (various)	ATRAZINE	4 lb/gal L; 90% DG
BALAN (Elanco)	BENEFIN	1½ lb/gal L, 60% DF
BANVEL (Sandoz)	DICAMBA	4 lb/gal L
BASAGRAN (BASF)	BENTAZON	4 lb/gal L
BEACON (Ciba-Geigy)	PRIMISULFURON	75% DG (in pouches)
BETAMIX (Nor-Am)	DESMEDIPHAM + PHENMEDIPHAM	1.3 lb/gal L (0.65 + 0.65)
BETANEX (Nor-Am)	DESMEDIPHAM	1.3 lb/gal L
*BICEP (Ciba-Geigy)	ATRAZINE + METOLACHLOR	4.5 lb/gal L (2 + 2.5), 6.0 lb/gal L (2.7 + 3.3)
*BLADEX (DuPont)	CYANAZINE	4L; 90% DF
BLAZER 2L (BASF)	ACIFLUORFEN	2 lb/gal L
*BRONCO (Monsanto)	ALACHLOR + GLYPHOSATE	3.6 lb/gal L (2.6 + 1)
*BUCTRIL (Rhone-Poulenc)	BROMOXYNIL	2 lb/gal L, 4 lb/gal L
BUCTRIL-ATRAZINE (Rhone-Poulenc)	ATRAZINE + BROMOXYNIL	3 lb/gal L (2 + 1)
*BULLET (Monsanto)	ATRAZINE + ALACHLOR	4 lb/gal L (1.5 + 2.5)
BUTOXONE (Vertac)	2,4-DB	2 lb/gal L
BUTYRAC (Rhone Poulenc)	2,4-DB	2 lb/gal L
CLASSIC (DuPont)	CHLORIMURON ETHYL	25% DF
COBRA (Valent)	LACTOFEN	2 lb/gal L
COMMAND (FMC)	CLOMAZONE	4 lb/gal L
COMMENCE (Elanco/FMC)	CLOMAZONE + TRIFLURALIN	5.25 lb/gal L (2.25 + 3)
CYCLE (Ciba-Geigy)	CYANAZINE + METOLACHLOR	4 lb/gal L (2 + 2)
2,4-D Several (various)	2,4-D	various
DIQUAT (Valent)	DIQUAT	2 lb/gal L
DOWPON M (Vertac)	DALAPON	74% WSP
DUAL (Ciba-Geigy)	METOLACHLOR	8 lb/gal L; 25% G
EPTAM (ICI)	EPTC	7 lb/gal L; 10% G
ERADICANE (ICI)	EPTC + R-25788	6.7 lb/gal L
ERADICANE EXTRA (ICI)	EPTC + R-25788 + R-33865	6 lb/gal L
EVIK (Ciba-Geigy)	AMETRYNE	80% WP
EXPRESS (DuPont)	TRIBENURON METHYL	75% DF
*EXTRAZINE II (DuPont)	ATRAZINE + CYANAZINE	4 lb/gal L (1 + 3), 90% DF (21.4 + 67.5)
FUSILADE 2000 (ICI)	FLUAZIFOP-P-BUTYL	1 lb/gal L
GALAXY (BASF)	BENTAZON + ACIFLUORFEN	3.68 lb/gal L (3 + 0.68)
*GRAMOXONE EXTRA (ICI)	PARAQUAT	2.5 lb/gal L
HARMONY EXTRA (DuPont)	THIFENSULFURON METHYL + TRIBENURON METHYL	75% DF
HERBICIDE 273 (Pennwalt)	ENDOTHALL	3 lb/gal L
KERB (Rohm and Haas)	PRONAMIDE	50% WP (in soluble pouches)
*LASSO (Monsanto)	ALACHLOR	4 lb/gal L; 15% G
*MICRO-TECH LASSO (Monsanto), ARENA (other)	ALACHLOR	4 lb/gal L
*LADDOK (BASF)	ATRAZINE + BENTAZON	3.3 lb/gal L (1.7 + 1.7)
*LARIAT (Monsanto)	ATRAZINE + ALACHLOR	4 lb/gal L (1.5 + 2.5)

(Continued on next page)

*Restricted Use Pesticide

**"Several" means there are numerous 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.

†DF—dry flowable, DS—dry soluble granule, G—granular, L—liquid, DG—dispersible granule, WP—wettable powder.

