$4.00

1994 WEED CONTROL GUIDE FOR FIELD CROPS

MICHIGAN STATE UNIVERSITY EXTENSION

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.

EXTENSION BULLETIN E-434 (MAJOR REVISION-DESTROY PREVIOUS EDITIONS)
Information Current as of November 1, 1993

PESTICIDE EMERGENCY INFORMATION

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

Current as of June 1993

Human Pesticide Poisoning

Eastern Half of Michigan

***(313) 745-5711**

Poison Control Center

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

Western Half of Michigan

Contact local hospital emergency room.

Upper Peninsula of Michigan

within 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

Special Pesticide Emergencies

Animal Poisoning

Your veterinarian:

Phone No.

or

Animal Health Diagnostic Laboratory (Toxicology) Michigan State University:

(517) 355-0281

Pesticide Fire

Local fire department:

Phone No.

and

Fire Marshal Division, Michigan State Police:

(517) 322-1924

Traffic Accident

Local police department or sheriff's department:

Phone No.

and

Operations Division, Michigan State Police:

***(517) 336-6605**

Environmental Pollution

Pollution Emergency Alerting System (PEAS), Michigan Department of Natural Resources:

Phone No.

and

For environmental emergencies:

***1-800-292-4706**

Pesticide disposal information

Michigan Department of Natural Resources.
Waste Management Division.

(517) 373-2730

National Pesticide Telecommunications Network

Provides advice on recognizing and managing pesticide poisoning, toxicology, general pesticide information and emergency response assistance, Funded by EPA, based at Texas Tech University Health Services Center.

1-800-858-7378

**** Telephone Number Operated 24 Hours***

Michigan State University Extension

(Revised June 1993 — Destroy previous editions)

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1994
WEED CONTROL GUIDE for Field Crops

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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 front cover.

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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 appear. If 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. 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 nonuniform 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

DC—*Dry Concentrate*
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*
SC—*Suspension Concentrate*

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

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* label calls 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, additives are not recommended for postemergence *Bladex 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

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.

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 are more persistent at higher soil pH, and crop rotation must be considered before applying a herbicide. Some herbicides (metribuzin) are more available at higher soil pH. Rates must be reduced to avoid crop injury. Knowledge of the soil pH in a field is critical, as soil pH may vary from 6.5 to 7.5 in areas within a field.

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.

Soil sample 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, always know the soil pH, 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 × boom width (in feet) ÷ 43,560 = acres sprayed.
7. Divide the volume sprayed by the area sprayed to obtain the actual output of the sprayer in gallons per acre.
8. Make adjustments to tractor speed, pressure, or nozzle size and repeat steps 3-7 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 1-8 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 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 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, reducing 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 of 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 *Accent, Beacon, Classic, Express, Harmony Extra, Lorox Plus, Pinnacle,* and *Preview;* and also *Command.* Consult these specific herbicide labels for detailed spray tank cleaning procedures.

In general, 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 1 gal household ammonia in 100 gal of water as a cleaning agent.

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 dam-

age 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.

The following herbicides contain advisory statements regarding groundwater protection:

Aatrex
Arena
Atrazine
Bicep
Bladex
Broadstrike + Treflan
Broadstrike + Dual
Bronco
Buctril-Atrazine
Bullet
Cycle
Extrazine II
Laddok
Lariat
Lasso
Lexone
Marksman
Micro-Tech
Partner
Preview
Salute
Sencor
Sutazine
Turbo

- **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 microorganisms 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.

For additional information on pesticide storage, refer to Midwest Plan Service bulletin 37, Designing facilities for pesticide and fertilizer containment, available from Agriculture and Biosystems Engineering Dept., 122 Davidson Hall, Iowa State University, Ames, IA 50011.

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.

Worker Protection

New federal rules for farm worker protection, issued during 1992, require farmers to provide additional training and notification to farm workers to prevent their accidental or occupational exposure to pesticides. Farmers should contact their Cooperative Extension Service agents to learn the details of these new rules and availability of training materials for education of workers.

Warn all unauthorized persons to leave a target area being treated with a pesticide. This is the responsibility of both the applicator and grower. Warn occupants of properties near the target area when such precautions are specified by a pesticide label or when common sense dictates a written or verbal warning. The Federal Worker Protection Standard becomes effective April 15, 1994. If you employ farm workers and/or handlers you must comply with the general regulations of WPS as well as the restrictions stated on pesticides labels under the heading "Agricultural Use Requirements." For more information contact the MSU Extension Service or Michigan Department of Agriculture.

Re-Entry into the Application Area

Read and follow the label instructions on Restricted Entry Intervals (REI) for easy pesticide used (See Table 12). Post areas that have been treated to warn others not to enter until the specified REI has elapsed as required by the label. Take down the postings within 24 hours after the REI has expired. Any person who has to go into a treated area prior to the elapse of the REI must wear personal protective equipment. Farm workers should not work in the treated area until the REI has elapsed.

Record Keeping

The 1990 Farm Bill requires that all applicators who apply restricted use pesticides (RUP) keep records and maintain them for two years. Proposed records include the following information:

(1) Brand name, or product name, and EPA registration number of RUP applied.

(2) Total amount of product used application of the RUP.

(3) Address or location, size of area treated, target pest, and crop, commodity or stored product treated with RUP.

(4) Month, day and year of RUP application.

(5) Name, address, and certification number of certified applicator who applied or supervised the application of the RUP.

Proposed penalties are up to $500 for the first violation and up to $1000 for subsequent violations. Provisions for protecting the identity of individual producers are included in the law.

Right to Farm

Farmers in Michigan are protected from nuisance lawsuits under the Right to Farm Act if they follow specific acceptable management practices. The Generally Accepted Management Practices for Pesticides have been issued and are now in effect. Practices for fertilizer application will be completed soon. Contact your Cooperative Extension Agent or regional office of the Michigan Department of Agriculture for copies of rules.

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.

Herbicide Resistance in Weeds

Triazine resistant common lambsquarters has been confirmed in sites throughout most of the corn production regions of Michigan. In addition, resistance has been confirmed in pigweed species, common ragweed, common groundsel, and marestail (horseweed). The occurrence of triazine resistance is generally associated with cropping systems where triazine herbicides (i.e., atrazine, *Bladex,* and *Princep*) have been frequently used for weed control. Triazine resistant common lambsquarters are often identified in fields where corn is grown continuously. Triazine resistant biotypes of several other species have been identified in other states and countries.

There is growing concern about resistance to sulfonylureas and imidazolinones. Resistance to these herbicides has not been observed in Michigan but has occurred in western regions of the U.S. Resistance to these herbicide groups is a concern because both affect the same process in plants.

An understanding of the practices that lead to herbicide resistance is important since prevention is the best approach. This is particularly important with the introduction of herbicide resistant crops such as *Pursuit* resistant corn hybrids. Herbicide resistant crops increase the possibilities for one herbicide to be applied for multiple years to the same field, even with rotation of crops.

Farmers should include weed control practices that delay or prevent the development of herbicide resistance. The following list of practices was modified from a list developed by the North Central Weed Science Society Herbicide Resistance Committee. Some practices may be impractical in certain situations. However, no single practice is likely to be successful alone.

(1) Rotate herbicides using herbicides of differing modes of action. Do not make more than two consecutive applications of herbicides with the same mode of action against the same weed unless other effective control practices are also included in the management system.

(2) Apply herbicides in tank-mixed, prepackaged, or sequential mixtures which include multiple modes of action.

(3) Scout fields regularly and identify weeds present.

(4) Rotate crops, particularly those with different life cycles.

(5) Combine mechanical control practices such as rotary hoeing and cultivation with herbicide treatments.

(6) Clean tillage and harvest equipment before moving from fields infested with resistant weeds to those which are not infested.

Herbicide Mode-of-Action

Herbicide Mode-of-Action refers to the method by which the

herbicide kills plants. An understanding of herbicide mode of action is useful in developing herbicide programs that prevent herbicide resistance. The following list categorizes herbicides into general modes of action. Individual herbicide families and herbicide examples are listed within each mode of action. For additional details on herbicide mode of action refer to NCR 377 "Herbicide Mode of Action and Injury Symptoms."

I. Growth Regulators
  1. Phenoxy Acetic Acids
  Examples:
    2,4-D
    2,4-DB *(Butyrac 200, Butoxone 200)*
    MCPA
  2. Benzoic Acids
    dicamba *(Banvel)*
  3. Pyridines
    clopyralid *(Stinger)*

IIA. Amino Acid Synthesis Inhibitors (ALS Inhibitors)
  1. Imidazolinones
    imazaquin *(Scepter)*
    imazethapyr *(Pursuit)*
  2. Sulfonylureas
    chlorimuron *(Classic,* component in *Preview, Lorox Plus)*
    thifensulfuron *(Pinnacle,* component in *Harmony Extra)*
    tribenuron *(Express,* component in *Harmony Extra)*
    nicosulfuron *(Accent)*
    primisulfuron *(Beacon)*
  3. Sulfonamides
    flumetsulam *(Broadstrike)*

IIB. Amino Acid Synthesis Inhibitors (EPSP Inhibitors)
  1. Amino Acid Derivatives
    glyphosate *(Roundup, Ranger)*

III. Lipid Inhibitors
  1. Cyclohexanediones
    sethoxydim *(Poast, Poast Plus)*
    clethodim *(Select)*
  2. Aryloxyphenoxypropionates
    fluazifop *(Fusilade 2000,* Fusilade DX, component in *Fusion)*
    fenoxaprop *(Option II,* component in *Fusion)*
    quizalofop *(Assure II)*

IVA. Seedling Growth Inhibitors (Root Inhibitors)
  1. Dinitroanilines
    trifluralin *(Treflan, Tri-4)*
    ethalfluralin *(Sonalan)*
    pendimethalin *(Prowl)*

IVB. Seedling Growth Inhibitors (Shoot Inhibitors)
  1. Acetanilides
    alachlor *(Lasso, Arena, Micro-Tech, Partner)*
    metolachlor *(Dual)*
    propachlor *(Ramrod)*
    dimethenamid *(Frontier)*
  2. Thiocarbamates
    EPTC *(Eptam)*
    EPTC plus safener *(Eradicane, Eradicane Extra)*
    butylate plus safener *(Sutan +)*
    cycloate (Ro-Neet)

VA. Photosynthesis Inhibitors (Mobile)
  1. Triazines
    atrazine
    cyanazine *(Bladex)*
    simazine *(Princep)*
    metribuzin *(Lexone, Sencor)*
    hexazinone *(Velpar)*
  2. Phenylureas
    linuron *(Lorox, Linex)*
  3. Uracils
    terbacil *(Sinbar)*

VB. Photosynthesis inhibitors (Nonmobile)
  1. Benzothiadiazoles
    bentazon *(Basagran)*
  2. Nitriles
    bromoxynil *(Buctril)*

VI. Cell Membrane Disrupters
  1. bipyridiliums
    paraquat *(Gramoxone Extra)*
    diquat *(Diquat)*
  2. diphenylethers
    acifluorfen *(Blazer)*
    lactofen *(Cobra)*
    fomesafen *(Reflex)*

VII. Pigment Inhibitors
  1. isoxazolidinones
    clomazone *(Command)*

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
Bicep Lite
Bicep II
Bladex
Bronco
Buctril-Atrazine
Bullet
Cycle
Extrazine II
Gramoxone Extra
Laddok
Lariat
Lasso
Marksman
Micro-Tech
Option II
Partner
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 1A — CHEMICAL WEED CONTROL IN TILLED 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.) • See Table 1F for prepackaged herbicide mixes. • 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	• 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.) • Do not apply *Eradicane* to fields that were treated with a thiocarbamate herbicide *(Eptam, Ro-Neet, Eradicane, 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) + dimethenamid *(Frontier)*	1 + 1.17	1 qt 4L OR 1.1 lb 90% DG + 1¼ qt	• Fair to good control of nutsedge. • Will be more effective on nutsedge when incorporated. • *Bladex* may be included for more effective fall panicum control. • *Frontier* rate varies based on soil type (see label for details).
	atrazine (commercial product) + metolachlor *(Dual, Dual II)*	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. 19.) • Incorporated *Dual* rate of one quart may give only fair control of some annual grasses (especially fall panicum) and nutsedge. • *Dual II* contains a safener which increases corn tolerance to metolachlor. • See Table 1F for prepackaged herbicide mixes.
	atrazine (commercial product) + alachlor *(Lasso, Arena, Micro-Tech)* OR *(Partner)*	1 + 2½	1 qt 4L OR 1.1 lb 90% DG + 2½ qt 4L OR 3.8 lb 65% DG	• 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. 19.) • See Table 1F for prepackaged herbicide mixes.
	flumetsulam + metolachlor *(Broadstrike + Dual)*	.056 + 2.1	2¼ pt	• *Broadstrike* available in prepackaged mix only. See Table 1F. • SEE LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH EXCEEDS 7.8 AS INCREASED CROP INJURY MAY OCCUR. • DO NOT USE IF ORGANIC MATTER IS >5% *AND* SOIL pH <5.9 AS POOR WEED CONTROL MAY RESULT. • DO NOT USE ON PEAT OR MUCK SOILS. • THIS PRODUCT HAS A GROUNDWATER ADVISORY STATEMENT. • DO NOT APPLY TO SWEET CORN OR POPCORN. • DO NOT APPLY WITH 85 DAYS OF HARVEST. • SOIL-APPLIED ORGANOPHOSPHATE INSECTICIDES MAY INCREASE RISK OF CORN INJURY FROM BROADSTRIKE, ESPECIALLY WHEN APPLIED IN-FURROW. IF NEEDED, APPLY ORGANOPHOSPHATE INSECTICIDES IN A T-BAND TO REDUCE RISK OF CROP INJURY. • Control of only light to moderate common ragweed, cocklebur, and jimsonweed. Control may be improved by increasing application rate to 2½ pt/A or by adding atrazine to the tank mix. • Rotary hoe and cultivate if dry weather follows application.

(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**	flumetsulam + metolachlor *(Broadstrike + Dual)* + atrazine (commercial product)	.056 + 2.1 + 1	2¼ pt + 1 qt 4L OR 1.1 lb 90% DG	• *Broadstrike* available in prepackaged mix only. See Table 1F. • SEE LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH EXCEEDS 7.8 AS INCREASED CROP INJURY MAY OCCUR. • DO NOT USE IF ORGANIC MATTER IS >5% *AND* SOIL pH <5.9 AS POOR WEED CONTROL MAY RESULT. • DO NOT USE ON PEAT OR MUCK SOILS. • THIS PRODUCT HAS A GROUNDWATER ADVISORY STATEMENT. • DO NOT APPLY TO SWEET CORN OR POPCORN. • DO NOT APPLY WITH 85 DAYS OF HARVEST. • SOIL-APPLIED ORGANOPHOSPHATE INSECTICIDES MAY INCREASE RISK OF CORN INJURY FROM BROADSTRIKE, ESPECIALLY WHEN APPLIED IN-FURROW. IF NEEDED, APPLY ORGANOPHOSPHATE INSECTICIDES IN A T-BAND TO REDUCE RISK OF CROP INJURY. • Rotary hoe and cultivate if dry weather follows application.
	cyanazine *(Bladex)* + EPTC with protectant *(Eradicane)*	1¾ + 4	1¾ qt 4L OR 1.9 lb 90% DF + 4¾ pt	• Must be incorporated or mixed into top 2 to 3 in. of soil immediately after application. • No residue carryover. • Increase *Eradicane* rate to 6 pt/A for more effective nutsedge control. • Both herbicides weak on pigweed.
	cyanazine *(Bladex)* + butylate *(Sutan Plus)*	1¾ + 4	1¾ qt 4L OR 1.9 lb 90% DF + 4¾ pt	• Must be incorporated or mixed into top 2 to 3 in. of soil immediately after application. • No residue carryover. • Increase *Sutan Plus* rate to 6 pt for more effective nutsedge control. • Both herbicides weak on pigweed. • Do not use on corn seed stocks (Breeders, Foundation, or Increase).
	cyanazine *(Bladex)* + dimethenamid *(Frontier)*	1¾ + 1.17	1¾ qt 4L OR 1.9 lb 90% DF + 1¼ pt	• No residue carryover. • *Frontier* and *Bladex* rates vary depending on soil type (See labels for details).
	cyanazine *(Bladex)* + alachlor *(Lasso, Arena, Micro-Tech)* OR *(Partner)*	1¾ + 2½	1¾ qt 4L OR 1.9 lb 90% DF + 2½ qt 4L OR 3.8 lb 65% DG	• No residue carryover. • Can be used where residue problems have existed with atrazine.
	cyanazine *(Bladex)* + metolachlor *(Dual, Dual II)*	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. • *Dual II* contains a safener which increases corn tolerance to metolachlor. • See Table 1F for prepackaged herbicide mixes.

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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 **Annual grasses** (including green foxtail, giant foxtail, fall panicum, witchgrass, and crabgrass) **Nutsedge**	atrazine (commercial product)	½	½ qt 4L OR ⅗ lb 90% DG	• NOTE SPECIFIC REMARKS ABOVE FOR *SUTAN PLUS, ERADICANE, FRONTIER, DUAL, MICRO-TECH, PARTNER,* AND *LASSO.* • Can be used to reduce risk of atrazine carryover. • The preferred treatment where fall panicum is a problem. • May substitute *Princep* for atrazine if fall panicum is a severe problem. • Do not apply *Eradicane* to fields that were treated with a thiocarbamate herbicide the previous year. • *Dual II* contains a safener which increases corn tolerance to metolachlor. • See Table 1F for prepackaged herbicide mixes.
	+	+	+	
	cyanazine *(Bladex)*	1¼	1¼ qt 4L OR 1.4 lb 90% DF	
	+	+	+	
	butylate *(Sutan Plus)*	4	4¾ pt	
	OR	OR	OR	
	EPTC with protectant *(Eradicane)*	4	4¾ pt	
	OR	OR	OR	
	dimethenamid *(Frontier)*	1.17	1¼ pt	
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	2	1 qt	
	OR	OR	OR	
	alachlor *(Lasso, Arena, Micro-Tech)*	2½	2½ qt 4L	
	OR *(Partner)*		OR 3.8 lb 65% DG	

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, Lasso, Arena, Micro-Tech, Partner, Frontier, Dual,* or *Dual II* as listed under "Corn—Preplant—Mineral Soil" section. FOLLOWED BY: See "Corn—Postemergence—Mineral Soil" section.			

CORN — PREEMERGENCE — MINERAL SOIL

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves **Annual grasses** (including fall panicum, green foxtail, giant foxtail, witchgrass, and crabgrass)	atrazine (commercial product)	1	1 qt 4L OR 1.1 lb 90% DG	• 2½ qt/A of *Lasso, Arena,* or *Micro-Tech Lasso* should be used for more effective fall panicum control. • *Bladex* may be included for more effective fall panicum control. (See remarks for three-way tank mixes.) • See Table 1F for prepackaged herbicide mixes.
	+	+	+	
	alachlor *(Lasso, Arena, Micro-Tech)*	2	2 qt 4L	
	OR *(Partner)*		OR 3 lb 65% DG	
	atrazine (commercial product)	1	1 qt 4L OR 1.1 lb 90% DG	• *Bladex* may be included for more effective fall panicum control. (See remarks for three-way tank mixes.) • *Dual II* contains a safener which increases corn tolerance to metolachlor.
	+	+	+	
	metolachlor *(Dual, Dual II)*	2	1 qt	

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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)	atrazine (commercial product) + dimethenamid *(Frontier)*	1 + 1.17	1 qt 4L OR 1.1 lb 90% DG + 1¼ pt	• Will be more effective on nutsedge when incorporated. • *Bladex* may be included for more effective fall panicum control. • *Frontier* rate varies based on soil type (see label for details).
	atrazine (commercial product) + pendimethalin *(Prowl)*	1 + 1½	1 qt 4L OR 1.1 lb 90% DG + 1.8 qt 3.3 EC	• APPLY AFTER PLANTING. • DO NOT INCORPORATE. • Plant at least 1½ in. deep. • Adjust *Prowl* rate according to soil type (refer to *Prowl* label for details). • 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.)
	flumetsulam + metolachlor *(Broadstrike + Dual)*	.056 + 2.1	2¼ pt	• *Broadstrike* available in prepackaged mix only. See Table 1F. • *SEE LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS.* • DO NOT USE IF SOIL pH EXCEEDS 7.8 AS INCREASED CROP INJURY MAY OCCUR. • DO NOT USE IF ORGANIC MATTER IS >5% *AND* SOIL pH <5.9 AS POOR WEED CONTROL MAY RESULT. • DO NOT USE ON PEAT OR MUCK SOILS. • THIS PRODUCT HAS A GROUNDWATER ADVISORY STATEMENT. • DO NOT APPLY TO SWEET CORN OR POPCORN. • DO NOT APPLY WITH 85 DAYS OF HARVEST. • SOIL-APPLIED ORGANOPHOSPHATE INSECTICIDES MAY INCREASE RISK OF CORN INJURY FROM BROADSTRIKE, ESPECIALLY WHEN APPLIED IN-FURROW. IF NEEDED, APPLY ORGANOPHOSPHATE INSECTICIDES IN A T-BAND TO REDUCE RISK OF CROP INJURY. • Control of only light to moderate common ragweed, cocklebur, and jimsonweed. Control may be improved by increasing application rate to 2½ pt/A or by adding atrazine to the tank mix. • Rotary hoe and cultivate if dry weather follows application.
	flumetsulam + metolachlor *(Broadstrike + Dual)* + atrazine (commercial product)	.056 + 2.1 + 1	2¼ pt + 1 qt 4L OR 1.1 lb 90% DG	• *Broadstrike* available in prepackaged mix only. See Table 1F. • *SEE LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS.* • DO NOT USE IF SOIL pH EXCEEDS 7.8 AS INCREASED CROP INJURY MAY OCCUR. • DO NOT USE IF ORGANIC MATTER IS >5% *AND* SOIL pH <5.9 AS POOR WEED CONTROL MAY RESULT. • DO NOT USE ON PEAT OR MUCK SOILS. • THIS PRODUCT HAS A GROUNDWATER ADVISORY STATEMENT. • DO NOT APPLY TO SWEET CORN OR POPCORN. • DO NOT APPLY WITH 85 DAYS OF HARVEST. • SOIL-APPLIED ORGANOPHOSPHATE INSECTICIDES MAY INCREASE RISK OF CORN INJURY FROM BROADSTRIKE, ESPECIALLY WHEN APPLIED IN-FURROW. IF NEEDED, APPLY ORGANOPHOSPHATE INSECTICIDES IN A T-BAND TO REDUCE RISK OF CROP INJURY. • Rotary hoe and cultivate if dry weather follows application.

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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)* OR *(Partner)*	1¾ + 2	1¾ qt 4L OR 1.9 lb 90% DF + 2 qt 4L OR 3 lb 65% DG	• Can be used where residue problems have existed with atrazine.
	cyanazine *(Bladex)* + metolachlor *(Dual, Dual II)*	1¾ + 2	1¾ qt 4L OR 1.9 lb 90% DF + 1 qt	• Can be used where residue problems have existed with atrazine. • *Dual II* contains a safener which increases corn tolerance to metolachlon. • See Table 1F for prepackaged herbicide mixes.
	cyanazine *(Bladex)* + dimethenamid *(Frontier)*	1¾ + 1.17	1¾ qt 4L OR 1.9 lb 90% DF + 1¼ pt	• No residue carryover. • *Frontier* and *Bladex* rates vary depending on soil type (see labels for details).
	cyanazine *(Bladex)* + pendimethalin *(Prowl)*	1¾ + 1½	1¾ qt 4L OR 1.9 lb 90% DF + 1.8 qt 3.3 EC	• APPLY AFTER PLANTING. • DO NOT INCORPORATE. • Plant at least 1½ in. deep. • Adjust *Prowl* rate according to soil type (refer to *Prowl* label for details). • Do not use on sandy soils with less than 1.5% organic matter.
	atrazine (commercial product) + cyanazine *(Bladex)* + dimethenamid *(Frontier)* OR alachlor *(Lasso, Arena, Micro-Tech)* OR *(Partner)* OR pendimethalin *(Prowl)* OR metolachlor *(Dual, Dual II)*	½ + 1¼ + 1.17 OR 2 OR 1½ 2	½ qt 4L OR ⅜ lb 90% DG + 1¼ qt 4L OR 1.4 lb 90% DF + 1¼ pt OR 2 qt 4L OR 3 lb 65% DG OR 1.8 qt 3.3 EC 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. • *Dual II* contains a safener which increases corn tolerance to metolachlor. • See Table 1F for prepackaged herbicide mixes.
	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. • See Table 1F for prepackaged herbicide mixes.

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, Frontier, Partner, Prowl, Dual,* or *Dual II* as listed under "Corn—Preemergence—Mineral Soil" section, page 16. FOLLOWED BY: See "Corn—Postemergence—Mineral Soil" section.			

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: See "Corn—Postemergence—Organic Soil" section.	5	5 qt	• Must be followed with a postemergence treatment for control of broadleaved weeds.

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. • 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.). See Table 1H.
Annual broadleaves	dicamba *(Banvel, Clarity)*	½	1 pt	• Apply postemergence to corn from emergence up to the 5-leaf stage or 8 in. tall, whichever comes first. • *Banvel* may be applied at ½ pt/A to corn up to 36 in. tall or 15 days before tassel emergence. Drop nozzles are recommended for corn over 8 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. • 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. • Most effective when weeds are small (2 to 4 in.). See Table 1H.