TABLE 20—GLOSSARY OF CHEMICAL NAMES (continued)

TRADE NAME** AND (MANUFACTURER)	COMMON NAME	CONCENTRATION AND COMMERCIAL FORMULATION†
LEXONE (DuPont)	METRIBUZIN	50% WP; 75% DF; 4 lb/gal L
LOROX (DuPont)	LINURON	50% WP; 4 lb/gal L; 50% DF
LINEX (Griffin)	LINURON	4 lb/gal L
LOROX PLUS, NEW LOROX PLUS (DuPont)	LINURON + CHLORIMURON ETHYL	60% DG (56.9 + 3.1)
*MARKSMAN (Sandoz)	ATRAZINE + DICAMBA	3.2 lb/gal L (2.1 + 1.1)
MCPA Several (various)	MCPA	Various L
NORTRON (Nor-Am)	ETHOFUMESATE	1½ lb/gal L
OPTION (FMC)	FENOXAPROP	1 lb/gal L
PASSPORT (American Cyanamid)	IMAZETHAPYR + TRIFLURALIN	2.6 lb/gal L (0.2 + 2.4)
PINNACLE (DuPont)	THIFENSULFURON METHYL	25% DF
POAST (BASF)	SETHOXYDIM	1.53 lb/gal L
PREVIEW (DuPont)	METRIBUZIN + CHLORIMURON ETHYL	75% DG (68.5 + 6.5)
PRINCEP (Ciba-Geigy)	SIMAZINE	4 lb/gal L; 80% WP; 4% G; 90% DG
PROWL (American Cyanamid)	PENDIMETHALIN	4 lb/gal L
PURSUIT (American Cyanamid)	IMAZETHAPYR	2 lb/gal L
PURSUIT PLUS (American Cyanamid)	IMAZETHAPYR + PENDIMETHALIN	3 lb/gal L (2.8 + 0.2)
PYRAMIN (BASF)	PYRAZON	80% WP; 4 lb/gal L
RAMROD (Monsanto)	PROPACHLOR	4 lb/gal L; 65% WP; 20% G
RANGER (Monsanto)	GLYPHOSATE	2 lb/gal L
REFLEX (ICI)	FOMESAFEN	2 lb/gal L
RO-NEET (ICI)	CYCLOATE	6 lb/gal L; 10% G
ROUNDUP (Monsanto)	GLYPHOSATE	3 lb/gal L
SALUTE (Mobay)	METRIBUZIN + TRIFLURALIN	4 lb/gal L (1.33 + 2.67)
SCEPTER (American Cyanamid)	IMAZAQUIN	1.5 lb/gal L
SENCOR (Mobay)	METRIBUZIN	50% WP; 75% DF; 4 lb/gal L
SINBAR (DuPont)	TERBACIL	80% WP
SONALAN (Elanco)	ETHALFLURALIN	3 lb/gal L
STINGER (Dow)	CLOPYRALID	3 lb/gal L
SQUADRON (American Cyanamid)	PENDIMETHALIN + IMAZAQUIN	2.33 lb/gal L; (2.0 + 0.33)
STORM (BASF)	BENTAZON + ACIFLUORFEN	4 lb/gal L (2.7 + 1.3)
SUTAN PLUS (ICI)	BUTYLATE + R-25788	6.7 lb/gal L; 10% G
*SUTAZINE (ICI)	ATRAZINE + BUTYLATE + R-25788	6 lb/gal L (1.2 + 4.8), 24 G (6 + 18)
TREFLAN (Elanco)	TRIFLURALIN	4 lb/gal L; 10% G
TRI-4 (American Cyanamid)	TRIFLURALIN	4 lb/gal L
TRI-SCEPT (American Cyanamid)	TRIFLURALIN + IMAZAQUIN	3 lb/gal L (2.57 + 0.43)
TURBO (Mobay)	METRIBUZIN + METOLACHLOR	8 lb/gal L (1.45 + 6.55)
VELPAR (DuPont)	HEXAZINONE	2 lb/gal L; 90% WP

*Restricted Use Pesticides

**"Several" means there are numerous 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.

†DF—dry flowable, DS—dry soluble granule, G—granular, L—liquid, DG—dispersible granule, WP—wettable powder.

TABLE 21 — HERBICIDE PREMIXES

TRADE NAME	COMPANY	FORMULATION	FORMULATION EQUIVALENTS*	TYPICAL USE RATE	=	EQUIVALENT RATES
CORN HERBICIDES						
Bicep 6L	Ciba-Geigy	6L	1.68 qt Dual + 2.68 qt Atrazine 4L	2.4 qt/Acre	=	1 qt Dual + 1.6 qt Atrazine 4L
Bronco	Monsanto	4L	2.6 qt Lasso + 1.4 qt Roundup	4 qt/Acre	=	2.6 qt Lasso + 1.4 qt Roundup
Buctril + Atrazine	Rhone-Poulenc	3L	2 qt Buctril 2E + 2 qt Atrazine 4L	1 qt/Acre	=	0.5 qt Buctril 2E + 0.5 qt Atrazine 4L
Bullet	Monsanto	4L	2.5 qt Micro-Tech Lasso 1.5 qt Atrazine 4L	3 qt/Acre	=	1.88 qt Micro-Tech Lasso + 1.13 qt Atrazine 4L
Cycle	Ciba-Geigy	4L	2 pt Dual + 2 qt Bladex 4L	4 qt/Acre	=	2 pt Dual + 2 qt Bladex 4L
Extrazine II DF	DuPont	90% DF	.75 lb Bladex 90 DF + .25 lb Atrazine 90	2.2 lb/Acre	=	1.65 lb Bladex 90 DF + 0.55 lb Atrazine 90
Extrazine II 4L	DuPont	4L	3 qt Bladex 4L + 1 qt Atrazine 4L	2 qt/Acre	=	1.5 qt Bladex 4L + 0.5 qt Atrazine 4L
Laddok	BASF	3.3L	1.65 qt Basagran + 1.65 qt Atrazine 4L	3.5 pt/Acre	=	0.72 qt Basagran + 0.72 qt Atrazine 4L
Lariat	Monsanto	4L	2.5 qt Lasso + 1.5 qt Atrazine 4L	3 qt/Acre	=	1.88 qt Lasso + 1.13 qt Atrazine 4L
Marksman	Sandoz	3.2L	1.12 qt Banvel + 2.12 qt Atrazine 4L	3.5 pt/Acre	=	1 pt Banvel + 1 qt Atrazine 4L
Sutazine	ICI	6L	2.88 qt Sutan Plus + 1.2 qt Atrazine 4L	3.5 qt/Acre	=	2.5 qt Sutan Plus + 1 qt Atrazine 4L
SOYBEAN HERBICIDES						
Commence	FMC/Elanco	5.25	6 pt Treflan + 4.4 pt Command	2 pt/Acre	=	1½ pt Treflan + 1.1 pt Command
Galaxy	BASF	3.67	6 pt Basagran + 2.6 pt Blazer	2 pt/Acre	=	1½ pt Basagran + ⅔ pt Blazer
Salute	Mobay	4.0	5.3 pt Treflan + 2.7 pt Sencor	2¼ pt/Acre	=	1½ pt Treflan + ¾ pt Sencor
Storm	BASF	4.0	5.3 pt Basagran + 5.3 pt Blazer	1½ pt/Acre	=	1 pt Basagran + 1 pt Blazer
Squadron	American Cyanamid	2.33	4 pt Prowl + 1.75 pt Scepter	3 pt/Acre	=	1½ pt Prowl + ⅔ pt Scepter
Passport	American Cyanamid	2.6	4 pt Treflan + 0.8 Pursuit	2½ pt/Acre	=	1⅓ pt Treflan + ¼ pt Pursuit
Pursuit Plus	American Cyanamid	3.0	5.6 pt Prowl + 0.8 pt Pursuit	2½ pt/Acre	=	1¾ pt Prowl + ¼ pt Pursuit
Tri-Scept	American Cyanamid	3.0	5.2 pt Treflan + 2.3 pt Scepter	2⅓ pt/Acre	=	1½ pt Treflan + ⅔ pt Scepter
Turbo	Mobay	8.0	6.6 pt Dual + 3 pt Sencor	2 pt/Acre	=	1⅔ pt Dual + ¾ pt Sencor