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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	dicamba *(Banvel, Clarity)*	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. Do not apply to corn over 12 in. tall. Drop nozzles are recommended for corn over 8 in. tall. See Table 1H. • Use lower rates on coarser soils or soils low in organic matter. • Treatment must follow a preplant-incorporated or pre-emergence herbicide application for grass control. • 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. • Do not use with crop oil concentrate or other additives. • See additional remarks and limitations for dicamba *(Banvel)*. • See Table 1F for prepackaged herbicide mixes.
	+	+	+	
	atrazine (commercial product)	1	1 qt 4L OR 1.1 lb 90% DG	
	bentazon *(Basagran)*	1	1 qt	• Corn is tolerant to *Basagran* at all growth stages. For best results, apply early to small weeds. See Table 1H. • Weak on pigweed, nightshade, and lambsquarters. • Use a minimum of 40 psi and 20 gal of water/A. • 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.
	+	+	+	
	crop oil concentrate	1 qt	1 qt	
	bentazon *(Basagran)*	¾	¾ qt	• Do not apply to corn over 12 in. tall. • 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. • See Table 1F for prepackaged herbicide mixes. • Rates may be reduced to ½ lb/A for each herbicide if weeds are small. See *Laddok* label for details.
	+	+	+	
	atrazine (commercial product)	¾	¾ qt 4L OR 0.8 lb 90% DG	
	+	+	+	
	crop oil concentrate	1 qt	1 qt	
	bromoxynil *(Buctril)*	⅜	1½ pt 2L OR ¾ pt Gel	• Apply to corn between the 4-leaf stage (4 visible leaves) and prior to tassel emergence. • For best results, weeds must be small (see label or Table 1H). • Do not mix with spray additives or liquid fertilizers unless specified for tank mixes. • For ground applications, 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).
	bromoxynil *(Buctril)*	¼	1 pt OR ½ pt Gel	• Apply to corn after emergence but before corn is 12 in. tall. • Apply to weeds less than 4 in. tall for effective control. See Table 1H. • 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. • See Table 1F for prepackaged herbicide mixes.
	+	+	+	
	atrazine (commercial product)	½	½ qt 4L OR 0.6 lb 90% DG	

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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	2,4-D amine + metribuzin *(Sencor)*	¼ + 0.09	½ pt + 2 oz. 75% DF	• DO NOT APPLY DURING OR SHORTLY AFTER PERIODS OF COOL, WET OR CLOUDY WEATHER. • For corn over 8 in. tall, use drop nozzles. • Do not treat plants under stress. • Do not use additives. • Do not apply more than 5 oz. *Sencor* 75% DF per acre per season. • See supplemental *Sencor* label (Section 24C) for additional details.
	bentazon *(Basagran)* + metribuzin *(Sencor)* + surfactant	½ + 0.09 + ¼%	1 pt + 2 oz 75% DF + ¼%	• DO NOT APPLY DURING OR SHORTLY AFTER PERIODS OF COOL, WET, OR CLOUDY WEATHER. • Do not treat plants under stress. • Do not use additives that contain vegetable or petroleum oils. • Use 1 gal/A of 28% liquid nitrogen (urea ammonium nitrate) instead of surfactant for improved velvetleaf control. • Do not apply more than 5 oz *Sencor* 75% DF per acre per season. • See supplemental *Sencor* label (Section 24C) for additional details.
ONLY ragweed, cocklebur, jimsonweed, and Jerusalem artichoke	clopyralid *(Stinger)*	0.094	¼ pt	• Apply to field corn up to 24 in. tall. • Apply in 10 gal. of water or more per acre. • Treat ragweed, cocklebur, jimsonweed, and Jerusalem artichoke up to the 5-leaf stage. • Do not apply more than ⅔ pt per acre per year.
Perennial sowthistle, Canada thistle	clopyralid *(Stinger)*	0.188	½ pt	• Apply to field corn up to 24 in. tall. • Apply in 10 gal. of water or more per acre. • Treat thistle plants at least 6 to 8 in. in diameter or height but before the bud stage. • Do not cultivate before treatment. • Cultivation may be used 14 to 20 days often treatment. • Rate may be increased to ⅔ pt per acre for dense infestations. • 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 2⅓ lb 90% DG + 1 qt	• Do not apply to corn over 12 in. tall. • Emergency use. • Grasses must be less than 1½ in. tall. See Table 1H. • 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. See Table 1H. • 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 + ⅗ 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. • See Table 1F for prepackaged herbicide mixes.
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 corn up to 24 in. tall. For corn 24-36 in. tall use drop nozzles. Do not apply to corn taller than 36 in. or exhibiting 10 collars, whichever is most restrictive. • Apply to small, actively growing grasses (giant foxtail, green foxtail, yellow foxtail up to 4 in.; fall panicum up to 4 in.; barnyardgrass up to 6 in.; pigweed, smartweed up to 4 in.; jimsonweed up to 3 in.) See Table 1H. • 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. • Cultivation 7 to 14 days after treatment may improve control. • Do not apply *Accent* to corn previously treated with *Counter 15G* insecticide as severe corn injury may result. • *Accent* may be applied to corn previously treated with a banded (surface band or T-band) application of *Counter 20CR*. However, planned programs which include both *Accent and Counter* are not recommended. The risk of crop injury is reduced, but not eliminated, by banded application of *Counter 20CR*. • Applying *Accent* to corn previously treated with other soil-applied organophosphate insecticides (*Thimet, Dyfonate, Lorsban,* etc.) may result in temporary crop injury. • Soil-applied insecticides other than organophosphates do not increase corn injury from *Accent*. • 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. • *Accent* may be tank mixed with atrazine, *Buctril, Buctril*+Atrazine, *Banvel,* or *Marksman* for control of a broader spectrum of weeds. **See Table 11** for details on application timing and spray additives. • Control of green and yellow foxtail may be antagonized with tank mixes of *Accent* with *Buctril, Banvel, Clarity,* or *Marksman*. Timely cultivation or a second application may be required for complete control. • Refer to Table 11 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.

(Continued on next page)

CORN — POSTEMERGENCE — MINERAL 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 corn between 4 in. and 20 in. in height. • 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.) See Table 1H. • 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. • Cultivation 7 to 14 days after treatment may improve control. • Do not apply *Beacon* to corn previously treated with any formulation of *Counter* insecticide as severe corn injury may result. • Applying *Beacon* to corn previously treated with other soil-applied organophosphate insecticides (*Thimet, Dyfonate, Lorsban,* etc.) may result in temporary crop injury. • Soil-applied insecticides other than organophosphates do not increase corn injury from *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. • Inbred lines grown for hybrid seed production may be severely injured by *Beacon* application. Therefore inbred lines should be throughly tested for potential sensitivity to *Beacon* before treating large acreage. • *Beacon* may be tank mixed with *Banvel, Clarity, Buctril,* or 2,4-D for control of a broader spectrum of weeds. See **Table 1J** for details on application timing and spray additives. • Refer to Table 11 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. tall, use drop nozzles. • Most effective when weeds are small (2 to 4 in.) See Table 1H. • Ester formulations will cause more risk of crop injury. • 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.
Annual broadleaves	dicamba *(Banvel, Clarity)*	½ lb	1 pt	• Apply postemergence to corn from emergence up to the 5-leaf stage or 8 in. tall, whichever comes first. • *Banvel* may be applied at ½ pt/A to corn up to 36 in. tall or 15 days before tassel emergence. Drop nozzles are recommended for corn over 8 in. tall. • 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	• 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. Do not apply to corn over 12 in. tall. Drop nozzles are recommended for corn over 8 in. tall. • Treatment must follow a preplant-incorporated or preemergence herbicide application for grass control. • 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. • Do not use with crop oil concentrate or other additives. • See additional remarks and limitations for dicamba *(Banvel)*. • See Table 1F for prepackaged herbicide mixes.
	bentazon *(Basagran)* + crop oil concentrate	1 + 1 qt	1 qt + 1 qt	• Corn is tolerant to *Basagran* at all growth stages. However, best results are obtained with early applications to small weeds. See Table 1H. • Use a minimum of 40 psi and 20 gal of water/A. • Weak on pigweed, nightshade, and lambsquarters. • 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 — ORGANIC SOIL (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves	bentazon *(Basagran)*	¾	¾ qt	• Do not apply to corn over 12 in. tall. • 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. • See Table 1F for prepackaged herbicide mixes.
	+	+	+	
	atrazine (commercial product)	¾	¾ qt 4L OR 0.8 lb 90% DG	
	+	+	+	
	crop oil concentrate	1 qt	1 qt	
	bromoxynil *(Buctril)*	⅜	1½ pt 2L OR ¾ pt Gel	• Apply to corn between the 4-leaf stage (4 visible leaves) and prior to tassel emergence. • For best results, weeds must be small (see label and Table 1H). • Do not mix with spray additives or liquid fertilizers unless specified for tank mixes. • 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).
	bromoxynil *(Buctril)*	¼	1 pt 2L OR ½ pt Gel	• Apply to corn after emergence but before corn is 12 in. tall. • Apply to weeds less than 4 in. tall for effective control. See Table 1H. • 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. • See Table 1F for prepackaged herbicide mixes.
	+	+	+	
	atrazine (commercial product)	½	½ qt 4L OR 0.6 lb 90% DG	
	2,4-D amine	¼	½ pt	• For corn over 8 in. tall, use drop nozzles. • Do not apply during or shortly after periods of cool, wet, or cloudy weather. • Do not treat plants under stress. • Do not use additives. • Do not apply more than 5 oz. *Sencor* 75% DF per acre per season. • See supplemental *Sencor* label (Section 24C) for additional details.
	+	+	+	
	metribuzin *(Sencor)*	0.09	2 oz 75% DF	
	bentazon *(Basagran)*	½	1 pt	• Do not apply during or shortly after periods of cool, wet, or cloudy weather. • Do not treat plants under stress. • Do not use additives that contain vegetable or petroleum oils. • Use 1 gal/A of 28% liquid nitrogen (urea ammonium nitrate) instead of surfactant for improved velvetleaf control. • Do not apply more than 5 oz *Sencor* 75% DF per acre per season. • See supplemental *Sencor* label (Section 24C) for additional details.
	+	+	+	
	metribuzin *(Sencor)*	0.09	2 oz 75% DF	
	+	+	+	
	surfactant	¼%	¼%	
ONLY ragweed, cocklebur, jimsonweed, and Jerusalem artichoke	clopyralid *(Stinger)*	0.094	¼ pt	• Apply to field corn up to 24 in. tall. • Apply in 10 gal. of water or more per acre. • Treat ragweed, cocklebur, jimsonweed, and Jerusalem artichoke up to the 5-leaf stage. See Table 1H. • Do not apply more than ⅔ pt. per acre per year.

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CORN — POSTEMERGENCE — ORGANIC SOIL (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Perennial Sowthistle **Canada thistle**	clopyralid *(Stinger)*	0.188	½ pt	• Apply to field corn up to 24 in. tall. • Apply in 10 gal. of water or more per acre. • Treat thistle plants at least 6 to 8 in. in diameter or height but before the bud stage. • Do not cultivate before treatment. • Cultivation may be used 14 to 20 days after treatment. • Rate may be increased to ⅔ pt per acre for dense infestations. • 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) + crop oil concentrate	2 + 1 qt	2 qt 4L OR 2⅕ lb 90% DG + 1 qt	• Do not apply to corn over 12 in. tall. • Emergency use. • Grasses should be less than 1½ in. tall. See Table 1H. • 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.
	cyanazine *(Bladex)*	2	2.2 lb 90% DF	• USE WETTABLE POWDER OR DRY FLOWABLE ONLY. • Apply before weeds are 1½ in. tall. See Table 1H. • 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)* + atrazine (commercial product)	1½ + ½	1.7 lb 90% DF + ⅗ 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. • See Table 1F for prepackaged herbicide mixes.

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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 corn up to 24 in. tall. For corn 24-36 in. tall use drop nozzles. Do not apply to corn taller than 36 in. or exhibiting 10 collars, whichever is most restrictive. • Apply to small, actively growing grasses (giant foxtail, green foxtail, yellow foxtail up to 4 in.; fall panicum up to 4 in.; barnyardgrass up to 6 in.; pigweed, smartweed up to 4 in.; jimsonweed up to 3 in.) See Table 1H. • 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. • Cultivation 7 to 14 days after treatment may improve control. • Do not apply *Accent* to corn previously treated with *Counter 15G* insecticide or severe corn injury may result. • *Accent* may be applied to corn previously treated with a banded (surface band or T-band) application of *Counter 20CR.* However, planned programs which include both *Accent* and *Counter* are not recommended. The risk of crop injury is reduced, but not eliminated, by banded application of *Counter 20CR.* • Applying *Accent* to corn previously treated with other soil-applied organophosphate insecticides (*Thimet, Dyfonate, Lorsban,* etc.) may result in temporary crop injury. • Soil-applied insecticides other than organophosphates do not increase corn injury form *Accent.* • 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. • *Accent* may be tank mixed with atrazine, *Buctril, Buctril+Atrazine, Banvel,* or *Marksman* for control of a broader spectrum of weeds. **See Table 11** for details on application timing and spray additives. • Control of green and yellow foxtail may be antagonized with tank mixes of *Accent* with *Buctril, Banvel, Clarity,* or *Marksman.* Timely cultivation or a second application may be required for complete control. • Refer to Table 11 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 corn between 4 in. and 20 in. in height. • 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.) See Table 1H. • 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. • Cultivation 7 to 14 days after treatment may improve control. • Do not apply *Beacon* to corn previously treated with any formulation of *Counter* insecticide as severe corn injury may result. • Applying *Beacon* to corn previously treated with other soil-applied organophosphate insecticides (*Thimet, Dyfonate, Lorsban,* etc.) may result in temporary crop injury. • Soil-applied insecticides other than organophosphates do not increase corn injury from *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. • Inbred lines grown for hybrid seed production may be severely injured by *Beacon* application. Therefore inbred lines should be thoroughly tested for potential sensitivity to *Beacon* before treating large acreage. • *Beacon* may be tank mixed with *Banvel, Clarity, Buctril,* or 2,4-D for control of a broader spectrum of weeds. See **Table 1J** for details on application timing and spray additives. • Refer to Table 11 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	1⅜ + 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. • Shields provide additional protection against corn injury. • Apply in a minimum of 20 gal of water per acre. • Do not exceed 20 psi nozzle pressure. • Double outlet 150° nozzles or two nozzles mounted double swivel are preferred. • Refer to label for rotation crop restrictions. • Generally more effective on annual grasses than *Lorox* or *Linex*. • See label and Table 1H for maximum weed size. Selectivity is based on tall corn and small weeds.
	linuron *(Lorox* or *Linex)* + surfactant	1½ + ½%	3 pt 4L OR 3 lb 50% DF + ½%	• CAUTION—KEEP OFF CORN FOLIAGE. • Do not use before corn is 15 in. tall. • Emergency use. • Use drop nozzles or directed spray. • Shields provide additional protection against corn injury. • Apply in a minimum of 20 gal of water per acre. • Do not exceed 20 psi nozzle pressure. • Double outlet 150° nozzles or two nozzles mounted double swivel are preferred. • Use lower rates on lighter soils or soils low in organic matter. • For control of small weeds not over 2 in. tall. See Table 1H. Selectivity is based on tall corn and small weeds.
	paraquat *(Gramoxone Extra)* + surfactant	0.25 + ¼%	0.8 pt + ¼%	• CAUTION—KEEP OFF CORN FOLIAGE. • Do not use before corn is at least 10 in. tall. See Table 1H. • Emergency use. • Use drop nozzles or directed spray. • Shields provide additional protection against corn injury. • Apply in 20 gal or more of water per acre. • Do not exceed 20 psi nozzle pressure. • 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.
Annual grasses	sethoxydim *(Poast)* + crop oil concentrate	0.19 + 1 qt	1 pt + 1 qt	• **Requires specialized application equipment.** See *Poast* supplemental label for details on equipment design. • Do not apply with conventional drop nozzles. • Apply to corn at least 30 in. tall. • Spray must be directed no higher than 10 in. up the corn stalk. • Apply to annual grasses up to 8 in. tall. • Apply in a spray volume of no more than 20 gal per acre and a spray pressure of no more than 40 psi. • Use 150° double outlet fan nozzles or two 65° flat fan tips mounted on a double swivel. • **Precision application is critical.**

TABLE 1B — CHEMICAL WEED CONTROL IN 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. 19) 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 — LEGUME 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, Arena, Partner, Frontier, Dual,* or *Dual II* 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	
	+ Burndown (See Table 1D)			

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NO-TILL CORN — LEGUME 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 FOLLOWED BY:	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.
	atrazine (commercial product) + Burndown (See Table 1D)	2	2 qt 4L OR 2⅛ lb 90% DG	• 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. • 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, Arena, Partner, Frontier, Dual* or *Dual II* 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.
SPRING application followed by preemergence				
Alfalfa sod **Annual broadleaves** **Annual grasses**	2,4-D ester FOLLOWED BY:	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.
	atrazine (commercial product) + Burndown (See Table 1D)	2	2 qt 4L OR 2⅛ lb 90% DG	• 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. • 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, Arena, Partner, Frontier, Dual* or *Dual II* may be included if annual grasses are expected to be a serious problem.

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, Arena, Partner, Frontier, Dual* or *Dual II* 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 cyanazine *(Bladex)*	OR 2½	OR 2½ qt 4L OR 2.8 lb 90% DG	
	OR atrazine + cyanazine (commercial product +	OR 1 + 2	OR 1 + 2 qt 4L OR 1.1 + 2.2 lb 90% DG/DF	
	+ Burndown (See Table 1D)			

NO-TILL — GRAIN STUBBLE or ROW CROP RESIDUE

(With or 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). • *Dual II* contains a safener which increases corn tolerance to metolachlor. • See Table 1F for prepackaged herbicide mixes.
	+ alachlor *(Lasso, Arena, Micro-Tech)* OR *(Partner)*	+ 2½	+ 2½ qt 4L OR 3.8 lb 65% DG	
	OR metolachlor *(Dual, Dual II)*	OR 2	OR 1 qt	
	OR dimethenamid *(Frontier)*	OR 1.17	OR 1¼ pt	
	+ Burndown (See Table 1D)			
	atrazine (commercial product)	1½	1½ qt 4L OR 1.7 lb 90% DG	• APPLY AFTER PLANTING. DO NOT INCORPORATE. • Extreme care must be taken to assure complete closure of the seed furrow. If the seed furrow remains open (even partially open) severe injury will occur. • Adjust *Prowl* rate according to soil type (refer to *Prowl* label for details). • Do not use on sandy soil with less than 1.5% organic matter. • Plant at least 1½ in. deep. • *Bladex* may be included for more effective fall panicum control. (See remarks for four-way tank mixes).
	+ pendimethalin *(Prowl)*	+ 1½	+ 1.8 qt 3.3 EC	
	+ Burndown (See Table 1D)			

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

(With or without a cover crop)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued) **Annual broadleaves** **Annual grasses**	flumetsulam + metolachlor *(Broadstrike + Dual)* + Burndown (See Table 1D)	.056 + 2.1	2¼ pt	• *Broadstrike* available in prepackaged mix only. See Table 1F. • *SEE LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS.* • DO NOT USE IF SOIL pH EXCEEDS 7.8. AS INCREASED CROP INJURY MAY OCCUR. • DO NOT USE IF ORGANIC MATTER IS >5% *AND* SOIL pH <5.9 AS POOR WEED CONTROL MAY RESULT. • DO NOT USE ON PEAT OR MUCK SOILS. • THIS PRODUCT HAS A GROUNDWATER ADVISORY STATEMENT. • DO NOT APPLY TO SWEET CORN OR POPCORN. • DO NOT APPLY WITH 85 DAYS OF HARVEST. • SOIL-APPLIED ORGANOPHOSPHATE INSECTICIDES MAY INCREASE RISK OF CORN INJURY FROM BROADSTRIKE, ESPECIALLY WHEN APPLIED IN-FURROW. IF NEEDED, APPLY ORGANOPHOSPHATE INSECTICIDES IN A T-BAND TO REDUCE RISK OF CROP INJURY. • REFER TO HERBICIDE LABEL FOR APPROVED BURNDOWN HERBICIDES. • Control of only light to moderate common ragweed, cocklebur, and jimsonweed. Control may be improved by increasing application rate to 2½ pt/A or by adding atrazine to the tank mix.
	flumetsulam + metolachlor *(Broadstrike + Dual)* + atrazine (commercial product) + Burndown (See Table 1D)	.056 + 2.1 + 1	2¼ pt + 1 qt 4L OR 1.1 lb 90% DG	• *Broadstrike* available in prepackaged mix only. See Table 1F. • *SEE LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS.* • DO NOT USE IF SOIL pH EXCEEDS 7.8. AS INCREASED CROP INJURY MAY OCCUR. • DO NOT USE IF ORGANIC MATTER IS >5% *AND* SOIL pH <5.9 AS POOR WEED CONTROL MAY RESULT. • DO NOT USE ON PEAT OR MUCK SOILS. • THIS PRODUCT HAS A GROUNDWATER ADVISORY STATEMENT. • DO NOT APPLY TO SWEET CORN OR POPCORN. • DO NOT APPLY WITH 85 DAYS OF HARVEST. • SOIL-APPLIED ORGANOPHOSPHATE INSECTICIDES MAY INCREASE RISK OF CORN INJURY FROM BROADSTRIKE, ESPECIALLY WHEN APPLIED IN-FURROW. IF NEEDED, APPLY ORGANOPHOSPHATE INSECTICIDES IN A T-BAND TO REDUCE RISK OF CROP INJURY. • REFER TO HERBICIDE LABEL FOR APPROVED BURNDOWN HERBICIDES.

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

(With or 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)* OR *(Partner)* OR dimethenamid *(Frontier)* + Burndown (See Table 1D)	2 + 2½ OR 1.17	2 qt 4L OR 2.2 lb 90% DF + 2½ qt 4L OR 3.8 lb 65% DG OR 1¼ pt	• Applied preemergence. • Use 3 qt *Lasso* for heavy grass (especially fall panicum or crabgrass) infestations. • No carryover. • *Bladex* rate varies, depending on surface residue and soil type (refer to *Bladex* label for details). • See Table 1F for prepackaged herbicide mixes.
	cyanazine *(Bladex)* + metolachlor *(Dual, Dual II)* + Burndown (See Table 1D)	2 + 2	2 qt 4L OR 2.2 lb 90% DF + 1 qt	• Applied preemergence. • No carryover. • *Bladex* rate varies depending on surface residue and soil type (refer to *Bladex* label for details). • *Dual II* contains a safener which increases corn tolerance to metolachlor. • See Table 1F for prepackaged herbicide mixes.
	cyanazine *(Bladex)* + pendimethalin *(Prowl)* + Burndown (See Table 1D)	2 + 1½	2 qt 4L OR 2.2 lb 90% DF + 1.8 qt 3.3 EC	• APPLY AFTER PLANTING. DO NOT INCORPORATE. • Extreme care must be taken to assure complete closure of the seed furrow. If the seed furrow remains open (even partially open) severe injury will occur. • Adjust *Prowl* rate according to soil type (refer to *Prowl* label for details). • Do not use on sandy soil with less than 1.5% organic matter. • Plant at least 1½ in. deep. • *Bladex rate varies, depending on surface residue and soil type (refer to Bladex* label for details.)
	atrazine (commercial product) + cyanazine *(Bladex)* + alachlor *(Lasso, Arena, Micro-Tech)* OR *(Partner)* OR dimethenamid *(Frontier)* + Burndown (See Table 1D)	¾ + 1½ + 2½ OR 1.17	¾ qt 4L OR ⅘ lb 90% DG + 1½ qt 4L OR 1.7 lb 90% DF + 2½ qt 4L OR 3.8 lb 65% DG OR 1¼ pt	• Applied preemergence. • Reduces potential atrazine carryover. • May substitute *Princep* for atrazine if fall panicum is a severe problem. • *Bladex* rate varies, depending on surface residue and soil type (refer to *Bladex* label for details). • See Table 1F for prepackaged herbicide mixes.

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

(With or without a cover crop)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves **Annual grasses**	atrazine (commercial product) + cyanazine *(Bladex)* + metolachlor *(Dual, Dual II)* + Burndown (See Table 1D)	¾ + 1½ + 2	¾ qt 4L OR ⅘ lb 90% DG + 1½ qt 4L OR 1.7 lb 90% DF + 1 qt	• Applied preemergence. • Reduces potential atrazine carryover. • May substitute *Princep* for atrazine if fall panicum is a severe problem. • *Bladex* rate varies, depending on surface residue and soil type (refer to *Bladex* label for details). • *Dual II* contains a safener which increases corn tolerance to metolachlor. • See Table 1F for prepackaged herbicide mixes.
	atrazine (commercial product) + cyanazine *(Bladex)* + pendimethalin *(Prowl)* + Burndown (See Table 1D)	¾ + 1½ + 1½	¾ qt 4L OR ⅘ lb 90% DG + 1½ qt 4L OR 1.7 lb 90% DF + 1.8 qt 3.3 EC	• APPLY AFTER PLANTING. DO NOT INCORPORATE. • Extreme care must be taken to assure complete closure of the seed furrow. If the seed furrow remains open (even partially open) severe injury will occur. • Adjust *Prowl* rate according to soil type (refer to *Prowl* label for details). • Do not use on sandy soil with less than 1.5% organic matter. • Plant at least 1½ in deep. • May substitute *Princep* for atrazine if fall panicum is a severe problem. • *Bladex* rate varies, depending on surface residue and soil type (refer to *Bladex* label for details). • See Table 1F for prepackaged herbicide mixes.
	cyanazine *(Bladex)* + atrazine (commercial product) + Burndown (See Table 1D)	2 + 1 	2 qt 4L OR 2.2 lb 90% DF + 1 qt 4L OR 1.1 lb 90% DG	• Applied preemergence. • Adjust *Bladex* rate according to surface residue and 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. • See Table 1F for prepackaged herbicide mixes.
	cyanazine *(Bladex)* + alachlor (Lasso, Arena, *Micro-Tech* OR *(Partner)* OR metolachlor *(Dual, Dual II)* OR dimethenamid *(Frontier)* + crop oil concentrate	2.2 + 2½ OR 2 OR 1.17 + 1 qt	2.2 qt 4L + 2½ qt 4L OR 3.8 lb 65% DG OR 1 qt OR 1¼ pt + 1 qt	• Applied preemergence. • Use *Bladex 4L* only. • For small annual weeds *no more than* 3 in. tall. • See Table 1D for details on burndown herbicides. • 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. • *Dual II* contains a safener which increases corn tolerance to metolachlor. • See Table 1F for prepackaged herbicide mixes.