*For formulation equivalents, dry flowable formulations are given in lb or pt per lb of premix, and liquid formulations are given in pt or qt per gal of premix.

TABLE 22—HERBICIDE CROP ROTATION RESTRICTIONS

	SOIL pH RESTRICTION	(in months) SOYBEANS	FIELD CORN	SEED CORN	WHEAT	OATS	BARLEY	RYE	ALFALFA	DRY BEANS	SUGAR BEETS	POTATOES	CANOLA
Command[d] 1½ pt	≤5.9	0	9[g,h]	>12	12	16	16	16	16	9	9	9	16
2 pt	≤5.9	0	9[g,h]	>12	12	16	16	16	16	9	9	9	16
Scepter[b,e] ⅓ pt (Post)	None	0	11	11	4	4	4	4	18	11	26	18	26
⅔ pt	None	0	18	18	16	16	16	16	18	11	26	18	26
Pursuit[f]	None	0	9½	18	4	18	4	18	18	9½	26	>18	26
Preview	>6.8	0	10	10[l]	4	*	4	*	10[a]	12	*	*	*
Lorox Plus, New Lorox Plus	>6.8	0	10	10[l]	4	4	4	4	*	*	*	*	*
Classic[c]	>7.0	0	9	9[l]	3	3	3	3	9	9	*	*	*
Reflex	None	0	10	10	4	4	4	4	18	18	18	18	18
Beacon	None	8	½[g]	—	3	8	8	8	8	8	18[j]	18	18
Accent	None	10	0	—	10	10	10	—	12	10	10/18[j,k]	10/18[k]	10/18[k]
Stinger	None	12[l]	0	—	0	0	0	—	12	12[l]	0	18	12

*Field bioassay after 18 months.

–No information on the label.

[a]12 months on clover.

[b]Extension of recrop intervals of *Scepter* application following *Preview* or *Lorox Plus.*

[c]Extension of recrop intervals following *Scepter, Lorox Plus,* or *Preview.*

[d]and Commence. Carryover may increase if extreme dryness occurs in the four months following herbicide application.

[e]and TriScept, Squadron

[f]and Pursuit Plus, Passport

[g]Choice of rotational crop hybrid is important. See herbicide labels and information provided by the manufacturer.

[h]Do not use an organophosphate at-plant insecticide on field corn following the previous year use of Command or Commence if soil pH is less than 5.9. Also—do not use an organophosphate at-plant insecticide on field corn following the previous year use of Command or Commence AND then apply Accent or Beacon postemergence in corn.

[i]Seed corn inbred lines vary in their sensitivity. Damage or yield loss may occur.

[j]Not recommended in fields where sugar beets are planned as a rotation crop.

[k]pH ≤6.5/pH >6.5

[l]Time interval extended to 18 months if organic matter <2% AND less than 15 in. of rainfall in the 12 months following treatment.