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

(With or without a cover crop)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves **Annual grasses**	cyanazine *(Bladex)* + atrazine (commercial product) + alachlor *(Lasso, Arena, Micro-Tech)* OR *(Partner)* OR metolachlor *(Dual, Dual II)* OR dimethenamid *(Frontier)* + crop oil concentrate	1½ + ¾ + 2½ OR OR 2 OR 1.17 + 1 qt	1½ qt 4L + ¾ qt 4L + 2½ qt 4L OR 3.8 lb 65% DG OR 1 qt OR 1¼ pt + 1 qt	• Applied preemergence. • Use *Bladex 4L* only. • For small annual weeds *no more than* 3 in. tall. • See Table 1D for details on burndown herbicides. • 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. • *Dual II* contains a safener which increases corn tolerance to metolachlor. • See Table 1F for prepackaged herbicide mixes.
	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. • See Table 1D for details on burndown herbicides. • 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. • See Table 1F for prepackaged herbicide mixes.

TABLE 1C. CROP AND WEED RESPONSE TO BURNDOWN HERBICIDES IN SOD

	Alfalfa	Red Clover	Hairy Vetch	Dandelion	Bromegrass	Timothy	Bluegrass	Orchardgrass	Quackgrass
Fall Application[a]									
Roundup (1 qt/A)	**F-G**	**F-G**	**F-G**	F	**G**	**G**	**G**	**G**	**G-E**
Roundup (2 qt/A)	**G-E**	**G-E**	**G-E**	**G**	**E**	**E**	**E**	**E**	**E**
2,4-D Ester (1 qt/A)	F	F	F	**G**	N	N	N	N	N
Roundup + 2,4-D Ester (1 qt/A + 1 qt/A)	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G-E**
Roundup + 2,4-D Ester (2 qt/A + 1 qt/A)	**G-E**	**G-E**	**G-E**	**G**	**E**	**E**	**E**	**E**	**E**
Spring Application[b]									
Roundup (1 qt/A)	F	F	F	P	F	F	–	P	**G**
Roundup (2 qt/A)	**F-G**	**F-G**	**F-G**	P	**G**	**G**	–	F	**E**
2,4-D Ester (1 qt/A)	**F-G**	**F-G**	**F-G**	**G**	N	N	N	N	N
Roundup + 2,4-D Ester (1 qt/A + 1 qt/A)	**F-G**	**F-G**	**F-G**	**G**	F	F	**G**	P	**G**
Roundup + 2,4-D Ester (2 qt/A + 1 qt/A)	**G**	**G**	**G**	**G**	**G**	**G**	**G**	F	**E**

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

a. Ideal timing is 4 to 6 weeks after mowing. Mow in late August–early September and treat in early–mid October in central or southern Michigan.
b. Treat when plants reach at least 6 inches tall.

TABLE 1D. EFFECTIVENESS OF BURNDOWN HERBICIDES IN CORN*,e

	ANNUAL BROADLEAVES									ANNUAL GRASSES								WINTER ANNUALS					COVER CROPS			
	Cocklebur	Jimsonweed	Lambsquarters	Nightshade	Pigweed	Ragweed	Smartweed	Velvetleaf	Wild Mustard	Barnyardgrass	Crabgrass	Giant Foxtail	Green Foxtail	Yellow Foxtail	Fall Panicum	Witchgrass	Wild Proso Millet	Chickweed (common)	Yellow Rocket	Shepards' purse	Pennycress	Marestail (Horseweed)	Rye	Wheat	Clover	Hairy Vetch
	Maximum Weed Height (inches)																	Herbicide Effectiveness								
Atrazine (1 lb ai/A)[ad]	2	2	2	2	2	2	2	2	2	NR	NR	NR	NR	NR	NR	NR	NR	–	G	E	G	G	P	P	P	P
Atrazine (2 lb ai/A)[ad]	3	3	3	3	3	3	3	3	3	NR	NR	NR	1½	1½	NR	NR	NR	–	E	E	E	E	F	F	F	F
Bladex 4L (2 qt/A)[ad]	3	3	3	3	3	3	3	3	3	3	NR	3	3	3	NR	3	NR	–	E	E	E	G	P	P	P	F
2,4-D Ester (1 pt/A)[e]	3	NR	3	3	3	3	NR	2	3	NR	NR	NR	NR	NR	NR	NR	NR	P	F	G	F	E	N	N	F	F
2,4-D Ester (1 qt/A)[e]	6	3	6	6	6	6	3	5	6	NR	NR	NR	NR	NR	NR	NR	NR	F	G	E	G	E	N	N	G	G
Roundup (1 pt/A)[be]	5	2	2	2	5	2	NR	NR	5	NR	–	5	5	5	–	–	–	E	G	E	G	G	G	G	P	P
Roundup (1 qt/A)[be]	16	10	10	10	16	10	5	5	16	5	–	16	16	16	–	–	–	E	E	E	E	E	E	E	F	F
Gramoxone Extra (1½ pt/A)[ce]	3	3	3	3	3	3	NR	3	3	3	3	3	3	3	3	3	3	E	G	G	G	P	F	F	P	P
Gramoxone Extra (2½ pt/A)[ce]	6	6	6	6	6	6	NR	6	6	6	6	6	6	6	6	6	6	E	E	E	E	P	G	G	F	F

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

*Burndown effectiveness varies depending on several factors. This table is intended as a guide to relative effectiveness of burndown herbicide options. This table assumes tank mix applications with residual herbicides.

a. Always add crop oil concentrate at 1 qt/A to maximize foliar activity.

b. Always add surfactant (2 qt/100 gal of water) with *Roundup*. Addition of ammonium sulfate at 17 lbs/100 gal of water often improves control.

c. Always add surfactant with *Gramoxone Extra*. Use 1/2 pt/100 gal of water. Double surfactant in liquid nitrogen fertilizer. Regrowth of rye or wheat may occur if plants are not fully tillered when treated.

d. Use of liquid nitrogen fertilizer as the herbicide carrier will improve burndown.

e. To avoid excessive cover crop growth, 2,4-D, *Gramoxone Extra*, or *Roundup* may be applied prior to planting.

TABLE 1E — SPECIAL WEED PROBLEMS IN CORN

SPECIAL WEED PROBLEMS IN CORN — 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.
Preplant incorporated **Quackgrass**	atrazine (commercial product) + EPTC with protectant *(Eradicane)*	1 + 6	1 qt 4L OR 1.1 lb 90% DG + 3½ qt	• Incorporate to a depth of 4 to 5 in. immediately after application with a disk, 2 times in opposite directions. • Quackgrass control with minimum soil residue or carryover. • Will also give nutsedge control. • Do not apply *Eradicane* to fields that were treated with a thiocarbamate herbicide (*Eptam, Ro-Neet, Eradicane, Sutan Plus*) the previous year.
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.
	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.

SPECIAL WEED PROBLEMS IN CORN — 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 with protectant *(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. • Do not apply *Eradicane* to fields that were treated with a thiocarbamate herbicide (*Eptam, Ro-Neet, Eradicane, Sutan Plus*) the previous year.
	metolachlor *(Dual, Dual II)*	2½	1¼ qt	• Preplant incorporated to a depth of 2 to 3 in. for consistent nutsedge control. • Control of annual grasses. • *Dual II* contains a safener which increases corn tolerance to metolachlor. • 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* OR *(Partner)*	3	3 qt 4L OR 4.6 lb 65% DG	• 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.
	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	• Suppression only. • Treat when nutsedge is 6 to 8 in tall. • A second application of either atrazine or *Basagran* will improve control. • Cultivation 7 to 14 days after application will improve control. • Do not apply more than 2.5 lbs a.i. of atrazine per acre per year. • See Table 1F for prepackaged herbicide mixes.

SPECIAL WEED PROBLEMS IN CORN — CANADA THISTLE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Postemergence **Canada Thistle**	bentazon *(Basagran)*	1 + 1	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.
	crop oil concentrate	1 qt + 1 qt	1 qt	• Use a minimum of 40 psi and 20 gal of water/A. Do not use flood nozzles.
	dicamba *(Banvel, Clarity)*	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).
	clopyralid *(Stinger)*	0.188	½ pt	• Apply to field corn up to 24 in. tall. • Apply in 10 gal. of water or more per acre. • Treat thistle plants at least 6 to 8 in. in diameter or height but before the bud stage. • Do not cultivate before treatment. • Cultivation may be used 14 to 20 days after treatment. • Rate may be increased to ⅔ pt per acre for dense infestations. • Do not apply more than ⅔ pt per acre per year.
	bentazon *(Basagran)*	¾	¾ qt	• Suppression only. • Treat when Canada thistle is 8 to 10 in. tall.
	+	+	+	• A second application of either atrazine or *Basagran* will improve control.
	atrazine (commercial product)	¾	¾ qt 4L OR 0.8 lb 90% DG	• Cultivation 7 to 14 days after application will improve control. • Do not apply more than 2.5 lbs a.i. of atrazine per acre per year.
	+	+	+	• See Table 1F for prepackaged herbicide mixes.
	crop oil concentrate	1 qt	1 qt	

SPECIAL WEED PROBLEMS IN CORN — 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. • May require a postemergence application for complete velvetleaf control. • See Table 1F for prepackaged herbicide mixes. • Do not use on corn seed stocks (Breeders, Foundation, or Increase).
	+	+	+	
	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.
	+	+	+	
	atrazine (commercial product)	1	1 qt 4L OR 1.1 lb 90% DG	

(Continued on next page)

SPECIAL WEED PROBLEMS IN CORN — VELVETLEAF (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Postemergence **Velvetleaf**	atrazine (commercial product)	2	2 qt 4L OR 2⅛ 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. • Do not apply to corn over 12 in. tall.
	+ crop oil concentrate	+ 1 qt	+ 1 qt	
	dicamba *(Banvel, Clarity)*	½	1 pt	• Apply postemergence to corn from emergence up to the 5-leaf stage or 8 in. tall, whichever comes first. • *Banvel* may be applied at ½ pt/A to corn up to 36 in. tall or 15 days before tassel emergence. Drop nozzles are recommended for corn over 8 in. tall. • 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, Clarity)*	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. • Do not apply to corn over 12 in. tall. Drop nozzles are recommended for corn over 8 in. tall. • 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. • See Table 1F for prepackaged herbicide mixes.
	+ atrazine	+ 1	+ 1 qt 4L OR 1.1 lb 90% DG	
	bentazon *(Basagran)*	¾	¾ qt	• For best results, treat when the largest velvetleaf plants in the field are 2 in. tall. • Do not apply to corn over 12 in. tall. • Combination reduces risk of carryover from postemergence 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. • See Table 1F for prepackaged herbicide mixes. • Rates may be reduced to ½ lb/A for each herbicide if weeds are small. See *Laddok* label for details.
	+ atrazine (commercial product)	+ ¾	+ ¾ qt 4L OR 0.8 lb 90% DG	
	+ crop oil concentrate	+ 1 qt	+ 1 qt	
	bromoxynil *(Buctril)*	⅜	1½ pt 2L OR ¾ pt Gel	• For best results, treat when the largest velvetleaf plants in the field are 2 in. tall. • Apply to corn between the 4-leaf stage (4 leaves visible) and before corn is 12 in. tall. • Do not mix with spray additives or liquid fertilizers. • Combination reduces risk of carryover from postemergence application of atrazine alone. • See Table 1F for prepackaged herbicide mixes.
	+ atrazine (commercial product)	+ ¾	+ ¾ qt 4L OR 0.8 lb 90% DG	

SPECIAL WEED PROBLEMS IN CORN — 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 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. Postemergence treatments provide the most effective, consistent control.

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Postemergence **Triazine-resistant Common Lambsquarters**	dicamba *(Banvel, Clarity)*	½	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. • *Banvel* may be applied at ½ pt/A to corn up to 36 in. tall or 15 days before tassel emergence. Drop nozzles are recommended for corn over 8 in. tall. • 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."
	dicamba *(Banvel, Clarity)* + atrazine (commercial product)	½ + 1	1 pt + 1 qt 4L OR 1.1 lb 90% DG	• 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. • Do not apply to corn over 12 in. tall. Drop nozzles are recommended for corn over 8 in. tall. • 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).* • See Table 1F for prepackaged herbicide mixes.
	bromoxynil *(Buctril)*	⅜	1½ pt 2L OR ¾ pt Gel	• 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 prior to tassel emergence. • 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.

(Continued on next page)

SPECIAL WEED PROBLEMS IN CORN – TRIAZINE RESISTANT LAMBSQUARTERS (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Postemergence **Triazine-resistant** **Common Lambsquarters**	bromoxynil *(Buctril)*	3/8	1½ pt 2L OR ¾ pt Gel	• Apply postemergence. Treatment must follow a preplant-incorporated or preemergence herbicide application for grass control.
	+ atrazine (commercial product)	+ ¾	+ ¾ qt 4L OR 0.8 lb 90% DG	• Apply to corn between the 4-leaf stage (4 visible leaves) and before corn is 12 in. tall. • 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. • See Table 1F for prepackaged herbicide mixes.
	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.
Preemergence **Triazine-resistant** **Common Lambsquarters**	pendimethalin *(Prowl)*	1½	1.8 qt 3.3 EC	• **APPLY AFTER PLANTING. DO NOT INCORPORATE.** • Tank mix with atrazine or *Bladex* **or** follow with 2,4-D, Banvel, Basagran, Buctril, Bladex, or atrazine for control of other broadleaf weeds. • This treatment will provide effective control of triazine resistant common lambsquarters with timely rainfall following treatment. Without adequate rainfall, a post-emergence herbicide treatment or cultivation will be required for complete control. • Adjust *Prowl* rate according to soil type (refer to *Prowl* label for details). • Do not use on sandy soil with less than 1.5% organic matter. • Plant at least 1½ in. deep.

TABLE 1F — HERBICIDE PREMIXES IN CORN

TRADE NAME	COMPANY	FORMULATION	FORMULATION EQUIVALENTS*	TYPICAL USE RATE	=	EQUIVALENT RATES
Bicep 6L	Ciba	6L	3.3 pt Dual + 2.68 qt Atrazine 4L	2.4 qt/Acre	=	2 pt Dual + 1.6 qt Atrazine 4L
Bicep Lite	Ciba	5.0L	3.3 pt Dual + 1.7 qt Atrazine 4L	2.4 qt/Acre	=	2 pt Dual + 1 qt Atrazine 4L
Bicep II	Ciba	5.9L	3.3 pt Dual II + 2.68 qt Atrazine 4L	2.4 qt/Acre	=	2 pt Dual II + 1.6 qt Atrazine 4L
Broadstrike + Dual	DowElanco/Ciba	7.67L	Broadstrike + 7.5 pt Dual	2¼ pt/Acre	=	0.056 lb a.i. Broadstrike + 2.1 pt Dual
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	3 pt/Acre	=	0.75 qt Buctril 2E + 0.75 qt Atrazine 4L
Bullet	Monsanto	4L	2.5 qt Micro-Tech + 1.5 qt Atrazine 4L	3 qt/Acre	=	1.88 qt Micro-Tech + 1.13 qt Atrazine 4L
Cycle	Ciba	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
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

*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 1G—WEED RESPONSE TO HERBICIDES IN CORN*

	ANNUAL BROADLEAVES									ANNUAL GRASSES								PERENNIALS				
	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (BLACK)	PIGWEED (REDROOT)	RAGWEED (COMMON)	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	F	F
BLADEX	F	P	**E**	**G**	F	**E**	**G**	P	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	F	N	N	N	N	N
BROADSTRIKE + DUAL	F	F	**E**	**G**	**E**	F	—	**G**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	**G**
DUAL	N	N	P	F	**G**	P	P	N	P	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**F**	N	N	N	N	**G**
ERADICANE	P	P	F	P	F	F	F	F	F	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**G**	N	N	N	F	**G**
FRONTIER	N	—	P	**G**	**G**	P	—	N	—	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	F
SUTAN PLUS	P	P	P	N	P	P	P	F	P	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	P	**G**
LASSO/PARTNER/MICRO-TECH	N	N	P	**G**	**G**	P	P	N	P	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	F
PRINCEP	F	F	**E**	**E**	**G**	**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	F	F
BLADEX	F	P	**E**	**G**	F	**E**	**G**	P	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	F	N	N	N	N	N
BROADSTRIKE + DUAL	F	F	**E**	**G**	**E**	F	—	**G**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	F
DUAL	N	N	P	F	**G**	P	P	N	P	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	F
FRONTIER	N	—	P	**G**	**G**	P	—	N	—	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	P
LASSO/PARTNER/MICRO-TECH	N	N	P	**G**	**G**	P	P	N	P	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	P
PRINCEP	F	F	**E**	**E**	**G**	**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**	P	**E**	**E**	**E**	**E**	**E**	**G**	P	P	F	**G**	F
ATRAZINE	**G**	**G**	**E**	**G**	**E**	**E**	**G**	**G**	**E**	F	P	F	**G**	**G**	P	P	P	P	P	F	F	F
BANVEL/CLARITY	**G**	**G**	**G**	**G**	**G**	**G**	**E**	**G**	**G**	N	N	N	N	N	N	N	N	**G**	**G**	F	N	N
BANVEL + ATRAZINE	**G**	**G**	**E**	**G**	**E**	**E**	**E**	**E**	**E**	P	P	P	F	F	P	P	P	F	F	F	P	F
BASAGRAN	**E**	**G**	F	P	P	F	**G**	**G**	**E**	N	N	N	N	N	N	N	N	N	N	**G**	N	**G**
BASAGRAN + ATRAZINE	**E**	**G**	**G**	F	**G**	**E**	**G**	**E**	**E**	P	P	P	F	F	P	P	P	P	P	F	P	**G**
BEACON	**E**	**G**	F	**G**	**E**	**E**	**G**	**G**	F	P	P	F	F	F	**G**	**G**	P	P	P	F	**G**	F
BLADEX 90 DF	F	P	**G**	**G**	F	**G**	**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
BUCTRIL + ATRAZINE	**G**	**G**	**E**	**G**	**G**	**E**	**G**	**E**	**G**	P	P	P	F	F	P	P	P	P	P	P	P	F
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	**G**	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	**G**	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
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; — = 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 1H — WEED AND CROP HEIGHTS FOR POSTEMERGENCE HERBICIDE APPLICATIONS IN CORN*

Herbicide[b]	RATE/A	MAXIMUM HEIGHT[a]																
		COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (BLACK)	PIGWEED (REDROOT)	RAGWEED (COMMON)	SMARTWEED	VELVETLEAF	WILD MUSTARD	BARNYARDGRASS	CRABGRASS	GIANT FOXTAIL	GREEN FOXTAIL	YELLOW FOXTAIL	FALL PANICUM	WITCHGRASS	WILD PROSO MILLET	CORN
Broadcast																			**Maximum height**
Accent	⅔ oz	NR	3″	NR	NR	4″	NR	4″	NR	NR	4″	NR	4″	4″	4″	4″	4″	4″	24″
Atrazine 4L	2 qt	4″	4″	6″	4″	6″	4″	4″	4″	4″	NR	NR	NR	1½″	1½″	NR	NR	NR	12″
Banvel/Clarity	1 pt	4″	4″	4″	4″	4″	4″	6″	4″	2″	NR	NR	NR	NR	NR	NR	NR	NR	8″ or 5 lf
Banvel + Atrazine 4L	1 pt + 2 pt	6″	6″	6″	6″	6″	6″	8″	6″	6″	NR	NR	NR	NR	NR	NR	NR	NR	8″ or 5 lf
Basagran	2 pt	10″	10″	NR	NR	NR	3″	10″	5″	8″	NR	NR	NR	NR	NR	NR	NR	NR	–
Basagran + Atrazine 4L	1.4 pt + 1.4 pt	8″	8″	8″	NR	6″	5″	12″	10″	8″	NR	NR	NR	NR	NR	NR	NR	NR	12″
Beacon	.76 oz	4″	4″	NR	4″	4″	9″	4″	4″	NR	NR	NR	NR	NR	NR	2″	2″	NR	20″
Bladex 90DF	2 lb	NR	NR	1½″	1½″	NR	1½″	1½″	NR	1½″	1½″	NR	1″	1½″	1½″	NR	NR	NR	4 lf
Buctril	1½ pt	10″	6″	8″	6″	NR	6″	6″	5″	NR	NR	NR	NR	NR	NR	NR	NR	NR	*
Buctril + Atrazine	1½ pt + 1½ pt	12″	6″	12″	6″	6″	6″	8″	6″	4″	NR	NR	NR	NR	NR	NR	NR	NR	12″
Stinger	¼ pt	5 lf	5 lf	NR	NR	NR	5 lf	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	24″
2,4-D amine	1 pt	4″	NR	4″	4″	4″	4″	NR	2″	4″	NR	NR	NR	NR	NR	NR	NR	NR	8″
Directed																			**Minimum height**
Evik	2 lb	3″	3″	3″	3″	3″	3″	3″	3″	3″	3″	3″	3″	3″	3″	3″	3″	4″	12″
Gramoxone Extra	0.8 pt	3″	3″	3″	3″	3″	3″	NR	3″	3″	3″	3″	3″	3″	3″	3″	3″	3″	10″
Linex/Lorox (50% DF)	3 lb	3″	3″	3″	3″	3″	3″	3″	3″	3″	NR	NR	NR	NR	NR	NR	NR	NR	15″

[a] NR = not recommended; – = no restrictions on crop growth stage
[b] Consult label for recommended additives.
* Before tassel emergence

The weed heights and growth stages listed in this table are estimates of the maximum size where consistent control is expected. The maximum height for effective control in any specific situation is dependent on environment conditions including soil moisture, temperature, and relative humidity.

TABLE 1I — TANK-MIX COMBINATIONS, ADDITIVES AND APPLICATION TIMING FOR ACCENT

	Additives				
	Surfactant	COC	Surfactant + 28%N	COC + 28%N	Maximum Corn Height
Accent Alone	yes	yes	yes	yes	24 in.
+ Atrazine	no	yes	no	yes	12 in.
+ Banvel/Clarity	yes	no	yes	no	8 in.*
+ Buctril	yes	no	yes	no	24 in.
+ Buctril + atrazine	yes	no	yes	no	12 in.
+ Marksman	yes	no	yes	no	8 in.*

Surfactant = Non-ionic surfactant (¼%)
COC = Crop Oil Concentrate (1%)
28%N = 28% liquid Nitrogen Fertilizer (urea-ammonium nitrate) (4%)
* or 5-leaf stage

TABLE 1J — TANK-MIX COMBINATIONS, ADDITIVES AND APPLICATION TIMING FOR BEACON

	Additives				
	Surfactant	COC	Surfactant + 28%N	COC + 28%N	Maximum Corn Height
Beacon Alone	yes	yes	yes	yes	20 in.
+ Buctril	yes	no	no	no	20 in.
+ Banvel/Clarity	yes	no	no	no	8 in.*
+ 2,4 D	yes	no	no	no	8 in.

Surfactant = Non-ionic surfactant (¼%)
COC = Crop Oil Concentrate (1%)
28%N = 28% Liquid Nitrogen Fertilizer (urea-ammonium nitrate) (4%)
* or 5-leaf stage

TABLE 1K — CHEMICAL WEED CONTROL IN PURSUIT RESISTANT/TOLERANT CORN

In addition to the herbicide options in Tables 1A and 1B, the following herbicides and herbicide combinations may be applied to corn hybrids warranted by the seed company to possess **resistance/tolerance** to direct application of *Pursuit* herbicide. These hybrids are designated as IR, IT, IMR, IPRO, or IMI-CORN. Corn hybrids with resistance/tolerance to *Pursuit* are currently marketed by CIBA, ICI Seeds, UAP, and Pioneer, among others. These hybrids vary in cross-resistance to other herbicide families (ie. sulfonylureas), however they all appear to possess adequate resistance to *Pursuit. Pursuit* may be applied preplant incorporated, preemergence, or postemergence. The following table describes recommended postemergence treatments with *Pursuit*. These treatments should follow *Sutan Plus, Eradicane, Lasso, Arena, Micro-Tech, Partner, Dual, Dual II,* or *Frontier* as listed under "Corn-Preplant — Mineral Soil" section, or *Lasso, Arena, Micro-Tech, Partner, Prowl, Dual, Dual II* or *Frontier* as listed under "Corn-Preemergence — Mineral Soil" section.

PURSUIT RESISTANT/TOLERANT CORN

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
	imazethapyr *(Pursuit)*	0.063	¼ pt 2L	• **USE ONLY ON *PURSUIT* RESISTANT/TOLERANT CORN HYBRIDS.**
	+	+	+	• Do not apply *Pursuit* alone to both corn and soybeans in rotation.
	28% liquid nitrogen	1 qt	1 qt	• See practices to prevent/delay herbicide resistant weeds, pg. 14.
	OR	OR	OR	• See *Pursuit* label on Table 11 for Crop Rotation Restrictions.
	ammonium sulfate	2.5 lb	2.5 lb	• Use a minimum of 20 psi and 10 gallon of water/A.
	+	+	+	• Apply with BOTH surfactant and fertilizer or control will be reduced.
	surfactant	¼%	¼%	• Excellent control of cocklebur and pigweed. Good control of nightshade, smartweed, velvetleaf, wild mustard, and foxtail species. Fair to poor control of jimsonweed, lambsquarters, common ragweed, and grasses other than foxtail.
				• Do not harvest treated corn for 45 days after treatment.
				• Any labelled soil insecticides may be used prior to treatment with *Pursuit* on IR type corn hybrids (e.g. Pioneer IR).
				• Do not use *Counter 15G* insecticide in-furrow on IT type hybrids (eg. ICI seeds).
				• Contact the seed company for additional details on specific hybrids.
				• Apply when weeds are small (<3 inches)
				• See Soybean — Postemergence section for weed response (2F) and maximum broadleaf weed heights (2G).

(Continued on next page)

PURSUIT RESISTANT/TOLERANT CORN (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
	imazethapyr *(Pursuit)*	0.063	¼ pt 2L	• **USE ONLY ON *PURSUIT* RESISTANT/TOLERANT CORN HYBRIDS.**
	+	+	+	• Do not apply *Pursuit* alone to both corn and soybeans in rotation.
	bromoxynil *(Buctril)*	¼	1 pt	• See practices to prevent/delay herbicide resistant weeds, pg. 14.
	+	+	+	• See *Pursuit* label on Table 11 for Crop Rotation Restrictions.
	28% liquid nitrogen	1 qt	1 qt	• Apply with BOTH surfactant and fertilizer or control will be reduced.
	OR	OR	OR	• Excellent control of cocklebur and pigweed. Good control of nightshade, smartweed, velvetleaf, wild mustard, and foxtail species. Fair to poor control of jimsonweed, lambsquarters, common ragweed, and grasses other than foxtail.
	ammonium sulfate	2.5 lb	2.5 lb	• Do not harvest treated corn for 45 days after treatment.
	+	+	+	• Any labelled soil insecticides may be used prior to treatment with Pursuit on IR type corn hybrids (e.g. Pioneer IR).
	surfactant	¼%	¼%	• Do not use *Counter 15G* insecticide in-furrow on IT type hybrids (eg. ICI seeds).
				• Contact the seed company for additional details on specific hybrids.
				• Apply when weeds are small (<3 inches)
				• Grass activity of *Pursuit* may be reduced when tank mixed with *Buctril*.
				• Application of *Buctril* in combination with *Pursuit* (and additives) will result in temporary leaf burn.
				• See additional remarks and limitations for bromoxynil *(Buctril)*.

(Continued on next page)

PURSUIT RESISTANT/TOLERANT CORN (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
	imazethapyr *(Pursuit)*	0.063	¼ pt 2L	• **USE ONLY ON *PURSUIT* RESISTANT/TOLERANT CORN HYBRIDS.**
	+	+	+	• Do not apply *Pursuit* alone to both corn and soybeans in rotation.
	dicamba *(Banvel, Clarity)*	¼	½ pt	• See practices to prevent/delay herbicide resistant weeds, pg. 14.
	+	+	+	• See *Pursuit* label on Table 11 for Crop Rotation Restrictions.
	28% liquid nitrogen	1 qt	1 qt	• Apply with BOTH surfactant and fertilizer or control will be reduced.
	OR	OR	OR	• Excellent control of cocklebur and pigweed. Good control of nightshade, smartweed, velvetleaf, wild mustard, and foxtail species. Fair to poor control of jimsonweed, lambsquarters, common ragweed, and grasses other than foxtail.
	ammonium sulfate	2.5 lb	2.5 lb	• Do not harvest treated corn for 45 days after treatment.
	+	+	+	• Any labelled soil insecticides may be used prior to treatment with Pursuit on IR type corn hybrids (e.g. Pioneer IR).
	surfactant	¼%	¼%	• Do not use *Counter 15G* insecticide in-furrow on IT type hybrids (eg. ICI seeds).
				• Contact the seed company for additional details on specific hybrids.
				• Do not apply to corn over 8 inches tall.
				• Apply when weeds are small (<3 inches).
				• Grass activity of *Pursuit* may be reduced when tank mixed with *Banvel* or *Clarity*.
				• Application of *Banvel* or *Clarity* in combination with *Pursuit* (and additives) increases risk of injury from dicamba (leaning, rolled leaves, brace root fusion).
				• See additional remarks and limitations for dicamba *(Banvel, Clarity)*.

TABLE 2A — CHEMICAL WEED CONTROL IN TILLED SOYBEAN

PREPLANT

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses **Annual broadleaves** **Yellow Nutsedge**	metribuzin *(Lexone* or *Sencor)*	3/8	3/4 pt 4L OR 1/2 lb 75% DF OR 1/2 lb *Sencor Solupak*	• 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. 87 or metribuzin label. • DO NOT use on sands or soils with less than 1/2% 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. • Alachlor rate should be increased to 3 qt/A and *Dual* to 2 1/2 pt/A for effective nutsedge control. • See Table 2E for prepackaged herbicide mixes.
	+ alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)* OR metolachlor *(Dual, Dual II)*	+ 2 OR 2	+ 2 qt OR 3 lb 65% DG OR 2 pt	
	metribuzin + chlorimuron-ethyl *(Preview)* + alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)* OR metolachlor *(Dual, Dual II)*	0.29 + 2 OR 2	6 oz 75% DG + 2 qt OR 3 lb 65% DG OR 2 pt	• Alachlor is a **restricted use** pesticide. • SEE *PREVIEW* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH IS GREATER THAN 6.8. Soil pH may be quite variable in a field. 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 1/2% organic matter. • Use on soils with organic matter from 1/2 to 5%. • 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. • Alachlor rate should be increased to 3 qt/A and *Dual* to 2 1/2 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** (except yellow nutsedge)	flumetsulam + trifluralin *(Broadstrike +* *Treflan)*	0.062 + 0.88	2 pt	• *Broadstrike* available in a prepackaged mix only. See Table 2E. • SEE LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH EXCEEDS 7.8. AS INCREASED CROP INJURY MAY OCCUR. • DO NOT USE IF ORGANIC MATTER IS >5% AND SOIL pH IS <5.9 AS POOR WEED CONTROL MAY RESULT. • DO NOT USE ON PEAT OR MUCK SOILS. • THIS PRODUCT HAS A GROUNDWATER ADVISORY STATEMENT. • Incorporate within 24 hours of application to the top 2 to 3 inches of soil. • Control of only light to moderate common ragweed, cocklebur, and jimsonweed infestation.

(Continued on next page)

SOYBEANS — PREPLANT (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses **Annual broadleaves** (including nightshade) **Yellow Nutsedge**	imazaquin *(Scepter)* + alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)* OR metolachlor *(Dual, Dual II)*	0.125 + 2 OR 2	⅔ pt OR 2.8 oz 70% DG + 2 qt OR 3 lb 65% DG OR 2 pt	• Alachlor is a **restricted use** pesticide. • CORN CANNOT BE PLANTED THE YEAR FOLLOWING *SCEPTER* APPLICATION EXCEPT IN THE SOUTHERN TWO TIERS OF COUNTIES IN MICHIGAN AND IF 15" OF RAIN FALLS AFTER APPLICATION. SEE *SCEPTER* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • Imidazolinone resistant (IR or IMR) and imidazolinone tolerant (IT) corn hybrids can be planted the year following Scepter application. • 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 alachlor 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, Micro-Tech,* or *Partner)* OR metolachlor *(Dual, Dual II)*	0.063 + 2 OR 2	4 oz 2L OR 1.4 oz 70% DG + 2 qt OR 3 lb 65% DG OR 2 pt	• Alachlor is a **restricted use** pesticide. • SEE *PURSUIT* LABEL OR TABLE 11 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 *Scepter* a postemergence herbicide application for common ragweed control may be necessary. • Alachlor 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 incorporated.
	flumetsulam + metolachlor *(Broadstrike + Dual)*	0.056 + 2.1	2¼ pt	• *Broadstrike* available in a prepackaged mix only. See Table 2E. • SEE LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH EXCEEDS 7.8. AS INCREASED CROP INJURY MAY OCCUR. • DO NOT USE IF ORGANIC MATTER IS >5% *AND* SOIL pH IS <5.9 AS POOR WEED CONTROL MAY RESULT. • DO NOT USE ON PEAT OR MUCK SOILS. • THIS PRODUCT HAS A GROUNDWATER ADVISORY STATEMENT. • Control of only light to moderate common ragweed, cocklebur, and jimsonweed infestation. Increase application rate to 2½ pt/A to improve control. See label.

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SOYBEANS — PREPLANT (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses	trifluralin *(Treflan)*	¾	1½ pt	• Incorporate in 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	2.4 pt 3.3 EC	• 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 OR ½ lb *Sencor Solupak*	• 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. 00 or metribuzin label. • This tank mix will NOT control yellow nutsedge. • 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. • See Table 2E for prepackaged herbicide mixes.
	Combine any of the above dinitroanilines *(Treflan, Sonalan,* or *Prowl)* with metribuzin + chlorimuron-ethyl *(Preview)*	0.29	6 oz 75% DG	• SEE *PREVIEW* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH IS GREATER THAN 6.8. Soil pH may be quite variable in a field. 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%. • 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. • This tank mix will not control yellow nutsedge. • See specific remarks for each dinitroaniline herbicide. • **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 metribuzin *(Sencor* or *Lexone)* + imazethapyr *(Pursuit)*	⅜ + 0.031	¾ pt 4L OR ½ lb 75% DF + 2 oz 2L OR 0.7 oz 70% DG	• SEE *PURSUIT* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • Good control of velvetleaf. Fair control of jimsonweed and cocklebur. • *Pursuit* provides black nightshade and redroot pigweed control. • Reduce metribuzin rate if soil pH is above 7.0. See label. • If soil pH is above 7.4, DO NOT apply metribuzin. • See specific remarks for each dinitroaniline herbicide. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • See Table 2E for prepackaged herbicide mixes.

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SOYBEANS — PREPLANT (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual grasses **Annual broadleaves** (including nightshade)	Combine any of the above dinitroanilines *(Treflan, Sonalan,* or *Prowl)* with imazaquin *(Scepter)*	0.125	⅔ pt 1.5L OR 2.8 oz 70% DG	• CORN CANNOT BE PLANTED THE YEAR FOLLOWING *SCEPTER* APPLICATION EXCEPT IN THE SOUTHERN TWO TIERS OF COUNTIES IN MICHIGAN AND IF 15" OF RAIN FALLS AFTER APPLICATION. SEE *SCEPTER* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • Imidazolinone resistant (IR or IMR) and imidazolinone tolerant (IT) corn hybrids can be planted the year following *Scepter* application. • 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. • See Table 2E for prepackaged herbicide mixes.
Annual grasses **Annual broadleaves** (including nightshade; except common ragweed)	Combine any of the above dinitroanilines *(Treflan, Sonalan,* or *Prowl)* with imazethapyr *(Pursuit)*	0.063	4 oz 2L OR 1.4 oz 70% DG	• SEE *PURSUIT* LABEL OR TABLE 11 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 *Scepter* 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. • See Table 2E for prepackaged herbicide mixes.
Annual grasses **Annual broadleaves** (except yellow nutsedge and black nightshade)	clomazone *(Command)* + metribuzin *(Sencor* or *Lexone)*	¾ + ¼	1½ pt 4EC + ½ pt 4L OR ⅓ lb 75% DF OR ⅓ lb *Sencor Solupak*	• SEE *COMMAND* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • Excellent control of velvetleaf. Fair control of cocklebur and jimsonweed. Poor control of yellow nutsedge. • 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. • 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.

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SOYBEANS — PREPLANT (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses **Annual broadleaves** (except black nightshade)	clomazone *(Command)* + metribuzin + chlorimuron-ethyl *(Preview)*	¾ + 0.29	1½ pt 4EC + 6 oz 75% DG	• *SEE BOTH COMMAND* AND *PREVIEW* LABELS OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH IS GREATER THAN 6.8. Soil pH may be quite variable in a field. 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%. • 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. Poor control of yellow nutsedge. • 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.
Annual grasses **Annual broadleaves** (including black nightshade) **Yellow Nutsedge**	clomazone *(Command)* + alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)* OR metolachlor *(Dual, Dual II)*	0.75 + 2 OR 2	1½ pt 4EC + 2 qt OR 3 lb 65% WG OR 2 pt	• Alachlor is a **restricted use** pesticide. • SEE *COMMAND* LABEL OR TABLE 11 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 very moist soils. Preplant incorporate 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.

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SOYBEANS — PREPLANT (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual grasses	clomazone	¾	1½ pt 4EC	• CORN CANNOT BE PLANTED THE YEAR FOLLOWING *SCEPTER* APPLICATION EXCEPT IN THE SOUTHERN TWO TIERS OF COUNTIES IN MICHIGAN OR IF 15" OF RAIN FALLS AFTER APPLICATION. SEE BOTH *COMMAND* AND *SCEPTER* LABELS OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • Imidazolinone resultant (IR or IMR) and imidazolinone tolerant (IT) corn hybrids can be planted the year following *Scepter* application. • 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. • 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.
Annual broadleaves	*(Command)*	+	+	
(including black	+			
nightshade)	imazaquin	0.125	⅔ pt 1.5L	
Yellow Nutsedge	*(Scepter)*		OR	
			2.8 oz 70% DG	

SOYBEANS — PREPLANT FOLLOWED BY PREEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses **Annual broadleaves** (including nightshade) **Yellow Nutsedge**	*Command*, as listed above, preplant incorporated FOLLOWED BY: alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)* OR metolachlor *(Dual, Dual II)*	2 OR 2	2 qt OR 3 lb 65% DG OR 2 pt	• Alachlor is a **restricted use** pesticide. • SEE *COMMAND* LABEL OR TABLE 11 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 improved when alachlor or *Dual* are incorporated. • Excellent control of velvetleaf. Fair control of cocklebur and jimsonweed.
Annual broadleaves **Annual grasses**	*Command, Treflan, Sonalan, Prowl, Lasso, Micro-tech, Partner, 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.
	Command, Treflan, Sonalan, Prowl, Lasso, Micro-tech, Partner, Arena, or *Dual* as listed above, preplant incorporated FOLLOWED BY: linuron + chlorimuron-ethyl *(Lorox Plus)*	0.53	14 oz 60% DG	• Applied preemergence. • SEE *LOROX PLUS* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH IS GREATER THAN 6.8. Soil pH may be quite variable in a field. 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.

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SOYBEANS — PREPLANT FOLLOWED BY PREEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves **Annual grasses**	*Command, Treflan, Sonalan, Prowl, Lasso, Micro-Tech, Partner, Arena,* or *Dual,* as listed above, preplant incorporated FOLLOWED BY:			
	metribuzin *(Lexone* or *Sencor)*	⅜	¾ pt 4L OR ½ lb 75% DF OR ½ lb *Sencor Solupak*	• 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. 87 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 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.
	metribuzin + chlorimuron-ethyl *(Preview)*	0.29	6 oz 75% DG	• Applied preemergence. • SEE LABELS OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH IS GREATER THAN 6.8. Soil pH may be quite variable in a field. 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%. • 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	⅔ pt 1.5 L OR 2.8 oz 70% DG	• Applied preemergence. • CORN CANNOT BE PLANTED THE YEAR FOLLOWING *SCEPTER* APPLICATION EXCEPT IN THE SOUTHERN TWO TIERS OF COUNTIES IN MICHIGAN AND IF 15" OF RAIN FALLS AFTER APPLICATION. SEE *SCEPTER* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • Imidazolinone resistant (IR or IMR) and imidazolinone tolerant (IT) corn hybrids can be planted the year following *Scepter* application. • 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	4 oz 2L OR 1.4 oz 70% DG	• DO NOT apply *Command* followed by *Pursuit.* • Applied preemergence. Rotary hoe if no rainfall occurs within 7 days. • SEE *PURSUIT* LABEL OR TABLE 11 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 *Scepter* or a postemergence herbicide may be necessary for common ragweed control. • *Pursuit* will suppress nutsedge. Incorporate alachlor or *Dual* for nutsedge control. • *Pursuit* alone will control nightshade.

SOYBEANS — PREEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves **Annual grasses** **Yellow Nutsedge**	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.
	+ alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)* OR metolachlor *(Dual, Dual II)*	+ 2 OR 2	+ 2 qt OR 3 lb 65% DG OR 2 pt	• 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. • Nutsedge control is improved when alachlor or *Dual* are incorporated.
	metribuzin *(Lexone* or *Sencor)*	⅜	¾ pt 4L OR ½ lb 75% DF OR ½ lb *Sencor Solupak*	• 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. 87 or metribuzin label.
	+ alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)* OR metolachlor *(Dual, Dual II)*	+ 2 OR 2	+ 2 qt OR 3 lb 65% DG OR 2 pt	• 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. • Nutsedge control is improved when alachlor or *Dual* are incorporated. • See Table 2E for prepackaged herbicide mixes.

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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** **Yellow Nutsedge**	imazaquin *(Scepter)* + alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)* OR metolachlor *(Dual, Dual II)*	0.125 + 2 OR 2	⅔ pt 1.5L OR 2.8 oz 70% DG + 2 qt OR 3 lb 65% DG OR 2 pt	• Alachlor is a **restricted use** pesticide. • CORN CANNOT BE PLANTED THE YEAR FOLLOWING *SCEPTER* APPLICATION EXCEPT IN THE SOUTHERN TWO TIERS OF COUNTIES IN MICHIGAN AND IF 15" OF RAIN FALLS AFTER APPLICATION. SEE *SCEPTER* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • Imidazolinone resistant (IR or IMR) and imidazolinone tolerant (IT) corn hybrids can be planted the year following *Scepter* application. • Good control of cocklebur and jimsonweed. Fair control of velvetleaf. • 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. • Nutsedge control is improved when alachlor or *Dual* are incorporated.
	imazethapyr *(Pursuit)* + alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)* OR metolachlor *(Dual, Dual II)*	0.063 + 2 OR 2	4 oz 2L OR 1.4 oz 70% DG + 2 qt OR 3 lb 65% DG OR 2 pt	• Alachlor is a **restricted use** pesticide. • SEE *PURSUIT* LABEL OR TABLE 11 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. • Nutsedge control is improved when alachlor or *Dual* are incorporated.
	linuron + chlorimuron-ethyl *(Lorox Plus)* + alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)* OR metolachlor *(Dual, Dual II)*	0.53 + 2 OR 2	14 oz 60% DG + 2 qt OR 3 lb 65% DG OR 2 pt	• Alachlor is a **restricted use** pesticide. • Applied preemergence. • SEE *LOROX PLUS* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH IS GREATER THAN 6.8. Soil pH may be quite variable in a field. 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%. • 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.

(Continued on next page)

SOYBEANS — PREEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves **Annual grasses** **Yellow Nutsedge**	metribuzin + chlorimuron-ethyl *(Preview)* + alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)* OR metolachlor *(Dual, Dual II)*	0.29 + 2 OR 2	6 oz 75% DG + 2 qt OR 3 lb 65% DG OR 2 pt	• Alachlor is a **restricted use** pesticide. • Applied preemergence. • SEE *PREVIEW* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH IS GREATER THAN 6.8. Soil pH may be quire variable in a field. 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%. • 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.
	flumetsulam + metolachlor *(Broadstrike + Dual)*	0.056 + 2.1	2¼ pt	• *Broadstrike* available in a prepackaged mix only. See Table 2E. • SEE LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH EXCEEDS 7.8. AS INCREASED CROP INJURY MAY OCCUR. • DO NOT USE IF ORGANIC MATTER IS >5% *AND* SOIL pH IS <5.9 AS POOR WEED CONTROL MAY RESULT. • DO NOT USE ON PEAT OR MUCK SOILS. • THIS PRODUCT HAS A GROUNDWATER ADVISORY STATEMENT. • Control of only light to moderate common ragweed, cocklebur, and jimsonweed infestation. Increase application rate to 2½ pt/A to improve control. See label. • Rotary hoe and cultivate if dry weather follows preemergence application.
Annual broadleaves **Annual grasses**	linuron *(Lorox* or *Linex)* + pendimethalin *(Prowl)*	¾ + 1	¾ qt 4L OR 1½ lb 50% DF + 2.4 pt 3.3 EC	• DO NOT use on coarse textured sandy or loamy sand soils or on soils with less than 1% organic matter. • NOT RECOMMENDED on sandy loam soils. Brittleness of soybean stems at the soil line may occur. • Fair control of velvetleaf and black nightshade. Poor control of cocklebur, jimsonweed, and yellow nutsedge. • Preemergence following and up until 2 days after soybean planting. • Plant soybeans 1¾ in. deep.

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SOYBEANS — PREEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves (except nightshade) **Annual grasses**	metribuzin *(Lexone* or *Sencor)*	3/8	3/4 pt 4L OR 1/2 lb 75% DF	• DO NOT use on sands or soils with less than 1/2% organic matter. DO NOT use on loamy sand or sandy loam soils with less than 1% organic matter. • NOT RECOMMENDED on sandy loam soils. Brittleness of soybean stems at the soil line may occur. • Fair control of jimsonweed and cocklebur. Poor control of yellow nutsedge. No control of black nightshade. • Preemergence following and up until 2 days after soybean planting. • 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.
	+ pendimethalin *(Prowl)*	+	+ 2.4 pt 3.3 EC	
Annual broadleaves (including nightshade) **Annual grasses**	imazethapyr + pendimethalin *(Pursuit Plus)*	0.94	2 1/2 pt	• Label for prepackaged mix of *Pursuit Plus* only. • SEE *PURSUIT PLUS* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • NOT RECOMMENDED on sandy loam or loamy sand soils. Brittleness of soybean stems at the soil line may occur. • Fair control of yellow nutsedge, cocklebur, jimsonweed, and velvetleaf. • COMMON RAGWEED will only be supressed. • Preemergence following and up until 2 days after soybean planting.

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, Micro-Tech, Partner, Dual, Dual II,* or *Command,* as listed above, preplant incorporated, or *Lasso, Arena, Micro-Tech, Partner,* or *Dual* preemergence. FOLLOWED BY: *Blazer, Basagran, Classic, Cobra, Galaxy, Scepter, Pursuit, Reflex,* and/or *Pinnacle.* For specific broadleaf weed control, see "Soybean — Postemergence" section.			
	Pursuit, Scepter, Preview, or metribuzin as listed above, preplant incorporated, or linuron, metribuzin, *Preview, Lorox Plus, Pursuit* or *Scepter* preemergence. FOLLOWED BY: *Assure II, Poast, Poast Plus, Fusion, Fusilade 2000, Fusilade DX, Select,* or *Option II.* 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 Table 2G and 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. • Apply both 28% liquid nitrogen and crop oil concentrate if velvetleaf and lambsquarters are present. See Table 2H. • Poor control of pigweed and black nightshade. Fair to good control of common ragweed and lambsquarters. • *Basagran* can be tank mixed with *Blazer, Cobra, Reflex, Pursuit, Pinnacle,* and *Scepter* for redroot pigweed control. *Basagran* can be tank mixed with *Blazer, Cobra, Pursuit,* or *Reflex* for black nightshade control. See Tables 2F and 2I. • A prepackaged mix of *Basagran* plus *Blazer (Galaxy* or *Storm)* is available. See remarks for *Galaxy* and Table 2F. • *Basagran* can be tank mixed for postemergence grass control. See Table 2K.
Annual broadleaves	bentazon + acifluorfen *(Storm)* + crop oil concentrate	0.75 + 1 qt	1½ pt + 1 qt	• *Storm* is a prepackaged mix of *Basagran* plus *Blazer.* 1½ pt/A of *Storm* is equal to 1 pt/A of *Basagran* + 1 pt/A of *Blazer.* • Most effective on small weeds. See Table 2G and label. • Common lambsquarters and velvetleaf control may be inconsistent. • Use a minimum of 40 psi and 20 gal of water/A. Do not use flood nozzles. • Replace COC with ½-1 gal/A of 28% liquid nitrogen for improved pigweed and velvetleaf control. • *Storm* can be tankmixed with *Classic* for improved velvetleaf control. • *Storm* cannot be tankmixed with postemergence grass herbicides. See Table 2K.
Annual broadleaves **Yellow Nutsedge**	bentazon + acifluorfen *(Galaxy)* + crop oil concentrate	0.92 + 1 qt	2 pt + 1 qt	• *Galaxy* is a prepackaged mix of *Basagran* plus *Blazer.* 2 pt/A of *Galaxy* is equal to 1.5 pt/A of *Basagran* + 0.66 pt/A of *Blazer.* • Most effective on small weeds. See Table 2G and label. • A later application of *Basagran* may be needed for yellow nutsedge control. • 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. • Replace COC with ½-1 gal/A of 28% liquid nitrogen OR 2.5 lb ammonium sulfate if velvetleaf is the target weed and NOT common ragweed or lambsquarters. • *Galaxy* can be tankmixed with *Pinnacle* for improved lambsquarters control OR *Classic* for improved nutsedge and pigweed control OR *Pursuit* for improved pigweed control. See Tables 2F and 2I. • *Galaxy* cannot be tankmixed with postemergence grass herbicides. See Table 2K.

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SOYBEANS — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
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. • SEE LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • Most effective on small weeds. Labeled rates of ½ to ¾ oz/A, depending on weed size. See Table 2G and label. • ¾ oz/A required for Jerusalem artichoke. • Apply after the first trifoliate leaf of soybeans has fully expanded. • *Classic* can be applied at ¼ oz/A when tank mixed with *Pinnacle*. This tank mix is not limited by soil pH. HOWEVER, crop rotation restrictions remain the same. • 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. See Table 2H. • 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. • Allow 60 days between *Classic* application and soybean harvest. • *Classic* can be tank mixed with *Pinnacle* for lambsquarters control. *Classic* can be tank mixed with *Galaxy, Blazer, Reflex* or *Cobra*. See labels and Tables 2F and 2I. • *Classic* can be tank mixed with some postemergence herbicides for control of some grasses. See Table 2K.
Annual broadleaves (ONLY lambsquarters, smartweed, pigweed, wild mustard and Velvetleaf)	thifensulfuron methyl *(Pinnacle)* + surfactant	0.004 + ⅛%	¼ oz 25% DF + ⅛%	• No soil pH or crop rotation restrictions. • For velvetleaf control, add 2-4 qt/A of 28% liquid nitrogen/A or 2-4 lb of ammonium sulfate in addition to surfactant. See Table 2H. • 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 the surfactant *Dash*. • DO NOT exceed ⅛% of nonionic surfactant. • *Pinnacle* can be tank mixed with *Blazer, Cobra, Reflex, Galaxy, Basagran, Pursuit* or *Classic* for additional weed control. See Tables 2F and 2I. • *Pinnacle* can be tank mixed with *Assure II* for annual grass control. See Table 2K. • **Special precaution:** A special sprayer clean-out procedure is required. See label.

(Continued on next page)

SOYBEANS — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves (EXCEPT lambs-quarters) **Jerusalem artichoke**	imazethapyr *(Pursuit)* + 28% liquid nitrogen OR ammonium sulfate + surfactant	0.063 + 1 qt OR 2.5 lb + ¼%	4 oz 2L OR 1.4 oz 70% DG + 1 qt OR 2.5 lb + ¼%	• SEE *PURSUIT* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT apply without both surfactant AND fertilizer or control will be reduced. See Table 2H. • Will control yellow and green foxtails, barnyardgrass, and crabgrass up to 3 inches tall, and giant foxtail up to 6 inches tall. • 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 tank mixed with *Basagran, Blazer, Reflex, Cobra, Pinnacle* and *Galaxy* for additional weed control. See Tables 2F and 2I. • *Pursuit* may be tank mixed with postemergence grass herbicides for volunteer corn control only. See Table 2K.
Annual broadleaves (EXCEPT velvetleaf and lambsquarters)	acifluorfen *(Blazer)* + surfactant	0.38 + ⅛%	1.5 pt + ⅛%	• Most effective on small weeds. See label and Table 2G. • 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. • ½ to 1 gal/A of 28% liquid nitrogen may be added INSTEAD OF surfactant for improved weed control. • Allow 50 days between *Blazer* application and soybean harvest. • *Blazer* can be tank mixed with *Scepter* or *Pursuit* for additional cocklebur control, with *Basagran* for additional cocklebur, velvetleaf, and lambsquarters control, and with *Pinnacle* for additional lambsquarters and pigweed control. See Tables 2F and 2I. • A prepackaged mix of *Basagran* plus *Blazer (Galaxy)* is available. See remarks for *Galaxy.* • *Blazer* can be tank mixed for postemergence grass control. See Table 2K.
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 and Table 2G. • DO NOT apply more than 1 pt/A of *Reflex* over a 2-year period. • Apply before soybeans bloom. • *Reflex* can be tank mixed with *Basagran* or *Pinnacle* for velvetleaf, smartweed, lambsquarters and cocklebur control. *Reflex* can be tank mixed with *Scepter* or *Pursuit* for cocklebur control, and with *Classic* for cocklebur and smartweed control. See Tables 2F and 2I. • *Reflex* can be tank mixed for postemergence grass control. See Table 2K.