TABLE 23 — TOXICITY, SOLUBILITY, ADSORPTIVITY, AND PERSISTENCE OF HERBICIDES

HERBICIDE	[1]TOXICITY LD_{50} mg/kg Oral	Dermal	WATER SOLUBILITY (ppm at 25°C)	ADSORPTIVITY TO SOIL	SOIL PERSISTENCE AT STANDARD RATE (months)	[2]RUNOFF/ LEACHING POTENTIAL
Accent	5,050	—	70 (pH 7.0)	—	—	—
Amiben	5,620	—	700	weak	1.5-2	L/H
Antor	2,300	—	105	moderate	1-2.5	M/L
Assure	1,670	—	<1	moderate	½	H/L
Atrazine	1,780	—	33	strong	2-8	M/H
Balan	>10,000	—	1	v. strong	4-5	H/L
Banvel	1,707	2,000	4500	weak	1-6	L/H
Basagran	2,063	—	500	weak	½	L/M
Beacon	>11,000	—	18,000 (pH 7.2)	—	—	—
Betamix	4,100	>2,000	1	moderate	1	H/L
Betanex	>10,250	—	7	moderate	1	—
Bladex	288	>2,000	171	strong	2-3	M/M
Blazer	1,300	450/2,000	infinite	strong	1	M/M
Buctril	260	—	50	moderate	0.5	M/L
Classic	>4,000	>2,000	300	strong	1-10	L/H
Cobra	>5,000	2,000	0.1	strong	0.5	M/L
Command	1,369	—	1100	v. strong	3-6	M/M
2,4-D	375	—	900	weak	1	M/M
2,4-DB	1,960	—	insoluble	weak	1	M/M
Defol 6	4,950	—	—	—	—	—
Des-i-cate	200	—	100,000	moderate	¼	L/L
Diquat	215	>400	infinite	v. strong	—	H/L
Dowpon	970	—	110	v. weak	—	L/H
Dual	2,780	>10,000	530	strong	1-3	M/M
Enquik	1,200	>2	—	—	—	—
Eptam	1,630	—	370	strong	1.5-2	M/M
Eradicane	2,000	—	370	strong	1.5-2	M/M
Evik	1,750	—	185	v. strong	1-3	L/M
Express	>5,000	>5,000	286	—	½	L/L
Fusilade 2000	3,328	—	2	moderate	¼	H/L
Gramoxone Extra	150	—	infinite	v. strong	1	H/L
Harmony Extra	>5,000	>5,000	*	*	½	L/L
Herbicide 273	51	—	100,000	moderate	0.25	L/L
Hoelon	563	—	3000	strong	½	M/L
Kerb	5,620	—	15	strong	2-9	H/L
Lasso	1,800	—	242	strong	1-2	M/M
Lexone/Sencor	1,100	>20,000	1200	moderate	2-4	M/H
Lorox/Linex	4,000	—	75	v. strong	2-4	H/M
Lorox Plus/ New Lorox Plus	2,300	—	**	v. strong	1-10	—
MCPA	1,160	—	insoluble	v. weak	1-4	L/H
Nortron	6,400	1,400	110	strong	1-4	M/H
Option	>2,300	>1,000	0.9	moderate	1	M/L
Pinnacle	>5,000	>5,000	2,400	—	¼	L/L
Poast	3,200	>5,000	48	moderate	¼	L/L
Preview	1,500	—	***	v. strong	1-10	—
Princep	>5,000	>3,100	5	strong	2-8	M/H
Prowl	1,250	>5,000	<1	v. strong	3-6	H/L
Pursuit	>5,000	>5,000	1,400	weak	2-8	L/H
Pyramin	3,030	—	1	strong	1-2	M/H
Ramrod	710	—	700	moderate	1-1.5	M/L
Reflex	1,858	—	600,000	weak	6	M/H

(Continued on next page)

TABLE 23 — TOXICITY, SOLUBILITY, ADSORPTIVITY, AND PERSISTENCE OF HERBICIDES (continued)