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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	12.5 oz + 1 pt	• Poor on smartweed and lambsquarters. Fair on velvetleaf. • Most effective on small weeds. See label and Table 2G. • 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 at 1 gal/A may be substituted for crop oil concentrate. See Table 2H. • 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 *Pinnacle* or *Basagran* to control velvetleaf, smartweed, and lambsquarters. *Cobra* can be tank mixed with *Classic* or *Pursuit* for control of smartweed and cocklebur or with *Scepter* for cocklebur control. See Tables 2F and 2I. • *Cobra* can be tank mixed for postemergence grass control. See Table 2K.
Annual broadleaves (ONLY redroot pigweed and cocklebur)	imazaquin *(Scepter)* + crop oil concentrate OR surfactant	0.063 + 1 qt OR ¼%	⅓ pt OR 1.4 oz 70% DG + 1 qt OR ¼%	• SEE LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • For redroot pigweed and cocklebur control ONLY. See Table 2G. • 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. CORN CANNOT BE PLANTED THE YEAR FOLLOWING A ⅔ pt/A APPLICATION. • 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, Blazer, Reflex,* or *Cobra* for control of additional broadleaf weeds. See Tables 2F and 2I. • *Scepter* cannot be tank mixed with postemergence grass herbicides. See Table 2K.
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, Assure II, Fusilade 2000* or *DX, Poast, Poast Plus,* or *Option* treatments.

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SOYBEANS — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses	sethoxydim *(Poast)*	0.19	16 oz	• No soil activity. Controls only grasses present when sprayed.
	OR	OR	OR	• Treat actively growing grasses. See Table 2J.
	sethoxydim *(Poast Plus)*	0.19	24 oz	• *Poast* can be reduced to 12 oz/A and *Poast Plus* can be reduced to 16 oz/A for 1- to 4-in. barnyardgrass, green and giant foxtail, and fall panicum.
	+	+	+	
	crop oil concentrate	1 qt	1 qt	• Use 5 to 20 gal of water/A and a minimum of 40 psi.
	OR	OR	OR	• Addition of 2.5 lb ammonium sulfate/A in *Poast* or *Poast Plus* applications increases large crabgrass control.
	Dash	1 qt	1 qt	• *Poast Plus* can be tank mixed with *Basagran. Poast* can be mixed with *Basagran* and/or *Blazer.* Increase *Poast* to 24 oz/A for yellow-foxtail, barnyardgrass, and crabgrass when tank mixing. See *Poast* or *Poast Plus* label for additional information and Table 2K.
				• Wait 1 day after *Poast* or *Poast Plus* application before applying *Basagran* or *Blazer.* Wait 7 days after *Basagran* or *Blazer* application before applying *Poast* or *Poast Plus.*
				• Avoid drift onto corn, small grains, and turf.
	fluazifop-P-butyl *(Fusilade 2000, Fusilade DX)*	0.188	24 oz of 2000 12 oz of DX	• *Fusilade DX* is a 2 lb/gal formulation of Fusilade 2000.
				• No soil activity. Controls only grasses present when sprayed.
	+	+	+	• Treat actively growing grasses. See Table 2J.
	crop oil concentrate	1 qt	1 qt	• Use 5 to 40 gal of water/A and 40 to 60 psi.
				• *Fusilade 2000* can be reduced to 20 oz/A and *DX* to 10 oz/A for certain conditions. See label.
				• *Fusilade* can be tank mixed with *Basagran, Reflex, Cobra,* and *Blazer.* However, the minimum rate for *Fusilade 2000* would be 24 oz/A and for *DX* 12 oz/A. See label and Table 2K.
				• Wait 3 days after *Fusilade* application before applying *Basagran* or *Blazer.* Wait 7 days after *Basagran* or *Blazer* application before applying *Fusilade 2000.*
				• Avoid drift onto corn, small grains, and turf.
	fluazifop-P-butyl + fenoxaprop *(Fusion)*	0.166	8 oz	• No soil activity. Controls only grasses present when sprayed.
				• Treat actively growing grasses. See Table 2J.
	+	+	+	• Use 5 to 40 gal of water/A and 40 to 60 psi.
	crop oil concentrate	½-1%	½-1%	• *Fusion* can be tank mixed with *Basagran, Reflex, Blazer, Classic, Pinnacle,* and *Pursuit.* See Table 2K.
	OR	OR	OR	
	surfactant	¼-½%	¼-½%	• Avoid drift onto corn, small grains, and turf.
	clethodim *(Select)*	0.125	8 oz	• No soil activity. Controls only grasses present when sprayed.
	+	+	+	• Treat actively growing grasses. See Table 2J.
	crop oil concentrate	1 qt	1 qt	• Use 10 to 40 gal of water/A and 20 to 60 psi.
				• *Select* can be applied at 6 oz/A under favorable soil moisture and humidity and when some grass species are small. See label and Table 2J.
				• DO NOT cultivate for 7 days before or 7 days after treatment.
				• Avoid drift onto corn, small grains, or turf.
				• Allow 60 days between *Select* application and soybean harvest.
				• *Select* can be tank mixed with *Basagran, Blazer, Reflex, Cobra,* or *Classic.* See Table 2K.

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SOYBEANS — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual grasses	quizalofop-P-ethyl *(Assure II)*	0.044	7 oz	• No soil activity. Controls only grasses present when sprayed.
	+	+	+	• Treat actively growing grasses. See Table 2J.
	crop oil concentrate	1%	1%	• Use 10 to 40 gal of water/A and a minimum of 40 psi.
	OR	OR	OR	• 8 oz/A required for barnyardgrass and crabgrass control.
	surfactant	¼%	¼%	• DO NOT cultivate for 7 days before or 7 days after treatment.
				• Wait 1 day after *Assure II* application before applying *Basagran* or *Blazer*. Wait 7 days after *Basagran* or *Blazer* before applying *Assure II*.
				• Avoid drift onto corn, small grains, or turf.
				• Allow 80 days between *Assure II* application and soybean harvest.
				• *Assure II* 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 II* by 2 oz/A and reduce the surfactant rate to ⅛%. See Table 2K.
	fenoxaprop *(Option II)*	0.074	12 oz .79EC	• *Option II* is a **restricted use** pesticide.
	+	+	+	• No soil activity. Controls only grasses present when sprayed.
	crop oil concentrate	1 qt	1 qt	• Treat actively growing yellow foxtail, witchgrass, fall panicum, and barnyardgrass 3 to 6 in., and crabgrass 1 to 2 in. tall. See Table 2J.
				• *Option* can be reduced to 8 oz/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.
				• Do NOT cultivate for 4 days following application.
				• Apply a minimum of 90 days before soybean harvest.
				• *Option II* can be tank mixed with *Pursuit, Basagran* and/or *Blazer* for broad spectrum weed control. However *Option* should be increased to 16 oz/A with *Blazer* and 12 to 16 oz/A with *Basagran*. See *Option II* label.
Volunteer corn	fluazifop-P-butyl *(Fusilade 2000, Fusilade DX)*	0.094	12 oz of 2000 6 oz of DX	• Refer to above remarks on annual grass control.
				• Treat volunteer corn up to 24 in. See Table 2J.
	+	+	+	
	crop oil concentrate	1 qt	1 qt	
	sethoxydim *(Poast)*	0.19	16 oz	• Refer to remarks on annual grass control.
				• Treat volunteer corn up to 20 in. See Table 2J.
	OR	OR	OR	• *Poast* can be reduced to 12 oz/A or *Poast Plus* to 18 oz/A if volunteer corn is less than 12 in. tall.
	sethoxydim *(Poast Plus)*	0.19	24 oz	
	+	+	+	
	crop oil concentrate	1 qt	1 qt	
	OR	OR	OR	
	Dash	1 qt	1 qt	
	+	+	+	
	28% liquid nitrogen	1 gal	1 gal	
	OR	OR	OR	
	ammonium sulfate	2½ lb	2½ lb	
	clethodim *(Select)*	0.094	6 oz	• Refer to remarks on annual grass control.
				• Treat volunteer corn up to 18 in. See Table 2J.
	+	+	+	• Reduce rate to 4 oz/A on 4-12 in. corn.
	crop oil concentrate	1 qt	1 qt	

(Continued on next page)

SOYBEANS — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Volunteer corn	quizalofop-P-ethyl *(Assure II)*	0.031	5 oz	• Refer to remarks on annual grass control. • Treat volunteer corn up to 18 in. See Table 2J.
	+	+	+	
	crop oil concentrate	1%	1%	
	OR	OR	OR	
	surfactant	¼%	¼%	
	fluazifop-P-butyl + fenoxaprop *(Fusion)*	0.126	6 oz	• Refer to remarks on annual grass control. • Treat volunteer corn from 12-24 in. See Table 2J.
	+	+	+	
	crop oil concentrate	½-1%	½-1%	
	OR	OR	OR	
	surfactant	¼-½%	¼-½%	
	fenoxaprop *(Option II)*	0.05	8 oz	• *Option II* is a **restricted use** pesticide. • Refer to remarks on annual grass control. • Treat volunteer corn from 10 to 16 in. See Table 2J.
	+	+	+	
	crop oil concentrate	1 qt	1 qt	
Volunteer corn Weed escapes Perennials	glyphosate *(Roundup)*	Rate varies	See label	• Use with ropewick applicator, wipe-on applicator, or recirculating sprayer.
Quackgrass	quizalofop-P-ethyl *(Assure II)*	0.0625	10 oz	• Make application when quackgrass is 6 to 10 in. tall. See Table 2J. • Two applications may be needed for best quackgrass control. Make second application of 7 oz/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.
	+	+	+	
	crop oil concentrate	1%	1%	
	OR	OR	OR	
	surfactant	¼%	¼%	
	fluazifop-P-butyl *(Fusilade 2000, Fusilade DX)*	0.188	24 oz of 2000 12 oz of DX	• Make application when quackgrass is 6 to 10 in. tall. See Table 2J. • Two applications may be needed for best quackgrass control. Make a second application of 16 oz/A of *2000* or 8 oz/A of *DX* 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.
	+	+	+	
	crop oil concentrate	1 qt	1 qt	
	sethoxydim *(Poast)*	0.29 + 0.19	24 oz + 16 oz	• Make application when quackgrass is 6 to 8 in. tall. See Table 2J. • Two applications will be needed for best quackgrass control. Make the second application 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.
	OR	OR	OR	
	sethoxydim *(Poast Plus)*	0.29 + 0.19	36 oz + 24 oz	
	+	+	+	
	crop oil concentrate	1 qt + 1 qt	1 qt + 1 qt	
	OR	OR	OR	
	Dash	1 qt + 1 qt	1 qt + 1 qt	
	+	+	+	
	28% liquid nitrogen	1 gal + 1 gal	1 gal + 1 gal	
	OR	OR	OR	
	ammonium sulfate	2½lb + 2½lb	2½lb + 2½lb	
	fluazifop-P-butyl + fenoxaprop *(Fusion)*	0.25	12 oz	• Make application when quackgrass is 6 to 10 in. tall. See Table 2J. • Two applications may be needed for best quackgrass control. Make a second application of 8 oz/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.
	+	+	+	
	crop oil concentrate	1%	1%	

(Continued on next page)

SOYBEANS — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Quackgrass	clethodim *(Select)*	0.25	16 oz	• Make application when quackgrass is 6 to 8 in. tall. See Table 2J.
	+	+	+	• Two applications may be needed for best quackgrass control. Make a second application of 8 oz/A 14 to 21 days later when quackgrass has regrown. Cultivation may replace second application.
	crop oil concentrate	1 qt	1 qt	• Use 10 to 40 gal of water/A and 20 to 60 psi.

SOYBEANS — PREHARVEST APPLICATION

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses	glyphosate	¾-3	1-4 qt	• DO NOT apply to soybeans grown for seed.
Annual broadleaves	*(Roundup)*			• Apply up until 7 days before harvest.
Perennial Weeds	+	+	+	• Pods must NOT be green.
	Surfactant	½%	½%	• DO NOT graze or harvest the treated crop for livestock feed within 25 days of application.
				• Apply in 10-40 gal of water.
				• Apply 1 qt/A for annual weeds.
				• Apply rate needed for perennial weeds.

TABLE 2B — CHEMICAL WEED CONTROL IN NO-TILL SOYBEANS

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. 67) may be used in no-till soybeans and may be needed to provide adequate control. Fields should be scouted routinely (weekly) for weed escapes.

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
Annual broadleaves **Annual grasses**	metribuzin *(Lexone* or *Sencor)*	⅜	¾ pt 4L OR ½ lb 75% DF OR ½ lb *Sencor Solupak*	• Alachlor is a **restricted use** pesticide. • Applied preemergence. • Refer to herbicide labels for approved burndown herbicides. • Reduce metribuzin rate if soil pH is above 7.0. See label.
	+ alachlor *(Lasso, Arena, Micro-Tech* or *Partner)* OR metolachlor *(Dual, Dual II)* + Burndown (See Table 2C)	+ 2½ OR 2	+ 2½ qt OR 3.8 lb 65% DG OR 2 pt	• If soil pH is above 7.4, do not apply metribuzin. • See label for crop rotation restrictions. • Use 3 qt *Lasso* with heavy annual grass (especially fall panicum and crabgrass) infestations. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • May need follow-up treatment with a postemergence herbicide for weed escapes. See "Soybeans — Postemergence" for weeds controlled and use directions. • See Table 2E for prepackaged mixes.

(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
Annual broadleaves (except nightshade) **Annual grasses**	metribuzin *(Lexone* or *Sencor)*	⅜	¾ pt 4L OR ½ lb 75% DF OR ½ lb *Sencor Solupak*	• Preemergence following and up to 2 days after soybean planting. • Refer to herbicide labels for approved burndown herbicides. • DO NOT use on sands or soils with less than ½% organic matter. Do not use on loamy sands or sandy loams with less than 1% organic matter. • NOT RECOMMENDED ON LOAMY SAND OR SANDY LOAM SOILS. Brittleness of soybean stems at the soil line may occur. • Reduce metribuzin rate if soil pH is above 7.0 See label. • If soil pH is above 7.4, do not apply metribuzin. • See label for crop rotation restrictions. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • May need follow-up treatment with a postemergence herbicide for weed escapes. See "Soybeans — Postemergence" for weeds controlled and use directions.
	+ pendimethalin *(Prowl)* + Burndown (See Table 2C)	+ 1	+ 2.4 pt 3.3 EC	
Annual broadleaves **Annual grasses**	linuron *(Lorox* or *Linex)*	¾	¾ qt 4L OR 1½ lb 50% DF	• Alachlor is a **restricted use** pesticide. • Applied preemergence. • Refer to herbicide labels for approved burndown herbicides. • 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. • Plant soybeans at least 1¾ in. deep. • Use 3 qt *Lasso* with heavy annual grass (especially fall panicum and crabgrass) infestations. • May need follow-up treatment with a postemergence herbicide for weed escapes (see "Soybeans — Postemergence" for weeds controlled and use directions). • See Table 2E for prepackaged mixes.
	+ alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)* OR metolachlor *(Dual, Dual II)* + Burndown (See Table 2C)	+ 2½ OR 2	+ 2½ qt OR 3.8 lb 65% DG OR 2 pt	
	linuron *(Lorox* or *Linex)*	¾	¾ qt 4L OR 1½ lb 50% DF	• Preemergence following and up to 2 days after soybean planting. • Refer to herbicide labels for approved burndown herbicides. • DO NOT use on sands or soils with less than ½% organic matter. Do not use on loamy sands or sandy loams with less than 1% organic matter. • NOT RECOMMENDED ON LOAMY SAND OR SANDY LOAM SOILS. Brittleness of soybean stems at the soil line may occur. • If heavy rainfall occurs soon after application, injury to crop may result. • Plant soybeans at least 1¾ in. deep. • May need follow-up treatment with a postemergence herbicide for weed escapes (see "Soybeans — Postemergence" for weeds controlled and use directions).
	+ pendimethalin *(Prowl)* + Burndown (See Table 2C)	+ 1	+ 2.4 pt 3.3 EC	

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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 **Annual grasses**	metribuzin + chlorimuron ethyl *(Preview)* + alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)* OR metolachlor *(Dual, Dual II)* + Burndown (See Table 2C)	0.29 + 2½ OR 2	6 oz 75% DG + 2½ qt OR 3.8 lb 65% DG OR 2 pt	• Alachlor is a **restricted use** pesticide. • Applied preemergence. • Refer to herbicide labels for approved burndown herbicides. • SEE LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH IS GREATER THAN 6.8. Soil pH may be quite variable in a field. Soybean stunting and INJURY TO LABELLED ROTATION CROPS WILL OCCUR. • 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 5%. • 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 labelled rotation crops. • **Special precaution:** A special sprayer clean-out procedure is required for *Preview.* See label for specific instructions. • Use 3 qt *alachlor* with heavy annual grass (especially fall panicum and crabgrass) infestations. • May need follow-up treatment with a postemergence herbicide for weed escapes. See "Soybeans — Postemergence" section for weeds controlled and use directions. • Better control of velvetleaf, cocklebur, and jimsonweed than with metribuzin. • See Table 2E for prepackaged mixes.
	linuron + chlorimuron ethyl *(Lorox Plus)* + alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)* OR metolachlor *(Dual, Dual II)* + Burndown (See Table 2C)	0.53 + 2½ OR 2	14 oz 60% DG + 2½ qt OR 3.8 lb 65% DG OR 2 pt	• Alachlor is a **restricted use** pesticide. • Applied preemergence. • Refer to herbicide labels for approved burndown herbicides. • SEE LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH IS GREATER THAN 6.8. Soil pH may be quite variable in a field. Soybean stunting and INJURY TO LABELLED ROTATION CROPS WILL OCCUR. • 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 inches deep. • Use caution to avoid misapplication or spray overlap as carryover may occur to labelled rotation crops. • If heavy rainfall occurs soon after application, injury to crop may result. • **Special precaution:** A special sprayer clean-out procedure is required for *Lorox Plus.* See label for specific instructions. • Use 3 qt alachlor with heavy annual grass (especially fall panicum and crabgrass) infestations. • May need follow-up treatment with a postemergence herbicide for weed escapes. See "Soybeans — Postemergence" for weeds controlled and use directions. • Better control of velvetleaf, jimsonweed, and cocklebur than with linuron. • See Table 2E for prepackaged mixes.

(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 **Annual grasses**	flumetsulam + metolachlor *(Broadstrike + Dual)* Burndown (See Table 2C)	0.056 + 2.1	2¼ pt	• *Broadstrike* available in a prepackaged mix only. See Table 2E. • SEE LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH EXCEEDS 7.8. AS INCREASED CROP INJURY MAY OCCUR. • DO NOT USE IF ORGANIC MATTER IS >5% AND SOIL ph IS <5.9 AS POOR WEED CONTROL MAY RESULT. • DO NOT USE ON PEAT OR MUCK SOILS. • THIS PRODUCT HAS A GROUNDWATER ADVISORY STATEMENT. • Control of only light to moderate common ragweed, cocklebur and jimsonweed infestations. Increase application rate to 2½ pt/A to improve control. See label. • Rotary hoe and cultivate if dry weather follows preemergence application.
	imazaquin *(Scepter)* + alachlor *(Lasso, Arena, Micro-Tech, or Partner)* OR metolachlor *(Dual, Dual II)* + Burndown (See Table 2C)	0.125 + 2½ OR 2	⅔ pt 1.5 L OR 2.8 oz or 70% DG + 2½ qt OR 3.8 lb 65% DG OR 2 pt	• Alachlor is a **restricted use** pesticide. • Applied preemergence. • Refer to herbicide labels for approved burndown herbicides. • CORN CANNOT BE PLANTED THE YEAR FOLLOWING SCEPTER APPLICATION EXCEPT IN THE SOUTHERN TWO TIERS OF COUNTIES IN MICHIGAN AND IF 15 INCHES OF RAINFALL OCCURS AFTER APPLICATION. SEE LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • Imidazolinone Resistant (IR or IMR) and Imidazolinone Tolerant (IT) corn hybrids can be planted the year following *Scepter* application. • Use caution to avoid misapplication or spray overlap or carryover may occur to labelled rotation crops. • Soybean stunting (shortening of internodes) may occur on sandy soils. • May need follow-up treatment with a postemergence herbicide for weed escapes. See "Soybeans — Postemergence" for weeds controlled and use directions. • Good control of cocklebur and jimsonweed. Fair control of velvetleaf. • See Table 2E for prepackaged mixes.

(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 **Annual grasses**	imazethapyr *(Pursuit)* + alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)* OR metolachlor *(Dual, Dual II)* + Burndown (See Table 2C)	0.063 + 2½ OR 2	¼ pt 2L OR 1.4 oz 70% DG + 2½ qt OR 3.8 lb 65% DG OR 2 pt	• Alachlor is a **restricted use** pesticide. • Applied preemergence. • Refer to herbicide labels for approved burndown herbicides. • SEE *PURSUIT* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • Use caution to avoid misapplication or spray overlap or carryover may occur to labelled rotation crops. • May need follow-up treatment with a postemergence herbicide for weed escapes (see "Soybean — Post-emergence" section for weeds controlled and use directions). • Fair control of cocklebur, jimsonweed, and velvetleaf. Common ragweed may only be suppressed, and an additional preemergence herbicide such as metribuzin or a postemergence herbicide may be needed. • See Table 2E for prepackaged mixes.
	imazethapyr + pendimethalin *(Pursuit Plus)* + Burndown (See Table 2C)	0.063 + 1	¼ pt 2L + 2.4 pt 3.3 EC	• Label for premix *Pursuit Plus* only. • Preemergence following and up to 2 days after soybean planting. • Refer to herbicide labels for approved burndown herbicides. • DO NOT use on sands or soils with less than ½% organic matter. Do not use on loamy sands or sandy loams with less than 1% organic matter. • NOT RECOMMENDED ON LOAMY SAND OR SANDY LOAM SOILS. Brittleness of soybean stems at the soil line may occur. • SEE *PURSUIT* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • Use caution to avoid misapplication or spray overlap or carryover may occur to labelled rotation crops. • May need follow-up treatment with a postemergence herbicide for weed escapes (see "Soybean — Post-emergence" section for weeds controlled and use directions). • Fair control of cocklebur, jimsonweed, and velvetleaf. Common ragweed may only be suppressed, and an additional preemergence herbicide such as metribuzin or a postemergence herbicide may be needed.

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	2,4-D ester	0.5	1 pt	• Apply 10 to 14 days before planting.
Annual broadleaves	OR	OR	OR	• Delay planting at least 7 days following 2,4-D ester
Marestail	glyphosate *(Roundup)*	0.56	1½ pt	application at 1 pt/A. Do not apply 2,4-D amine before planting soybeans.
	+	+	+	• If marestail plants exceed 2 in., increase *Roundup* rate
	surfactant	½%	½%	to 1 qt/A.
				• Must be followed by a sequential application preemergence.
				• 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 is a **restricted use** pesticide.
Preemergence	*(Lexone or Sencor)*		OR	• Apply preemergence.
			½ lb 75% DF	• Refer to herbicide labels for approved burndown herbicides.
			OR	
			½ lb *Sencor Solupak*	• See remarks and limitations for each herbicide under "Soybeans — No-Till."
	OR	OR	OR	
	metribuzin + chlorimuron-ethyl *(Preview)*	0.29	6 oz 75% DG	
	OR	OR	OR	
	linuron *(Lorox or Linex)*	¾	¾ qt 4L	
			OR	
			1½ lb 50% DF	
	OR	OR	OR	
	linuron + chlorimuron-ethyl *(Lorox Plus)*	0.53	14 oz 60% DG	
	+	+	+	
	alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)*	2½	2½ qt	
			OR	
			3.8 lb 65% DG	
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	2	2 pt	
	+			
	Burndown (See Table 2C)			

(Continued on next page)

SOYBEANS — NO-TILL — MARESTAIL (HORSEWEED) CONTROL (continued)

(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 is a **restricted use** pesticide.
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.
			OR	• Must be followed by a sequential application preemergence.
			⅜ lb *Sencor Solupak*	
	+	+	+	
	alachlor	1½	1½ qt	
	(Lasso, Arena, Micro-Tech, or *Partner)*		OR 2.3 lb 65% DG	
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	1½	1½ pt	
FOLLOWED BY:	metribuzin	⅛	¼ pt 4L	• Apply preemergence.
Preemergence	*(Lexone or Sencor)*		OR	• Refer to herbicide labels for approved burndown herbicides.
			3/16 lb 75% DF	• See remarks and limitations for each herbicide under "Soybeans — No-Till."
			OR	
			3/16 lb *Sencor Solupak*	
	+	+	+	
	alachlor	1	1 qt	
	(Lasso, Arena, Micro-Tech, or *Partner)*		OR 1.5 lb 65% DG	
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	½	½ pt	
	+			
	Burndown (See Table 2C)			
Early preplant				• Alachlor is a **restricted use** pesticide.
	metribuzin + chlorimuron-ethyl *(Preview)*	0.19	4 oz 75% DG	• Apply 10 to 14 days before planting.
				• Apply before marestail plants exceed 3 in.
				• Must be followed by a sequential application preemergence.
	+	+	+	
	alachlor	1½	1½ qt	
	(Lasso, Arena, Micro-Tech, or *Partner)*		OR 2.3 lb 65% DG	
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	1½	1½ pt	
FOLLOWED BY:	metribuzin + chlorimuron-ethyl *(Preview)*	0.1	2 oz 75% DG	• Apply preemergence.
Preemergence				• Refer to herbicide labels for approved burndown herbicides.
	+	+	+	• See remarks and limitations for each herbicide under "Soybeans — No-Till."
	alachlor	1	1 qt	
	(Lasso, Arena, Micro-Tech, or *Partner)*		OR 1.5 lb 65% DG	
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	½	½ pt	
	+			
	Burndown (See Table 2C)			

(Continued on next page)

SOYBEANS — NO-TILL — MARESTAIL (HORSEWEED) CONTROL (continued)

(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)*	0.35	9 oz 60% DG	• Alachlor is a **restricted use** pesticide. • Apply 10 to 14 days before planting. • Apply before marestail exceed 3 in. • Must be followed by sequential application preemergence.
	+	+	+	
	alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)*	1½	1½ qt OR 2.3 lb 65% DG	
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	1½	1½ pt	
FOLLOWED BY: ***Preemergence***	linuron + chlorimuron-ethyl *(Lorox Plus)*	0.17	5 oz 60% DG	• Apply preemergence. • Refer to herbicide labels for approved burndown herbicides. • See remarks and limitations for each herbicide under "Soybeans — No-Till."
	+	+	+	
	alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)*	1	1 qt OR 1.5 lb 65% DG	
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	½	½ pt	
	+			
	Burndown (See Table 2C)			
Preemergence	metribuzin *(Lexone* or *Sencor)*	⅜	¾ pt 4L OR ½ lb 75% DF OR ½ lb *Sencor Solupak*	• Alachlor is a **restricted use** pesticide. • Apply preemergence. • Apply before marestail plants exceed 3 in. • *Roundup* rate must be at least 2 pt/A for effective control of marestail.
	OR	OR	OR	• 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."
	metribuzin + chlorimuron-ethyl *(Preview)*	0.29	6 oz 75% DG	
	OR	OR	OR	
	linuron + chlorimuron-ethyl *(Lorox Plus)*	0.53	14 oz 60% DG	
	+	+	+	
	alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)*	2½	2½ qt OR 3.8 lb 65% DG	
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	2	2 pt	
	+	+	+	
	glyphosate *(Roundup)*	¾	2 pt	

TABLE 2C. EFFECTIVENESS OF BURNDOWN HERBICIDES IN SOYBEANS*,**

	ANNUAL BROADLEAVES									ANNUAL GRASSES								WINTER ANNUALS					COVER CROPS			
	Cocklebur	Jimsonweed	Lambsquarters	Nightshade	Pigweed	Ragweed	Smartweed	Velvetleaf	Wild Mustard	Barnyardgrass	Crabgrass	Giant Foxtail	Green Foxtail	Yellow Foxtail	Fall Panicum	Witchgrass	Wild Proso Millet	Chickweed (common)	Yellow Rocket	Shepards' purse	Pennycress	Marestail (Horseweed)	Rye	Wheat	Clover	Hairy Vetch
	Maximum Weed Height (inches)																	Herbicide Effectiveness								
Lexone/Sencor (¾ pt/A)[ab]	2	2	2	NR	2	2	2	2	2	–	–	–	–	–	–	–	–	G	–	–	–	F	P	P	P	P
Lorox (¾ qt/A)[ab]	NR	NR	2	–	2	2	2	2	2	–	–	–	–	–	–	–	–	G	–	–	–	P	P	P	P	P
Preview (6 oz/A)[ab]	2	2	2	–	2	2	2	2	2	–	–	–	–	–	–	–	–	G	G	G	G	F	P	P	P	P
Lorox Plus (14 oz/A)[ab]	2	2	2	–	2	2	2	2	2	–	–	–	–	–	–	–	–	G	G	G	G	F	P	P	P	P
Pursuit (¼ pt/A)[ac]	8	3	NR	2	6	2	3	2	3	3	3	6	3	3	NR	NR	NR	F	–	–	–	P	P	P	P	P
2,4-D Ester (1 pt/A)[d]	3	NR	3	3	3	3	NR	2	3	NR	NR	NR	NR	NR	NR	NR	NR	P	F	G	F	E	N	N	F	F
2,4-D Ester (1 qt/A)[d]	6	3	6	6	6	6	3	5	6	NR	NR	NR	NR	NR	NR	NR	NR	F	G	E	G	E	N	N	G	G
Roundup (1 pt/A)[e]	5	2	2	2	5	2	NR	NR	5	NR	–	5	5	5	–	–	–	E	G	E	G	G	G	G	P	P
Roundup (1 qt/A)[e]	16	10	10	10	16	10	5	5	16	5	–	16	16	16	–	–	–	E	E	E	E	E	E	E	F	F
Gramoxone Extra (1½ pt/A)[f]	3	3	3	3	3	3	NR	3	3	3	3	3	3	3	3	3	3	E	G	G	G	P	F	F	P	P
Gramoxone Extra (2½ pt/A)[f]	6	6	6	6	6	6	NR	6	6	6	6	6	6	6	6	6	6	E	E	E	E	P	G	G	F	F

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

*Burndown effectiveness varies depending on several factors. This table is intended as a guide to relative effectiveness of burndown herbicide options. This table assumes tank mix application with residual herbicides.

**To avoid excessive cover crop growth, Gramoxone Extra or Roundup may be applied prior to planting.

a. Burndown effectiveness of these herbicides is highly dependent on environment. Maximum effectiveness will occur under high temperature, high humidity conditions. Under cool, cloudy conditions burndown effectiveness will be inadequate.

b. Always add crop oil concentrate at 1 qt/A to maximize foliar activity.

c. Always add either 28% liquid nitrogen at 1 qt/A or ammonium sulfate at 2.5 lb/A PLUS surfactant at 1/4% to maximize foliar activity.

d. Delay planting at least 7 and 30 days following 2,4-D ester application at 1 pt/A and 1 qt/A, respectively. Do not apply 2,4-D amine before planting soybeans. Refer to 2,4-D label for approval for preplant application in soybeans.

e. Always add surfactant (2 qt/100 gal of water) with *Roundup*. Addition of ammonium sulfate at 17 lbs/100 gal of water often improves control.

f. Always add surfactant (1/2 pt/100 gal of water) with *Gramoxone Extra*. Regrowth of rye or wheat may occur if plants are not fully tillered when treated.

TABLE 2D — SPECIAL WEED PROBLEMS IN SOYBEANS

SPECIAL WEED PROBLEMS IN SOYBEANS — VELVETLEAF

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Preplant incorporated				
Velvetleaf	clomazone *(Command)*	¾	1½ pt 4EC	• SEE *COMMAND* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • Do not apply to very moist soils. Preplant incorporate immediately on moist soils and within 8 hr on dry 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. • 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.
	+	+	+	
	metribuzin *(Lexone* or *Sencor)*	¼	½ pt 4L OR ⅓ lb 75% DF OR ⅓ lb *Sencor Solupak*	
	clomazone *(Command)*	¾	1½ pt 4EC	• SEE BOTH *COMMAND* AND *PREVIEW* LABELS OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH IS GREATER THAN 6.8. Soil pH may be quite variable in a field. 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%. • 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.
	+	+	+	
	metribuzin + chlorimuron-ethyl *(Preview)*	0.29	6 oz 75% DG	

(Continued on next page)

SPECIAL WEED PROBLEMS IN SOYBEANS — VELVETLEAF (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Preplant incorporated				
Velvetleaf	clomazone *(Command)*	¾	1½ pt 4EC	• CORN CANNOT BE PLANTED THE YEAR FOLLOWING *SCEPTER* APPLICATION EXCEPT IN THE SOUTHERN TWO TIERS OF COUNTIES IN MICHIGAN AND IF 15" OF RAIN FALLS AFTER APPLICATION. SEE BOTH *COMMAND* AND *SCEPTER* LABELS OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • Imidazolinone resistant (IR or IMR) and imidazolinone tolerant (IT) corn hybrids can be planted the year following *Scepter* application. • 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. • 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 2.8 oz 70% DG	
	clomazone *(Command)*	0.75	1½ pt 4EC	• Alachlor is a **restricted** pesticide. • SEE *COMMAND* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • Do not apply to very moist soils. Preplant incorporate immediately on moist soils and within 8 hr on dry 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, Micro-tech,* or *Partner)*	2	2 qt OR 3 lb 65% DG	
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	2	2 pt	

(Continued on next page)

SPECIAL WEED PROBLEMS IN SOYBEANS — 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.
	OR	OR	OR	• SEE *COMMAND* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS.
	pendimethalin *(Prowl)*	1	2.4 pt 3.3 EC	• This application rate of *Command* controls only velvetleaf. Other weed control relies on metribuzin plus the third herbicide.
	OR	OR	OR	
	ethalfluralin *(Sonalan)*	0.9	2½ pt	• Do not apply to very moist soils. Preplant incorporate immediately on moist soils and within 8 hr on dry soils.
	OR	OR	OR	• Use a drift additive to avoid spray drift.
	alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)*	2	2 qt OR 3 lb 65% DG	• 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.
	OR	OR	OR	• DO NOT use on soils with less than ½% organic matter, or on sands or loamy sands with less than 1% organic matter.
	metolachlor *(Dual, Dual II)*	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.
	+	+	+	• 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 OR ½ lb *Sencor Solupak*	• 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.
	clomazone *(Command)*	⅜	¾ pt	• See Table 2E for prepackaged herbicide mixes.

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SPECIAL WEED PROBLEMS IN SOYBEANS — VELVETLEAF (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Preplant incorporated followed by preemergence				
Velvetleaf	trifluralin *(Treflan)*	¾	1½ pt	• Alachlor is a **restricted use** pesticide. • SEE *COMMAND* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • 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	2.4 pt 3.3 EC	
	OR	OR	OR	
	ethalfluralin *(Sonalan)*	0.9	2½ pt	
	OR	OR	OR	
	alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)*	2	2 qt OR 3 lb 65% DG	
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	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 OR 0.4 lb *Sencor Solupak*	
FOLLOWED BY: ***Preemergence***	metribuzin *(Lexone* or *Sencor)*	0.15	0.3 pt 4L OR 0.2 lb 75% DF OR 0.2 lb *Sencor Solupak*	
Preemergence				
Velvetleaf	alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)*	2	2 qt OR 3 lb 65% DG	• Alachlor is a **restricted use** pesticide. • SEE *PREVIEW* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH IS GREATER THAN 6.8. Soil pH may be quite variable in a field. Soybean stunting and INJURY TO ROTATION CROPS WILL OCCUR. • More effective when preplant incorporated. • Good to excellent velvetleaf control. • 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%. • 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.
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	2	2 pt	
	+	+	+	
	metribuzin + chlorimuron-ethyl *(Preview)*	0.29	6 oz 75% DG	

(Continued on next page)

SPECIAL WEED PROBLEMS IN SOYBEANS — VELVETLEAF (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Preemergence				
Velvetleaf	alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)*	2	2 qt OR 3 lb 65% DG	• Alachlor is a **restricted use** pesticide. • SEE *LOROX PLUS* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT use IF SOIL pH IS GREATER THAN 6.8. Soil pH may be quite variable in a field. Soybean stunting and INJURY TO ROTATION CROPS WILL OCCUR. • Use for velvetleaf control when organic matter is less than 3% and a preemergence treatment is desired. • Good velvetleaf control. • 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.
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	2	2 pt	
	+	+	+	
	linuron + chlorimuron-ethyl *(Lorox Plus)*	0.53	14 oz 60% DG	
Postemergence				
Velvetleaf	bentazon *(Basagran)*	1	2 pt	• For velvetleaf control up to 6 in. (4- to 6-leaf). See Table 2G. • Crop oil concentrate at 1 qt/A can be applied in addition to the 28% liquid nitrogen with some increased risk of crop injury. See Table 2H. • 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. • Use a minimum of 40 psi and 20 gal of water/A. Do not use flood nozzles. • DO NOT APPLY 28% liquid nitrogen (urea ammonium nitrate) without crop oil concentrate if lambsquarters and/or common ragweed are also target weeds.
	+	+	+	
	28% liquid nitrogen	1 gal	1 gal	
	bentazon + acifluorfen *(Galaxy)*	0.92	2 pt	• For velvetleaf up to 5 in. (4- to 6-leaf). See Table 2G. • Replace 28% liquid nitrogen OR ammonium sulfate with 1 qt/A crop oil concentrate if common ragweed or lambsquarters are present. • Apply in a minimum of 20 gal of water/A at a minimum of 40 psi.
	+	+	+	
	28% liquid nitrogen	½-1 gal	½-1 gal	
	OR	OR	OR	
	ammonium sulfate	2.5 lb	2.5 lb	
	chlorimuron-ethyl *(Classic)*	0.012	¾ oz 25% DF	• For velvetleaf control up to 6 in. (8-leaf). See Table 2G. • DO NOT APPLY *CLASSIC* AT ¾ OZ/A TO SOILS WITH A pH GREATER THAN 7.0. • SEE *CLASSIC* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT apply without both surfactant AND fertilizer or control will be reduced. See Table 2H. • 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. • Allow a minimum of 60 days between *Classic* application and soybean harvest.
	+	+	+	
	28% liquid nitrogen	1 gal	1 gal	
	OR	OR	OR	
	10-34-0	2 qt	2 qt	
	+	+	+	
	surfactant	¼%	¼%	

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SPECIAL WEED PROBLEMS IN SOYBEANS — 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). See Table 2G.
	+	+	+	• No soil pH or crop rotation restrictions
	28% liquid nitrogen	4%	4%	• DO NOT apply without both surfactant AND fertilizer or control will be reduced. See Table 2H.
	+	+	+	• 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	⅛%	⅛%	• Apply after the first trifoliate leaf of soybeans has fully expanded.
				• Allow a minimum of 60 days between *Pinnacle* application and soybean harvest.
				• **Special precaution:** A special sprayer clean-out procedure is required. See label.
	imazethapyr *(Pursuit)*	0.063	¼ pt 2L	• For velvetleaf control up to 2 in. (4-leaf). See Table 2G.
	+	+	+	• SEE *PURSUIT* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS.
	28% liquid nitrogen	1 qt	1 qt	• DO NOT apply without both surfactant AND fertilizer or control will be reduced. See Table 2H.
	OR	OR	OR	• Apply at a minimum of 20 psi and in 10 gal of water/A.
	ammonium sulfate	4 lb	4 lb	• Apply after the first trifoliate leaf of soybeans has fully expanded.
	+	+	+	• For maximum effectiveness cultivate 7-10 days following postemergence herbicide application.
	surfactant	¼%	¼%	• Allow a minimum of 85 days between *Pursuit* application and soybean harvest.

SPECIAL WEED PROBLEMS IN SOYBEANS — 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.
	OR	OR	OR	• CORN CANNOT BE PLANTED THE YEAR FOLLOWING *SCEPTER* SOIL-APPLIED AT ⅔ PT/A EXCEPT IN THE SOUTHERN TWO TIERS OF COUNTIES IN MICHIGAN AND IF 15" OF RAIN FALLS AFTER APPLICATION. SEE LABELS OR TABLE 11 FOR CROP ROTATION RESTRICTIONS.
	pendimethalin *(Prowl)*	1	2.4 pt 3.3 EC	
	OR	OR	OR	
	ethalfluralin *(Sonalan)*	0.9	2½ pt	• Imidazolinone resistant (IR or IMR) and imidazolinone tolerant (IT) corn hybrids can be planted the year following *Scepter* application.
	OR	OR	OR	
	alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)*	2	2 qt OR 3 lb 65% DG	• Use caution to avoid misapplication or spray overlap or carryover may occur to labeled rotation crops.
				• See Table 2E for prepackaged herbicide mixes.
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	2	2 pt	
	OR			
	clomazone *(Command)*	¾	1½ pt	
	+	+	+	
	imazaquin *(Scepter)*	0.125	⅔ pt OR 2.8 oz 70% DG	

(Continued on next page)

SPECIAL WEED PROBLEMS IN SOYBEANS — 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. • SEE LABELS OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH IS GREATER THAN 6.8. Soil pH may be quite variable in the field. 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%. • 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	2.4 pt 3.3 EC	
	OR	OR	OR	
	ethalfluralin *(Sonalan)*	0.9	2½ pt	
	OR	OR	OR	
	alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)*	2	2 qt OR 3 lb 65% DG	
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	2	2 pt	
	OR	OR	OR	
	clomazone *(Command)*	¾	1½ pt	
	+	+	+	
	metribuzin + chlorimuron-ethyl *(Preview)*	0.29	6 oz 75% DG	
	trifluralin *(Treflan)*	¾	1½ pt	• Alachlor is a **restricted use** pesticide. • SEE *SCEPTER* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • 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. • See Table 2E for prepackaged herbicide mixes.
	OR	OR	OR	
	pendimethalin *(Prowl)*	1	2.4 pt 3.3 EC	
	OR	OR	OR	
	ethalfluralin *(Sonalan)*	0.9	2½ pt	
	OR	OR	OR	
	alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)*	2	2 qt OR 3 lb 65% DG	
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	2	2 pt	
	+	+	+	
	metribuzin *(Lexone* or *Sencor)*	⅜	¾ pt 4L OR ½ lb 75% DF OR ½ lb *Sencor Solupak*	
	+	+	+	
	imazaquin *(Scepter)*	0.063	⅓ pt OR 1.4 oz 70% DG	

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SPECIAL WEED PROBLEMS IN SOYBEANS — COCKLEBUR (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Preemergence **Cocklebur**	alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)*	2	2 qt OR 3 lb 65% DG	• Alachlor is a **restricted use** pesticide. • CORN CANNOT BE PLANTED THE YEAR FOLLOWING *SCEPTER* SOIL APPLIED AT ⅔ PT/A. SEE *SCEPTER* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • More effective when preplant incorporated. • Use caution to avoid misapplication or spray overlap as carryover may occur to labeled rotation crops.
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	2	2 pt	
	+	+	+	
	imazaquin *(Scepter)*	0.125	⅔ pt OR 2.8 oz 70% DG	
	alachlor *(Lasso, Arena, Micro-Tech,* or *Partner)*	2	2 qt OR 3 lb 65% DG	• Alachlor is a **restricted use** pesticide. • SEE *SCEPTER* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • More effective when preplant incorporated. • 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 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. • Some soybean varieties have low tolerance to metribuzin and should not be planted. Consult CES or agribusiness for a listing of these varieties. • See Table 2E for prepackaged herbicide mixes.
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	2	2 pt	
	+	+	+	
	metribuzin *(Lexone* or *Sencor)*	⅜	¾ pt 4L OR ½ lb 75% DF OR ½ lb *Sencor Solupak*	
	+	+	+	
	imazaquin *(Scepter)*	0.063	⅓ pt OR 1.4 oz 70% DG	
	alachlor *(Lasso, Arena, Micro-tech,* or *Partner)*	2	2 qt OR 3 lb 65% DG	• Alachlor is a **restricted use** pesticide. • SEE *PREVIEW* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • More effective when preplant incorporated. • DO NOT USE IF SOIL pH IS GREATER THAN 6.8. Soil pH may be quite variable in the field. Soybean stunting and INJURY TO 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 ½ to 5%. • 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.
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	2	2 pt	
	+	+	+	
	metribuzin + chlorimuron-ethyl *(Preview)*	0.29	6 oz 75% DG	

(Continued on next page)

SPECIAL WEED PROBLEMS IN SOYBEANS — COCKLEBUR (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Preemergence				
Cocklebur	alachlor *(Lasso, Arena, Micro-tech, or Partner)*	2	2 qt OR 3 lb 65% DG	• Alachlor is a **restricted use** pesticide. • SEE *LOROX PLUS* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT USE IF SOIL pH IS GREATER THAN 6.8. Soil pH may be quite variable in a field. Soybean stunting and INJURY TO ROTATION CROPS WILL OCCUR. • DO NOT use on sands. 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. • **Special precaution:** A special sprayer clean-out procedure is required for *Lorox Plus*. See label for specific instructions.
	OR	OR	OR	
	metolachlor *(Dual, Dual II)*	2	2 pt	
	+	+	+	
	linuron + chlorimuron-ethyl *(Lorox Plus)*	0.53	14 oz 60% DG	
Postemergence				
Cocklebur	bentazon *(Basagran)*	¾	1½ pt	• For cocklebur control up to 6 in. See Tables 2G and 2H. • Apply 2 pt/A for control up to 10 in. • Use a minimum of 20 gal of water/A and 40 psi. Do not use flood nozzles.
	+	+	+	
	crop oil concentrate	1 qt	1 qt	
	bentazon + acifluorfen *(Galaxy)*	0.92	2 pt	• For cocklebur control up to 6 in. See Tables 2G and 2H. • Use a minimum of 20 gal of water/A and a minimum of 40 psi. Do not use flood nozzles.
	+	+	+	
	crop oil concentrate	1 qt	1 qt	
	chlorimuron-ethyl *(Classic)*	.0078	½ oz 25% DF	• DO NOT APPLY TO SOILS WITH A pH GREATER THAN 7.0. • SEE *CLASSIC* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • For control of cocklebur up to 6 in. See Tables 2G and 2H. • Apply ¾ oz/A for control up to 12 in. • 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%	
	imazaquin *(Scepter)*	0.063	⅓ pt OR 0.09 lb 70% DG	• SEE *SCEPTER* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • For control of cocklebur up to 8 in. See Tables 2G and 2H. • ⅔ pt/A will control cocklebur of up to 12 in, but **crop rotation will be restricted.** • Use a minimum of 40 psi and 20 gal of water/A. Do not use flood nozzles.
	+	+	+	
	surfactant	¼%	¼%	
	OR	OR	OR	
	crop oil concentrate	1 qt	1 qt	
	imazethapyr *(Pursuit)*	0.063	¼ pt 2L	• SEE *PURSUIT* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • For cocklebur control up to 8 in. • DO NOT apply without both surfactant AND fertilizer or control will be reduced. See Tables 2G and 2H. • 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.
	+	+	+	
	28% liquid nitrogen	1 qt	1 qt	
	OR	OR	OR	
	ammonium sulfate	4 lb	4 lb	
	+	+	+	
	surfactant	¼%	¼%	

SPECIAL WEED PROBLEMS IN SOYBEANS — NUTSEDGE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Preplant incorporated				
Yellow Nutsedge	metolachlor *(Dual)*	2½	2½ pt	• Preplant incorporate to a depth of 2 to 3 in. • 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 11 FOR CROP ROTATION RESTRICTIONS FOR THESE HERBICIDES.
Postemergence				
Yellow 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. • 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%	• SEE *CLASSIC* LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. • DO NOT APPLY *CLASSIC* IF SOIL pH IS GREATER THAN 7.0. • Treat when nutsedge is 3 in. tall. Increase *Classic* rate to ¾ oz/A for 4 in. (6-leaf) nutsedge. • 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	alachlor *(Lasso, Arena)*	4	1 gal	• Alachlor is a **restricted use** pesticide.
FOLLOWED BY:				
Annual broadleaves	*Blazer, Basagran, Classic, Cobra, Galaxy, 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 67–74.