HERBICIDE	[1]TOXICITY LD_{50} mg/kg Oral	Dermal	WATER SOLUBILITY (ppm at 25°C)	ADSORPTIVITY TO SOIL	SOIL PERSISTENCE AT STANDARD RATE (months)	[2]RUNOFF/ LEACHING POTENTIAL
Ro-Neet	2,000	—	85	strong	1-3	H/L
Roundup/Ranger	4,300	—	infinite	v. strong	1	H/L
Scepter	>5,000	>5,000	60	moderate	2-8	L/H
Sinbar	>5,000	—	710	moderate	5-6	M/H
Sonalan	>10,000		1	v. strong	3-5	H/L
Stinger	>5,000	—	1000	moderate	1-10	L/H
Sutan +	3,500	>4,640	45	v. strong	1.5-2	M/M
Treflan	>10,000	—	<1	v. strong	3-6	H/L
Velpar	1,690	5,278	33,000	strong	4-6	M/H
(Table salt)	3,320		360,000	—	—	—
(Aspirin)	1,200		2,500	—	—	—

– No information available.

Sources: numerous, including *Herbicide Handbook, 1989 Herbicide Manual for Ag Chem. Dealers,* Iowa State; *U of Illinois Custom Spray Operation Training Manual, 1979; 1987 Illinois Pest Control; Farm Chemical Handbook.*

[1] The LD_{50} is a standard toxicological term which indicates the number of milligrams (mg) of pesticide per kilogram (kg) of test animal body weight required to kill 50 percent of a test animal population. Values less than 10 indicate extremely high toxicity to mammals. The LD_{50} data have been obtained from the Farm Chemical Handbook. Where the source gives an LD_{50} range, or there is a different LD_{50} value given for each sex of test animal, the LD_{50} value listed is the lowest one given in the source.

** Combination of Express and the active ingredient in Pinnacle*

*** Combination of Lorox plus chlorimuron*

**** Combination of Lexone plus chlorimuron*

[2] L-low, M-medium, H-high

PESTICIDE EMERGENCY INFORMATION

(Please post in an appropriate place)

For any type of emergency involving a pesticide, the following Emergency Information Centers should be contacted immediately for assistance.

Current as of August 1989

HUMAN PESTICIDE POISONING

Eastern Half of Michigan

within the Detroit city proper:
***(313) 745-5711**

within the 313 area code:
***1-800-462-6642**

Poison Control Center

Children's Hospital of Michigan
3901 Beaubien
Detroit, MI 48201

Western Half of Michigan

within the Grand Rapids city proper:
***(616) 774-7854**

Statewide
***1-800-632-2727**

Blodgett Regional Poison Center

Blodgett Memorial Medical Center
1840 Wealthy, S.E.
Grand Rapids, MI 49506

Upper Peninsula of Michigan

within the Marquette city proper:
***(906) 225-3497**

Upper Peninsula only:
***1-800-562-9781**

U.P. Poison Control Center

Marquette General Hospital
420 West Magnetic Street
Marquette, MI 48955

Michigan State University
Cooperative Extension Service

PESTICIDE EMERGENCY INFORMATION:
Revised by Larry G. Olsen, Pesticide Education Coordinator, Michigan State University.
Current as of August 1989—**destroy previous editions**

SPECIAL PESTICIDE EMERGENCIES

Animal Poisoning

Your personal veterinarian:

and/or

Animal Health Diagnostic Laboratory,
Michigan State University:
(517) 353-1683

Pesticide Fire

Local fire department:

and

Fire Marshal Division, Michigan State Police:
(517) 322-1924

Traffic Accident

Local police department or sheriff's department:

and

Operations Division, Michigan State Police:
***(517) 337-6102**

Environmental Pollution

Pollution Emergency Alerting System (PEAS)
Michigan Department of Natural Resources:
****1-800-292-4706***
(Toll free for environmental emergencies)

For information on pesticide disposal and local pick-up days:

Michigan Department of Natural Resources
Waste Management Division:
(517) 373-2730

** Telephone Number Operated 24 Hours*

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