TABLE 2E — HERBICIDE PREMIXES IN SOYBEANS

TRADE NAME	COMPANY	FORMULATION	FORMULATION EQUIVALENTS*	TYPICAL USE RATE	=	EQUIVALENT RATES
Bronco	Monsanto	4L	2.6 qt Lasso + 1.4 qt Roundup	4 qt/Acre	=	2.6 qt Lasso + 1.4 qt Roundup
Broadstrike + Dual	DowElanco/Ciba	7.67	Broadstrike + 7.5 pt Dual	2¼ pt/Acre	=	0.056 lb ai of Broadstrike + 2.1 pt Dual
Broadstrike + Treflan	DowElanco	3.65	Broadstrike + 7 pt Treflan	2 pt/Acre	=	0.062 lb ai of Broadstrike + 1¾ pt Treflan
Commence	FMC/DowElanco	5.25	6 pt Treflan + 4.4 pt Command	2 pt/Acre	=	1½ pt Treflan + 1.1 pt Command
Fusion	ICI	2.66	16 pt Fusilade 2000 + 6.7 pt Option	½ pt/Acre	=	1 pt Fusilade 2000 + 0.4 pt Option II
Galaxy	BASF	3.67	6 pt Basagran + 2.6 pt Blazer	2 pt/Acre	=	1½ pt Basagran + ⅔ pt Blazer
Salute	Miles Inc.	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	4.8 pt Prowl 3.3EC + 1.75 pt Scepter	3 pt/Acre	=	1.8 pt Prowl 3.3EC + ⅔ pt Scepter
Passport	American Cyanamid	2.6	4 pt Treflan + 0.8 pt Pursuit	2½ pt/Acre	=	1½ pt Treflan + ¼ pt Pursuit
Pursuit Plus	American Cyanamid	3.0	6.7 pt Prowl 3.3EC + 0.8 pt Pursuit	2½ pt/Acre	=	2.1 pt Prowl 3.3EC + 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	Miles Inc.	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 2F—WEED RESPONSE TO HERBICIDES IN SOYBEANS*

	ANNUAL BROADLEAVES										ANNUAL GRASSES								PERENNIALS				
	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (BLACK)	PIGWEED (REDROOT)	RAGWEED (COMMON)	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																							
COMMAND	F	F	**G**	P	P	**G**	**G**	**E**	P	–	**G**	**E**	**E**	**E**	**G**	**G**	**G**	F	N	N	N	N	N
DUAL/DUAL II	N	N	P	F	**G**	P	P	N	P	–	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	**G**
LASSO/PARTNER/MICROTECH	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**	–	P	F	**G**	**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	**G**	P	P	F	P	–	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	N
PURSUIT	F	F	**G**	**E**	**E**	F	**G**	**G**	**E**	–	F	F	**G**	**G**	**G**	P	P	F	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
BROADSTRIKE + DUAL	F	F	**E**	**G**	**E**	F	–	**G**	**E**	–	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	F
BROADSTRIKE + TREFLAN	F	F	**E**	F	**E**	F	–	**G**	**E**	–	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	P
COMMAND + LEXONE/SENCOR	**G**	F	**E**	P	**E**	**G**	**E**	**E**	**E**	–	**G**	**E**	**E**	**E**	**G**	**G**	**G**	F	N	N	N	N	N
DUAL + LEXONE/SENCOR[a]	**G**	F	**E**	F	**E**	**G**	**E**	**G**	**E**	–	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	**G**
LASSO + LEXONE/SENCOR[a]	**G**	F	**E**	**G**	**E**	**G**	**E**	**G**	**E**	–	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	F
TREFLAN + LEXONE/SENCOR[a]	**G**	F	**E**	N	**E**	**G**	**E**	**G**	**E**	–	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	N
SONALAN + LEXONE/SENCOR[a]	**G**	F	**E**	F	**E**	**G**	**E**	**G**	**E**	–	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	N
PROWL + LEXONE/SENCOR[a]	**G**	F	**E**	P	**E**	**G**	**E**	**G**	**E**	–	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	N
DUAL + PREVIEW	**E**	**G**	**E**	F	**E**	**G**	**E**	**G**	**E**	–	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	**G**
LASSO + PREVIEW	**E**	**G**	**E**	**G**	**E**	**G**	**E**	**G**	**E**	–	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	F
TREFLAN + PREVIEW	**E**	**G**	**E**	P	**E**	**G**	**E**	**G**	**E**	–	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	F
SONALAN + PREVIEW	**E**	**G**	**E**	F	**E**	**G**	**E**	**G**	**E**	–	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	F
PROWL + PREVIEW	**E**	**G**	**E**	P	**E**	**G**	**E**	**G**	**E**	–	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	F
DUAL + SCEPTER	**E**	**G**	**G**	**G**	**E**	F	**G**	**G**	**G**	–	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	**G**
LASSO + SCEPTER	**E**	**G**	**G**	**G**	**E**	F	**G**	**G**	**G**	–	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	F
TREFLAN + SCEPTER	**E**	**G**	**G**	**G**	**E**	F	**G**	**G**	**G**	–	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	F
SONALAN + SCEPTER	**E**	**G**	**G**	**G**	**E**	F	**G**	**G**	**G**	–	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	F
PROWL + SCEPTER	**E**	**G**	**G**	**G**	**E**	F	**G**	**G**	**G**	–	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	F
DUAL + PURSUIT	F	F	**G**	**E**	**E**	F	**G**	**G**	**E**	–	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	P	P	N	N	**G**
LASSO + PURSUIT	F	F	**G**	**E**	**E**	F	**G**	**G**	**E**	–	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	P	P	N	N	F
TREFLAN + PURSUIT	F	F	**G**	**E**	**E**	F	**G**	**G**	**E**	–	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	P	P	N	N	F
SONALAN + PURSUIT	F	F	**G**	**E**	**E**	F	**G**	**G**	**E**	–	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	P	P	N	N	F
PROWL + PURSUIT	F	F	**G**	**E**	**E**	F	**G**	**G**	**E**	–	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	P	P	N	N	F
COMMAND + PREVIEW	**E**	**G**	**E**	P	**E**	**G**	**E**	**E**	**E**	–	**G**	**E**	**E**	**E**	**G**	**G**	**G**	F	N	N	N	N	F
COMMAND + LASSO	F	F	**G**	**G**	**G**	**G**	**G**	**E**	P	–	**G**	**E**	**E**	**E**	**G**	**G**	**G**	F	N	N	N	N	F
COMMAND + DUAL	F	F	**G**	F	**G**	**G**	**G**	**E**	P	–	**G**	**E**	**E**	**E**	**G**	**G**	**G**	F	N	N	N	N	**G**
COMMAND + SCEPTER	**E**	**G**	**G**	**G**	**E**	**G**	**G**	**E**	**G**	–	**G**	**E**	**E**	**E**	**G**	**G**	**G**	F	N	N	N	N	F

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

[a] Add 2 oz/A of Pursuit to improve black nightshade control.

*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 2F—WEED RESPONSE TO HERBICIDES IN SOYBEANS*

	ANNUAL BROADLEAVES										ANNUAL GRASSES								PERENNIALS				
	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (BLACK)	PIGWEED (REDROOT)	RAGWEED (COMMON)	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
Preemergence																							
DUAL/DUAL II	N	N	P	F	**G**	P	P	N	P	P	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	F
LASSO/PARTNER/MICROTECH	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**	P	F	**G**	**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	F	**G**	**E**	F	**G**	F	**G**	P	F	F	F	F	F	P	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
BROADSTRIKE + DUAL	F	F	**E**	**G**	**E**	F	—	**G**	**E**	—	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	**G**
DUAL + LOROX	P	P	**G**	F	**G**	**G**	**G**	F	**G**	P	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	F
LASSO + LOROX	P	P	**G**	**G**	**G**	**G**	**G**	F	**G**	P	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	P
PROWL + LOROX	P	P	**G**	F	**G**	**G**	**G**	F	**G**	P	**G**	**G**	**G**	**G**	**G**	**G**	**G**	F	N	N	N	N	N
DUAL + LEXONE/SENCOR[a]	F	F	**E**	F	**E**	**G**	**E**	**G**	**E**	**G**	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	F
LASSO + LEXONE/SENCOR[a]	F	F	**E**	**G**	**E**	**G**	**E**	**G**	**E**	**G**	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	P
PROWL + LEXONE/SENCOR[a]	F	F	**E**	P	**E**	**G**	**E**	**G**	**E**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	**G**	F	N	N	N	N	N
DUAL + SCEPTER	**G**	**G**	**G**	F	**E**	**G**	**G**	F	**G**	P	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	F
LASSO + SCEPTER	**G**	**G**	**G**	**G**	**E**	**G**	**G**	F	**G**	P	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	P
PROWL + SCEPTER	**G**	**G**	**G**	F	**E**	**G**	**G**	F	**G**	P	**G**	**G**	**G**	**G**	**G**	**G**	**G**	F	N	N	N	N	P
DUAL + PURSUIT	F	F	F	**G**	**E**	F	**G**	F	**G**	P	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	F
LASSO + PURSUIT	F	F	F	**G**	**E**	F	**G**	F	**G**	P	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	F
PURSUIT PLUS	F	F	**G**	**G**	**E**	F	**G**	F	**G**	P	**G**	**G**	**G**	**G**	**G**	**G**	**G**	F	N	N	N	N	F
DUAL + LOROX PLUS	**G**	**G**	**E**	F	**E**	**G**	**G**	**G**	**E**	**G**	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	F
LASSO + LOROX PLUS	**G**	**G**	**E**	**G**	**E**	**G**	**G**	**G**	**E**	**G**	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	F
DUAL + PREVIEW	**G**	**G**	**E**	F	**E**	**G**	**E**	**G**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	F
LASSO + PREVIEW	**G**	**G**	**E**	**G**	**E**	**G**	**E**	**G**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	F

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

[a] Add 2 oz/A of Pursuit to improve black nightshade control.

*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 2F—WEED RESPONSE TO HERBICIDES IN SOYBEANS*

	ANNUAL BROADLEAVES										ANNUAL GRASSES								PERENNIALS				
	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (BLACK)***	PIGWEED (REDROOT)	RAGWEED (COMMON)	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
Postemergence **																							
ASSURE II	N	N	N	N	N	N	N	N	N	N	**G**	**G**	**E**	**E**	**E**	**E**	**E**	**E**	N	N	N	**E**	N
FUSILADE 2000; DX	N	N	N	N	N	N	N	N	N	N	**E**	**G**	**E**	**E**	**E**	**E**	**E**	**E**	N	N	N	**G**	N
FUSION	N	N	N	N	N	N	N	N	N	N	**G**	**G**	**E**	**E**	**E**	**G**	**G**	**E**	N	N	N	**G**	N
OPTION II	N	N	N	N	N	N	N	N	N	N	**G**	F	**E**	**E**	**G**	**G**	**G**	**E**	N	N	N	P	N
POAST or POAST PLUS	N	N	N	N	N	N	N	N	N	N	**E**	**G**	**E**	**E**	**E**	**E**	**E**	**E**	N	N	N	F	N
SELECT	N	N	N	N	N	N	N	N	N	N	**E**	**G**	**E**	**E**	**E**	**G**	**G**	—	N	N	N	F	N
BASAGRAN	**E**	**G**	**G**	P	P	F	**E**	**G**	**E**	F	N	N	N	N	N	N	N	N	N	N	**G**	N	**G**
CLASSIC	**E**	**G**	N	N	**E**	**G**	**E**	**G**	**E**	F	N	N	P	P	P	N	N	N	N	N	F	N	**G**
PINNACLE	F	F	**G**	N	**E**	P	**E**	**G**	**E**	N	N	N	N	N	N	N	N	N	N	N	N	N	N
PURSUIT	**E**	F	P	**G**	**E**	F	**G**	**G**	**G**	P	F	F	**G**	**G**	**G**	F	F	P	P	P	P	N	F
BLAZER	F	**G**	P	**G**	**E**	**E**	**G**	P	**E**	P	N	N	P	P	P	P	N	N	P	P	P	N	N
REFLEX	P	F	P	F	**E**	**G**	P	P	**E**	P	P	P	F	F	F	P	P	N	P	P	P	N	N
COBRA	**G**	**G**	P	**G**	**E**	**E**	P	F	**E**	P	N	N	N	N	N	N	N	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
GALAXY	**E**	**G**	**G**	F	**G**	**G**	**E**	**G**	**E**	F	N	N	P	P	P	P	N	N	P	P	F	N	F
STORM	**G**	**G**	F	**G**	**E**	**E**	**G**	F	**E**	P	N	N	P	P	P	P	N	N	P	P	P	N	P
BASAGRAN + PINNACLE	**E**	**G**	**E**	P	**E**	P	**E**	**G**	**E**	F	N	N	N	N	N	N	N	N	N	N	F	N	F
BASAGRAN + PURSUIT	**E**	**G**	F	**G**	**E**	F	**E**	**G**	**E**	F	F	F	**G**	**G**	**G**	F	F	P	P	P	F	N	F
BASAGRAN + BLAZER	**E**	**G**	**G**	**G**	**E**	**G**	**E**	**G**	**E**	F	N	N	P	P	P	P	N	N	P	P	F	N	F
BASAGRAN + REFLEX	**E**	**G**	**G**	F	**E**	**G**	**E**	**G**	**E**	F	P	P	F	F	F	P	P	N	P	P	F	N	F
BASAGRAN + COBRA	**E**	**G**	**G**	**G**	**E**	**G**	**E**	**G**	**E**	F	N	N	N	N	N	N	N	N	P	P	F	N	F
BASAGRAN + SCEPTER	**E**	**G**	**G**	P	**E**	F	**E**	**G**	**E**	F	N	N	F	F	F	N	N	N	N	N	F	N	F
CLASSIC + PINNACLE	**E**	**G**	**G**	N	**E**	F	**E**	**G**	**E**	F	N	N	N	N	N	N	N	N	N	N	N	N	F
CLASSIC + BLAZER	**E**	**G**	P	**G**	**E**	**E**	**E**	**G**	**E**	F	N	N	P	P	P	P	N	N	P	P	P	N	F
CLASSIC + REFLEX	**E**	**G**	P	F	**E**	**G**	**E**	**G**	**E**	F	P	P	P	P	P	P	P	N	P	P	P	N	F
CLASSIC + COBRA	**E**	**G**	P	**G**	**E**	**G**	**E**	**G**	**E**	F	N	N	N	N	N	N	N	N	P	P	P	N	F
CLASSIC + GALAXY	**E**	**G**	F	F	**E**	**G**	**E**	**G**	**E**	F	N	N	P	P	P	P	N	N	P	P	F	N	**G**
PINNACLE + BLAZER	F	**G**	**G**	**G**	**E**	**G**	**E**	**G**	**E**	P	N	N	P	P	P	P	N	N	P	P	P	N	N
PINNACLE + COBRA	F	F	**G**	**G**	**E**	**G**	**E**	**G**	**E**	P	N	N	N	N	N	N	N	N	P	P	P	N	N
PINNACLE + REFLEX	F	F	**G**	F	**E**	**G**	**E**	**G**	**E**	N	P	P	F	F	F	P	P	N	P	P	P	N	N
PINNACLE + GALAXY	**E**	**G**	**E**	F	**E**	**G**	**E**	**G**	**E**	F	N	N	P	P	P	N	N	N	P	P	F	N	F
PURSUIT + BLAZER	**E**	**G**	P	**G**	**E**	**G**	**G**	**G**	**E**	P	F	F	F	F	F	F	F	P	P	P	P	N	F
PURSUIT + REFLEX	**E**	F	P	**G**	**E**	**G**	**G**	**G**	**G**	P	F	F	F	F	F	F	F	P	P	P	P	N	F
PURSUIT + COBRA	**E**	F	P	**G**	**E**	**G**	**G**	**G**	**G**	P	F	F	F	F	F	F	F	P	P	P	P	N	F
PURSUIT + GALAXY	**E**	**G**	**G**	**G**	**E**	**G**	**E**	**G**	**E**	F	F	F	F	F	F	F	F	P	P	P	F	N	F
PURSUIT + PINNACLE	**E**	F	**G**	**G**	**E**	F	**E**	**G**	**E**	P	F	F	**G**	**G**	**G**	F	F	P	P	P	P	N	F
SCEPTER + BLAZER	**E**	**G**	P	**G**	**E**	**E**	**G**	P	**E**	P	P	P	F	F	F	P	P	N	P	P	P	N	N
SCEPTER + REFLEX	**E**	F	P	F	**E**	**G**	P	P	**E**	P	P	P	F	F	F	P	P	N	P	P	P	N	N
SCEPTER + COBRA	**E**	**G**	P	**G**	**E**	**E**	P	F	**E**	P	N	N	F	F	F	N	N	N	P	P	P	N	N
STORM + CLASSIC	**E**	**G**	F	**G**	**E**	**E**	**E**	**G**	**E**	F	N	N	P	P	P	P	N	N	P	P	F	N	**G**

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.

**** Weed response to postemergence broadleaf herbicide combinations may vary due to a change in application rate, a change in spray additive, or herbicide antagonism. See Table 2H for the proper additive(s) and see labels for proper herbicide rates. Rates may vary dependent on weed species, weed size, and tank mix.**

*** If application rates are reduced, control of **black nightshade** is Good with 2 oz/A of Pursuit, Fair with 6 oz/A of Cobra and Poor with ½ pt/A of Blazer.

TABLE 2G — MAXIMUM BROADLEAF WEED HEIGHTS FOR POSTEMERGENCE CONTROL IN SOYBEANS*

Herbicide	RATE/A	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (BLACK)**	PIGWEED (REDROOT)	RAGWEED (COMMON)	SMARTWEED	VELVETLEAF	WILD MUSTARD (DIAMETER OF ROSETTE)	HORSEWEED (MARESTAIL)
		WEED HEIGHT[a] (Inches)									
Basagran	2 pt	10[e]	10	2	NO	NO	3	10	6[b,e]	8	6
Blazer	1.5 pt	2	6	<1	2	4	3	6	NO	4	4
Classic	3/4 oz	12	6	NO	NO	4	4	4	6[c]	6	6
Cobra	12.5 oz	6	4	NO	2	4	4	SUP	2	4	4
Galaxy	2 pt	6	6	2	<2	2	3	6	5	4	5
Pinnacle	1/4 oz	SUP	SUP	4	NO	12	NO	6	6[d]	4	NO
Pursuit	1/4 pt	8	3	<1	2	6	2	3	2	3	NO
Reflex	1 pt	NO	4	SUP	2	2	3	4	NO	4	NO
Scepter	1/3 pt	8	NO	NO	NO	4	NO	NO	NO	NO	NO
Storm	1½ pt	6	6	INC	2	2	3	6	INC	4	NO

[a] NO = no control; SUP = suppression only; INC = inconsistent

[b] Add 1 gal/A of 28% liquid ammonium nitrate for velvetleaf control with Basagran.

[c] Add 28% liquid urea ammonium nitrate (UAN) to Classic + nonionic surfactant for velvetleaf control.

[d] Add 28% liquid urea ammonium nitrate (UAN) to Pinnacle + nonionic surfactant for velvetleaf control.

[e] Cocklebur up to 24 in. and velvetleaf up to 12 in. can be suppressed by 3 pt/A *Basagran* or 1.5 pt/A applied twice.

***The weed heights listed in this table are estimates of the maximum size where consistent control is expected. The maximum height for effective control in any specific situation is dependent on environment conditions including soil moisture, temperature, and relative humidity.**

If application rates are reduced control of **black nightshade is Good with 2 oz/A of Pursuit, Fair with 6 oz/A of Cobra and Poor with ½ pt/A of Blazer.

TABLE 2H — SUGGESTED ADDITIVES FOR POSTEMERGENCE HERBICIDE APPLICATION IN SOYBEANS*

Herbicide	Crop Oil Concentrate (COC)	OR	Nonionic Surfactant (NIS)	AND/OR	28% N or AMS or 10-34-0[a]
Assure II	1% (2% if drought stress)		1/4%		No
Fusilade 2000; DX	1/2–1%		1/4–1/2%		28% N at 1 gal/A may be added
Fusion	1/2–1%		1/4–1/2%		28% N at 4% may be added.
Option II	1 qt/A		No		No
Poast[b] or Poast Plus	1 qt/A (or DASH 1 qt/A)		No		28% N at 1/2–1 gal/A or AMS at 2.5 lb/A + COC or DASH
Select	1 qt/A		No		No
Basagran[c]	1 qt/A		No		28% N at 1 gal/A + COC
Blazer[d]	No		1/8%		Replace NIS w/2-4 qt/A of 28% N
Classic[e]	1% if hot, dry only		1/4%		28% N at 1 gal/A or 10-34-0 at 1 qt/A + NIS
Cobra[f]	1/2–2 pt/A		1/4% if high RH		28% N at 1 gal/A or AMS at 2.5 lb/A + NIS or COC
Galaxy[g]	2 pt/A		No		28% N at 1/2–1 gal/A OR AMS at 2.5 lb/A INSTEAD OF COC
Pinnacle[h]	1/2% if hot, dry only		1/8%		28% N at 2–4 qt/A + NIS
Pursuit[i]	1.5 pt if hot, dry only		1/4%		Always add 28% N or 10-34-0 at 1-2 qt/A or AMS at 2.5 lb/A
Reflex	1/2–1%		1/4–1/2%		28% N at 1 gal/A or 10-34-0 at 1 qt/A may be added
Scepter	1 qt/A		1/4%		No
Storm	1-2 pt/A		1/4%		28% N at 1/2-1 gal/A instead of COC or NIS

* **⅛% = 1 pt in 100 gal of spray solution; ¼% = 1 qt in 100 gal; 1% = 1 gal in 100 gal; 4% = 4 gal in 100 gal**

[a] 28% N = 28% urea ammonium nitrate; AMS = ammonium sulfate; 10-34-0 = diammonium phosphate

[b] AMS improves control of large crabgrass, quackgrass, and volunteer corn and cereals

[c] 28% N *may* be added for improved velvetleaf control. Leave COC in for consistent common ragweed and lambsquarters control. DASH at 1 qt/A may be applied instead of 1 qt/A of COC.

[d] Increase NIS to 1/4% for lambsquarters.

[e] 28% N or 10-34-0 *must* be added for velvetleaf control.

[f] RH = relative humidity. See Table 1s on the Cobra label for adjuvant recommendations based on relative humidity.

[g] Replace COC with 28% N or AMS for velvetleaf control when common ragweed and lambsquarters are not target weeds.

[h] 28% N *must* be added for velvetleaf control. *Only* under hot, dry conditions should NIS be increased to 1/4% or NIS replaced by COC at 1/2%.

[i] MSU does *not* recommend use of Sun-it II at 1 qt/A or COC at 1.5 pt/A with Pursuit instead of NIS *except* under hot, dry conditions.

TABLE 2I — LABELED TANKMIXES AND REQUIRED ADDITIVES FOR POSTEMERGENCE BROADLEAF WEED CONTROL IN SOYBEANS*

Find the box where additive information is printed by finding one herbicide in the names printed across the top of the chart, and then the second herbicide on the vertical side of the chart.

	BASAGRAN	CLASSIC	PINNACLE	PURSUIT	BLAZER	REFLEX	COBRA	SCEPTER	GALAXY[g]	STORM
Basagran		NL	1/8% NIS[a,b]	1/4% NIS + 1 qt UAN	1 pt COC[c]	1 qt COC	1 pt COC[d]	1 qt COC	NL	NL
Classic			1/8% NIS[b]	NL	1/4% NIS	1/4% NIS	1/4% NIS[e]	NL	1/4% NIS + 2 qt UAN	1/4% NIS + 2 qt UAN
Pinnacle				1/4% NIS[h] + 1 qt UAN	1/8% NIS[e]	1/4% NIS[h] + 1 qt UAN	1/8% NIS[e]	NL	1/8% NIS + 2 qt UAN	NL
Pursuit					1/4% NIS[f] + 1 qt UAN	1/4% NIS[f] + 1 qt UAN	1/4% NIS[f] + 1 qt UAN	NL	1/4% NIS + 1 qt UAN	NL
Blazer						NL	NL	1/4% NIS	NL	NL
Reflex							NL	1/2% NIS OR 1% COC	NL	NL
Cobra								1/8% NIS	NL	NL
Scepter									NL	NL
Galaxy[g]										NL
Storm										

* **NL-not labeled;** NIS-nonionic surfactant; COC-crop oil concentrate; UAN-28% urea ammonium nitrate; AMS-ammonium sulfate; 1/8% = 1 pt in 100 gal of spray solution; 1/4% = 1 qt in 100 gal. DASH is NOT RECOMMENDED with ANY TANKMIXES.

[a] Increase NIS to 1/4% OR use COC at 1/2% if dry conditions exist.

[b] Add UAN at 2-4 qt/A, 10-34-0 at 1-2 qt/A, or 2-4 lb/A of AMS IN ADDITION TO NIS for velvetleaf control.

[c] Blazer applied at 1 pt/A. Substitute UAN for COC only if velvetleaf is the target weed and lambsquarters and common ragweed are not.

[d] Cobra applied at 6 to 8 oz/A.

[e] Add 4 qt/A of UAN for velvetleaf control. Crop injury will increase.

[f] Tank mix either Blazer at 1 pt/A, Reflex at 1 pt/A, or Cobra at 1/4 pt/A with Pursuit for common ragweed control.

[g] Galaxy is a prepackaged mix of Basagran + Blazer. 2 pt/A of Galaxy = 1 1/2 pt/A of Basagran and 2/3 pt/A of Blazer.

[h] Reduce Pinnacle to 1/8 oz/A to avoid crop injury.

TABLE 2J — APPLICATION RATES OF POSTEMERGENCE GRASS HERBICIDES FOR CONTROL OF ANNUAL GRASS SPECIES AT VARIOUS HEIGHTS*

	Poast	Poast Plus	Select	Assure II	Fusilade[a] 2000	Fusion[ab]	Option II
				oz/A			
Barnyardgrass							
1–2″	12	18	–	–	20	–	–
2–3″	12	18	6	8	24	8	–
3–4″	12	18	6	8	–	8	12
4–6″	16	24	8	8	–	–	12
6–8″	16	24	–	–	–	–	–
Crabgrass							
<1″	–	–	–	–	20	–	–
1–2″	16	24	6	8	24	8	12
2–6″	16	24	8	8	–	–	–
Giant Foxtail							
1–2″	12	18	–	–	20	–	–
2–4″	12	18	6	7	24	8	8
4–6″	16	24	6	7	24	8	8
6–8″	16	24	8	7	–	8	–
8–12″	–	–	8	–	–	–	–
Green Foxtail							
1–2″	12	18	–	–	20	–	–
2–4″	12	18	6	7	24	8	8
4–6″	16	24	8	–	–	–	8
6–8″	16	24	–	–	–	–	–
Yellow Foxtail							
1–2″	16	24	–	–	20	–	–
2–4″	16	24	6	7	24	8	12
4–6″	16	24	8	–	–	–	12
6–8″	16	24	–	–	–	–	–
Fall Panicum							
1–2″	12	18	–	–	20	–	–
2–4″	12	18	6	7	24	8	12
4–6″	16	24	8	7	24	8	12
6–8″	16	24	–	–	–	–	–
Witchgrass							
1–2″	16	24	–	–	20	–	–
2–4″	16	24	6	7	24	8	12
4–6″	16	24	8	7	–	8	12
6–8″	16	24	–	–	–	–	–
V. Corn							
1–4″	12	18	–	–	–	–	–
4–6″	12	18	4	–	–	–	–
6–12″	12	18	4	5	–	–	–
12–18″	16	24	6	5	12	6	8
18–20″	16	24	–	–	12	6	8
20–24″	–	–	–	–	12	6	8
Quackgrass							
4–6″	–	–	16+8	–	–	–	–
6–8″	24+16	36+24	16+8	10+7	24+16	12+8	–
8–10″	–	–	–	10+7	24+16	12+8	–

[a] For Fusilade DX — apply ½ the oz/A listed for Fusilade 2000

[b] If grasses are small and not drought stressed, the *Fusion* rate can be reduced to 6 oz/A on barnyardgrass and all foxtails and 4 oz on volunteer corn

– Not labeled

TABLE 2K — LABELED TANK MIXES WITH POSTEMERGENCE GRASS HERBICIDES IN SOYBEANS*

	Poast	Poast Plus	Assure II	Fusilade 2000	Fusion	Select
Basagran	Y[1]	Y[2]	Y[3]	Y	Y	Y[6]
Classic	*	*	Y[3]	*	Y	Y[6]
Pinnacle	*	*	Y[3,8]	*	Y	*
Pursuit	*	Y[7]	Y[7]	Y[7]	Y[4]	Y[6]
Blazer	Y[1]	*	*	Y	Y	Y[6]
Reflex	*	*	*	Y	Y	Y[6]
Cobra	*	*	Y[5]	Y[5]	*	Y[6]
Scepter	*	*	*	*	*	*
Galaxy	*	*	*	*	Y	*
Storm	*	*	*	*	*	*
Basagran + Pinnacle	*	*	*	*	*	*
Basagran + Blazer	Y[1]	*	*	*	Y	*
Basagran + Reflex	*	*	*	Y	Y	*
Basagran + Cobra	*	*	*	*	*	*
Basagran + Scepter	*	*	*	*	*	*
Classic + Pinnacle	*	*	Y[3]	*	Y	*
Classic + Blazer	*	*	*	*	*	*
Classic + Reflex	*	*	*	*	Y	*
Reflex + Pinnacle	*	*	*	*	Y	*

If a decision is made to make a sequential application, i.e. two trips over the field, the basic rule is that a postemergence grass herbicide should be applied 1 day prior to postemergence broadleaf herbicide(s) application. If a broadleaf herbicide is applied first, delay the application of *Poast, Poast Plus, Assure II, Fusilade 2000, Fusion,* or *Select* until the grasses are actively growing again, which may be 7 days or more. Sequential applications require additional time and application costs.

Tankmixing saves time but is only labeled for some herbicides and for a limited number of grass species. Consult the pesticide labels for further information and always read and follow label directions.

Y Yes, can be tankmixed; * not labeled. No "grass" herbicides are labeled for tankmixing with: Classic + Cobra, Classic + Galaxy, Pinnacle + Blazer, Pinnacle + Cobra, Pinnacle + Galaxy, Pursuit + Blazer, Pursuit + Reflex, Pursuit + Cobra, Pursuit + Galaxy, Scepter + Blazer, Scepter + Reflex, and Scepter + Cobra.

[1] Apply *Poast* at 24 oz/A when tankmixing with *Basagran.* Do not tank mix if target grass is quackgrass. Do not tank mix with *Blazer* if target grass is volunteer corn.

[2] Apply *Poast Plus* at 36 oz/A when target grass is barnyard grass or yellow foxtail. Do not tank mix if target grass is quackgrass.

[3] Do not tank mix if target grass is barnyardgrass, yellow foxtail, or quackgrass.

[4] Tank mix only if volunteer corn or shattercane are target grass species.

[5] Tank mix on *Cobra* label only (not on *Assure II* or *Fusilade 2000*).

[6] Grass antagonism may occur.

[7] Tank mix on *Pursuit* label only. Grass antagonism may occur.

[8] Increase *Assure II* rate to 9 oz/A if target grass is fall panicum, green foxtail, or volunteer cereals.

TABLE 3A — CHEMICAL WEED CONTROL IN 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 in the spring to actively growing grain following tillering (usually about 6- to 8-in high) but prior to jointing (between 3 and 6 on Feeke's scale). DO NOT TREAT GRAIN IN BOOT TO DOUGH STAGE. 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 2L OR ¾ pt Gel	• May be applied from emergence up to boot stage (between 1 and 9 on Feeke's scale). • 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	• Apply in spring to actively growing grain with a well established secondary root system or following tillering but prior to jointing (between 3 and 6 on Feeke's scale). • Do not apply to spring-seeded barley. • 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.

(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)				
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 (between 1.2 and 7.1 on Feeke's scale). • 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)*	0.094	¼ pt.	• Apply to wheat or barley from the 3-leaf stage to boot stage (between 1.3 and 9 on Feeke's scale). 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, Buctril, Harmony Extra,* or *Express* for control of additional weeds. See label for details on rates.

(Continued on next page)

BARLEY AND WHEAT WITHOUT LEGUME SEEDINGS (continued)

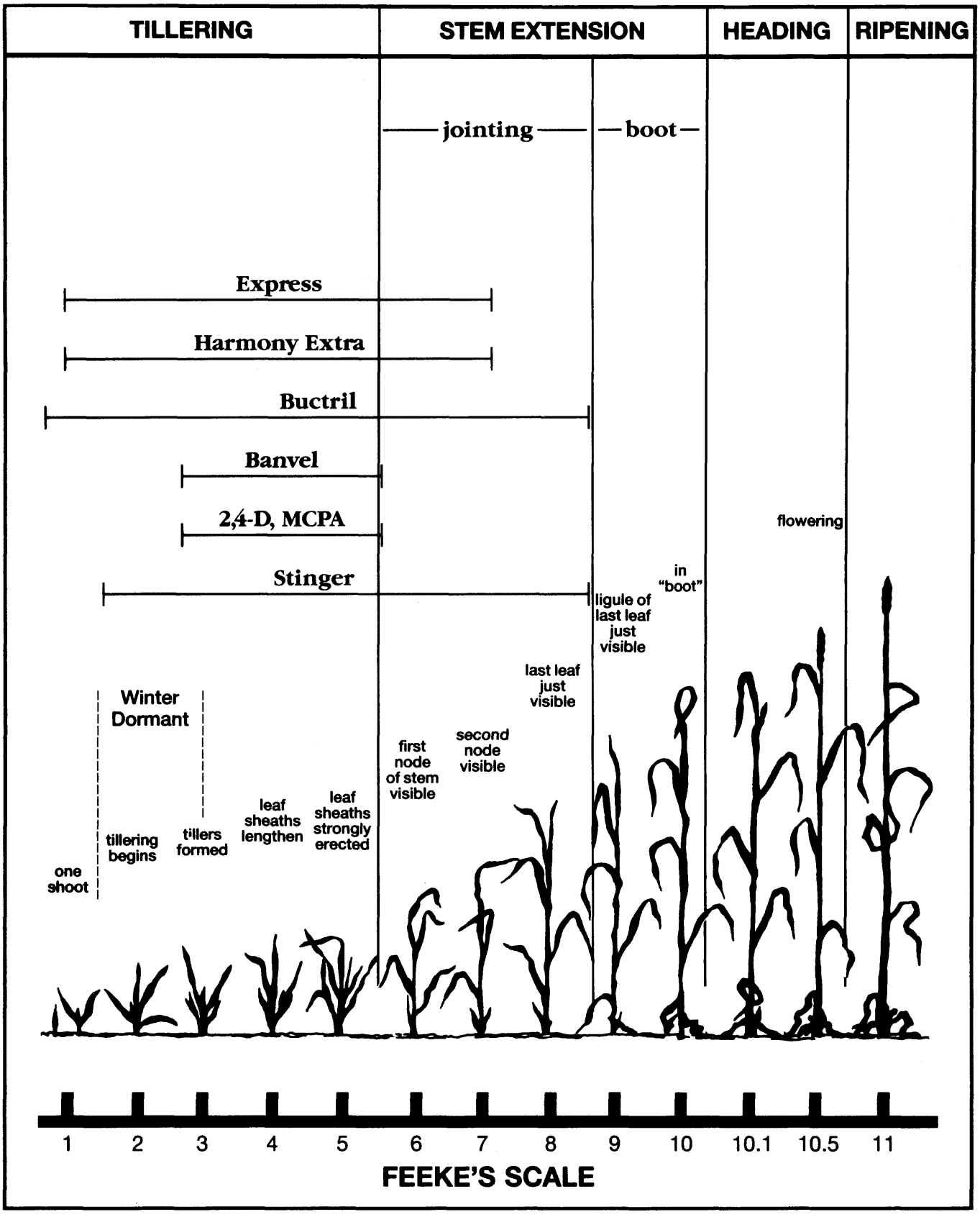
Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Perennials (bindweed, thistles)	2,4-D ester	¾	1½ pt	• Apply in the spring to actively growing grain following tillering (usually about 6- to 8-in. high) but prior to jointing (between 3 and 6 on Feeke's scale). DO NOT TREAT GRAIN IN BOOT TO DOUGH STAGE. 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	• Apply in spring to actively growing grain with a well established secondary root system or following tillering but prior to jointing (between 3 and 6 on Feeke's scale). • Do not apply to spring-seeded barley. • 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* (between 1.2 and 7.1 on Feeke's scale). • 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. • 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 thistle plants between rosette stage and bud stage for suppression. • Apply to wheat and barley from the 3-leaf stage to boot stage (between 1.3 and 9 on Feeke's scale). See label for details. • See remarks and limitations for *Stinger* for annual broadleaves.
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. • 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	• Apply in the spring to actively growing grain following tillering (usually about 6- to 8-in. high) but prior to jointing. DO NOT TREAT GRAIN IN BOOT TO DOUGH STAGE. The boot stage is when the upper sheath is beginning to swell with the enlarging head. • Do not apply to spring-seeded barley. • May use either ester or amine 2,4-D. • Provides suppression only. • See remarks and limitations for *Banvel* in "Corn — Post-emergence" section.

FIGURE 1 —
WHEAT GROWTH STAGES ACCORDING TO FEEKE'S SCALE AND CORRESPONDING HERBICIDE APPLICATION TIMING



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	3/8	3/4 pt	• Apply in the spring to actively growing grain following tillering (usually about 6- to 8-in. high) but prior to jointing. DO NOT TREAT GRAIN IN BOOT TO DOUGH STAGE. 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	3/8	3/4 pt 4L	• 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).
	bromoxynil *(Buctril)*	3/8	1 1/2 pt OR 3/4 pt Gel	• 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)*	0.094	1/4 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	3/16	3/8 pt 4L	• Apply in the spring to actively growing grain following tillering (usually about 6- to 8-in. high) but prior to jointing. DO NOT TREAT GRAIN IN BOOT TO DOUGH STAGE. 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 2L OR 3/4 pt Gel	• 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 3B —
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 3C—WEED RESPONSE TO HERBICIDES IN SMALL GRAINS*

	ANNUAL BROADLEAVES														PERENNIALS						
	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (Black)	PIGWEED (Redroot)	RAGWEED	SMARTWEED	VELVETLEAF	WILD MUSTARD	HOARY ALYSSUM	YELLOW ROCKET	CHICKWEED (COMMON)	MAYWEED (DOGFENNEL)	ANNUAL GRASSES	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	F	F	P	F	N	P	P	N	N	N	N	N
EXPRESS	F	—	**E**	P	F	P	F	P	**E**	—	**G**	**G**	**E**	N	P	F	F	N	N	F	P
HARMONY EXTRA	**G**	—	**E**	P	**E**	F	**E**	**G**	**E**	—	**G**	**G**	**E**	N	P	F	F	N	N	**G**	F
MCPA	F	F	**G**	**G**	**G**	**G**	P	F	**G**	**G**	**G**	P	P	N	P	P	P	N	N	P	P
STINGER	**E**	**G**	P	P	P	**G**	F	P	P	P	P	P	**G**	N	P	F	F	N	N	N	N
2,4-D AMINE	F	F	**G**	**G**	**G**	**G**	P	F	**G**	**G**	**G**	P	P	N	P	P	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 4A — CHEMICAL WEED CONTROL IN FORAGE ESTABLISHMENT

DIRECT-DRILLED FORAGE LEGUMES (NO-TILL)

(spring seedings following soybeans, corn, or dry edible beans)

In general, the major benefits of weed control in new alfalfa seedings are improved forage quality in the first harvest and insurance against stand loss from intense weed competition. In conventional tillage, weeds present at planting are killed by tillage during final seedbed preparation. 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. Do not apply 2,4-D in the spring prior to spring planting.

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 will improve first-harvest forage quality 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.

(Continued on next page)

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
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.

BIRDSFOOT TREFOIL (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	• 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	• 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	• 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.

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)*	0.19	1 pt	• 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. • 2,4-DB amine may be tank mixed with Poast or Poast Plus for broadleaf weed control. Temporary leaf burning may occur. Do not apply more than 0.5 lb a.i./A (1 qt/A) of 2,4-DB. Do not add fertilizer to this tank mix. See Remarks and Limitations for 2,4-DB. • 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.
	OR	OR	OR	
	sethoxydim *(Poast Plus)*	0.19	1.5 pt	
	+	+	+	
	crop oil concentrate	1 qt	1 qt	
Volunteer corn	sethoxydim *(Poast)*	0.19	1 pt	• 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.
	OR	OR	OR	
	sethoxydim *(Poast Plus)*	0.19	1.5 pt	
	+	+	+	
	crop oil concentrate	1 qt	1 qt	
	+	+	+	
	28% liquid nitrogen	1 gal	1 gal	
	OR	OR	OR	
	ammonium sulfate	2½ lb	2½ lb	
Volunteer cereals (wheat, barley, oats, rye)	sethoxydim *(Poast)*	0.29	1½ pt	• 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.
	OR	OR	OR	
	sethoxydim *(Poast Plus)*	0.25	2 pt	
	+	+	+	
	crop oil concentrate	1 qt	1 qt	
	+	+	+	
	28% liquid nitrogen	1 gal	1 gal	
	OR	OR	OR	
	ammonium sulfate	2½ lb	2½ lb	

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ALFALFA (Only) — POSTEMERGENCE — ALL TILLAGE SYSTEMS *(continued)*

(Clear seedings without small grain companion crops)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves	bromoxynil *(Buctril)*	¼	1 pt 2L OR ½ pt Gel	• 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.

TABLE 4B — CHEMICAL WEED CONTROL IN ESTABLISHED FORAGES

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). • *Sencor* rate may be reduced to ½ pt per acre for common chickweed control.
	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).
	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).

(Continued on next page)

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

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Dandelions	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).
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).

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.
	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 4C—
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 4D—WEED RESPONSE TO HERBICIDES IN FORAGES*

	ANNUAL BROADLEAVES												ANNUAL GRASSES							PERENNIALS					
	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (BLACK)	PIGWEED (REDROOT)	RAGWEED (COMMON)	SMARTWEED	VELVETLEAF	WILD MUSTARD	HOARY ALYSSUM	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	F	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	P	N	N	P	P
POAST or POAST PLUS	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	F	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 5A—CHEMICAL WEED CONTROL IN DRY EDIBLE BEANS

PREPLANT

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual grasses **Yellow nutsedge** **Redroot pigweed** **Black nightshade**	alachlor *(Lasso, Arena,* Micro-Tech, or *Partner)* OR metolachlor *(Dual)*	2 OR 2	2 qt OR 3 lb 65% DG OR 1 qt	• Alachlor is a **restricted use** pesticide. • Incorporate to 2-in. depth. • DO NOT use alachlor 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. • Alachlor or *Dual* should be preplant incorporated to minimize danger of bean injury. • Alachlor will provide better nightshade and pigweed control than *Dual.* • *Dual* will provide better yellow nutsedge control than alachlor. • A postemergence application of *Basagran* or an application of *Pursuit* may be necessary for broadleaf weed control. See remarks for these herbicides.
Annual grasses **Annual broadleaves** (except nightshade, cocklebur, jimsonweed)	EPTC *(Eptam)* + trifluralin *(Treflan)* OR pendimethalin *(Prowl)* OR ethalfluralin *(Sonalan)*	2¼ + ½ OR ¾ OR ¾	1¼ qt + 1 pt OR 1.8 pt 3.3 EC OR 2 pt	• Incorporate immediately after application. • *Eptam* suppresses common ragweed and wild mustard. • *Prowl* provides better velvetleaf control than *Treflan* or *Sonalan.* • *Treflan* provides better pigweed control than *Prowl* or *Sonalan.* • A postemergence application of *Basagran* or an application of *Pursuit* may be necessary for broadleaf weed control. See remarks for these herbicides.
Annual broadleaves (except common ragweed, lambs-quarters, smartweed, cocklebur, jimsonweed, and velvetleaf) **Annual grasses**	alachlor *(Lasso, Arena,* *Micro-Tech or Partner)* OR metolachlor *(Dual)* + imazethapyr *(Pursuit)*	2 OR 2 + 0.047	2 qt OR 3 lb 65% DG OR 1 qt + 3 oz	• Alachlor is a **restricted use** pesticide. • SEE *PURSUIT* SUPPLEMENTAL LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. DO NOT USE IF SUGAR BEETS ARE PLANNED IN THE CROP ROTATION. • DO NOT apply *Pursuit* if cold and/or wet conditions are present or predicted to occur within one week of application. • Delayed maturity may result from *Pursuit* application. • DO NOT apply if planting is delayed and chance of frost prior to maturity is likely to occur. • Incorporate to a 2-in. depth. • DO NOT use on sands or loamy sands—injury can occur. • Use 2 oz/A of *Pursuit* on sandy loam soils and all other soils with 2% or less organic matter. • For use on navy, black turtle, kidney, and cranberry beans ONLY. DO NOT apply to Domino black turtle beans. • 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 alachlor.

(Continued on next page)

PREPLANT (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves (including nightshade) **Annual grasses**	imazethapyr + pendimethalin *(Pursuit Plus)*	0.7	30 oz	• SEE *PURSUIT* SUPPLEMENTAL LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. DO NOT USE IF SUGARBEETS ARE PLANNED IN THE CROP ROTATION. • DO NOT apply *Pursuit* if cold and/or wet conditions are present or predicted to occur within one week of application. • Delayed maturity may result from *Pursuit* application. • DO NOT apply if planting is delayed and chance of frost prior to maturity is likely to occur. • Incorporate immediately after application. • DO NOT use on sands or loamy sands. • Use 20 oz/A of *Pursuit* on sandy loam soils and all other soils with 2% or less organic matter. • For use on navy, black turtle, kidney, and cranberry beans ONLY. DO NOT apply to Domino black turtle beans. • Apply BEFORE JUNE 20. • Avoid DRIFT AND SPRAY OVERLAP. • **Common ragweed** and **yellow nutsedge** will **not** be controlled by this treatment. • 30 oz of *Pursuit Plus* contains 1.6 pt of Prowl 3.3 EC. Under heavy annual grass pressure, control may not be adequate.
	EPTC *(Eptam)* + imazethapyr *(Pursuit)* + trifluralin *(Treflan)* OR pendimethalin *(Prowl)* OR ethalfluralin *(Sonalan)*	2¼ + 0.047 + ½ OR ¾ OR ¾	1¼ qt + 3 oz + 1 pt OR 1.8 pt 3.3 EC OR 2 pt	• SEE *PURSUIT* SUPPLEMENTAL LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. DO NOT USE IF SUGARBEETS ARE PLANNED IN THE CROP ROTATION. • DO NOT apply *Pursuit* if cold and/or wet conditions are present or predicted to occur within one week of application. • Delayed maturity may result from *Pursuit* application. • DO NOT apply if planting is delayed and chance of frost prior to maturity is likely to occur. • Incorporate immediately after application. • DO NOT use on sands or loamy sands. • Use 2 oz/A of *Pursuit* on sandy loam soils and all other soils with 2% or less organic matter. • For use on navy, black turtle, kidney, and cranberry beans ONLY. DO NOT apply to Domino black turtle beans. • 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. • A prepackaged mix of *Prowl* plus *Pursuit* is registered for use in dry beans *(Pursuit Plus)*. See supplemental label.

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 *Pursuit* for additional broadleaf weed control IF CROP ROTATION PERMITS.
	+	+	+	
	trifluralin *(Treflan)*	½	1 pt	
	OR	OR	OR	
	pendimethalin *(Prowl)*	¾	1.8 pt 3.3 EC	
	OR	OR	OR	
	ethalfluralin *(Sonalan)*	¾	2 pt	
FOLLOWED BY ***Preemergence***	imazethapyr *(Pursuit)*	0.047	3 oz	• SEE *PURSUIT* SUPPLEMENTAL LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. DO NOT USE IF SUGARBEETS ARE PLANNED IN THE CROP ROTATION. • DO NOT apply *Pursuit* if cold and/or wet conditions are present or predicted to occur within one week of application. • Delayed maturity may result from *Pursuit* application. • DO NOT apply if planting is delayed and chance of frost prior to maturity is likely to occur. • Requires rainfall for activation. Rotary hoe if no rainfall occurs within 7 days. • DO NOT use on sands or loamy sands. • Use 2 oz/A of *Pursuit* on sandy loam soils, and all other soils with 2% or less organic matter. • For use on navy, black turtle, kidney, and cranberry beans ONLY. DO NOT apply to Domino black turtle beans. • 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 (except common ragweed, lambsquarters, smartweed, cocklebur, jimsonweed, and velvetleaf) **Annual grasses**	metolachlor *(Dual)* + imazethapyr *(Pursuit)*	2 + 0.047	1 qt + 3 oz	• SEE *PURSUIT* SUPPLEMENTAL LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. DO NOT USE IF SUGARBEETS ARE PLANNED IN THE CROP ROTATION. • DO NOT apply *Pursuit* if cold and/or wet conditions are present or predicted to occur within one week of application. • Delayed maturity may result from *Pursuit* application. • DO NOT apply if planting is delayed and chance of frost prior to maturity is likely to occur. • Reduce *Dual* rate on coarse-textured soils low in organic matter (see label). • Danger of bean injury is greater when *Dual* is applied preemergence. • Requires rainfall for activation. Rotary hoe if no rainfall occurs within 7 days. • For use on navy, black turtle, kidney, and cranberry beans ONLY. DO NOT apply to Domino black turtle beans. • DO NOT USE on sands and loamy sands. • Use 2 oz/A of *Pursuit* on sandy loam soils and all other soils with 2% or less organic matter. • AVOID DRIFT. AVOID SPRAY OVERLAP. Sensitive crops may be injured. • Apply BEFORE JUNE 20.

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 AND 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.
Redroot Pigweed **Black Nightshade** **Wild Mustard**	imazethapyr *(Pursuit)* + surfactant	0.031 + ¼%	2 oz 2L + ¼%	• SEE *PURSUIT* SUPPLEMENTAL LABEL OR TABLE 11 FOR CROP ROTATION RESTRICTIONS. DO NOT USE IF SUGARBEETS ARE PLANNED IN THE CROP ROTATION. • DO NOT apply to pinto beans. • DO NOT add 28% liquid nitrogen or ammonium sulfate. • DO NOT apply if chance of frost prior to maturity is likely. • Apply before July 10. • Apply when broadleaf weeds are less than 2 inches tall.
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.

TABLE 5B — VINE DESICCATION IN DRY EDIBLE BEANS

Dry bean vine desiccation	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
	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. • 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 5C—WEED RESPONSE TO HERBICIDES IN DRY EDIBLE BEANS*

	ANNUAL BROADLEAVES									ANNUAL GRASSES								PERENNIALS				
	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (BLACK)	PIGWEED (REDROOT)	RAGWEED (COMMON)	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																						
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	**G**	P	P	F	F	F	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
PURSUIT PLUS	F	F	**G**	**E**	**E**	P	F	F	**G**	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	N	P
Preemergence																						
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	F	F	F	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
PURSUIT**	F	P	P	**G**	**E**	P	P	P	**G**	P	P	F	P	P	P	P	P	N	N	N	N	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.

**See 1994 Supplemental Label.

TABLE 6A — CHEMICAL WEED CONTROL IN POTATOES

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Quackgrass	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 OR ⅔ lb *Sencor Solupak*	• 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)* OR pendimethalin *(Prowl)*	2 OR ¾	2 pt OR 1.8 pt 3.3 EC	• If field leveling is necessary, it should be done soon after planting. • 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 OR ⅔ lb *Sencor Solupak*	• These treatments follow *Prowl or Dual* preemergence. • Delayed preemergence. • Apply before potato emergence. • Most effective on germinating and small emerged weeds.
	OR linuron *(Lorox or Linex)*	OR 1	OR 1 qt 4L OR 2 lb 50% DF	• 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.

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 OR ⅔ lb *Sencor Solupak*	• 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 OR ⅓ lb *Sencor Solupak*	• Do not apply postemergence within 3 days after periods 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. • Metribuzin at ⅓ lb DF/A can be tank mixed with *Poast* for annual grass and broadleaf weed control on russett or white-skinned potatoes that are NOT early maturing. See *Poast* remarks for the recommended rate. Add crop oil concentrate at 2 pt/A. Crop injury may occur.
	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 OR ⅓ lb *Sencor Solupak*	• 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. • Metribuzin at ⅓ lb DF/A can be tank mixed with *Poast* for annual grass and broadleaf weed control on russett or white-skinned potatoes that are NOT early maturing. Add crop oil concentrate at 2 pt/A. Crop injury may occur. • 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 + 28% liquid nitrogen OR ammonium sulfate	0.29 + .19 + 1 qt + 1 qt + 1 gal + 1 gal OR 2.5 lb + 2.5 lb	1½ pt + 1 pt + 1 qt + 1 qt + 1 gal + 1 gal OR 2.5 lb + 2.5 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. • 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.

TABLE 6B — VINE DESICCATION IN POTATOES

Potato vine desiccation	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
	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.
	paraquat *(Gramoxone Extra)* + surfactant	0.31-0.47 + ⅛%	1-1.5 pt + ⅛%	• *Gramoxone Extra* is a **restricted use** pesticide. • DO NOT USE to desiccate potato vines when potatoes are to be stored or used for seed. • DO NOT USE on muck soils. • Apply at 50 psi or less in 50 gal of clean water/A. • Split applications of 0.75 pt/A for the first application and repeated five to seven days later is suggested for dense vine canopies.
	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 6C—WEED RESPONSE TO HERBICIDES IN POTATOES*

	ANNUAL BROADLEAVES										ANNUAL GRASSES								PERENNIALS				
	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (BLACK)	PIGWEED (REDROOT)	RAGWEED (COMMON)	SMARTWEED	VELVETLEAF	WILD MUSTARD	WILD BUCKWHEAT	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	P	**E**	**E**	**E**	**E**	**E**	**E**	**E**	F	N	N	N	F	F
Preemergence																							
DUAL	N	N	P	F	**G**	P	P	N	P	P	**E**	**E**	**E**	**E**	**E**	**G**	**G**	F	N	N	N	N	F
LEXONE/SENCOR	F	F	**E**	N	**E**	**G**	**E**	**G**	**E**	**G**	P	F	**G**	**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	F	P	N	N	N	N	N
PROWL	N	N	**G**	P	F	P	P	F	P	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**	**G**	P	F	**G**	**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	F	P	N	N	N	N	N
Postemergence																							
LEXONE/SENCOR	**G**	F	**E**	N	**G**	**E**	**E**	**G**	**E**	F	P	P	F	F	F	F	F	P	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

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.

**Lorox/Linex provides good control of emerged wild buckwheat.

TABLE 7A—CHEMICAL WEED CONTROL IN 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 postemergence. • Injury may occur when *Betamix* or *Betanex* is applied postemergence before the 6 true leaf stage. • *Ro-Neet* provides good velvetleaf suppression.

PREEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves	pyrazon *(Pyramin)*	4	4 qt OR 6.2 lb	• *Do not use Pyramin* on sands or loamy sands or crop injury may occur. • Reduce the *Pyramin* rate to 3 qt/A OR 4.65 lb/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 OR 7.8 lb/A of *Pyramin.* • To control annual grasses, preplant incorporate *Ro-Neet* OR apply *Poast* postemergence OR apply *Nortron* preemergence. • *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)*	3 + 2	3 qt OR 4.7 lb + 5⅓ qt EC OR 2 qt SC	• See all remarks for *Pyramin.* • *Nortron* will provide some suppression of annual grasses, such as foxtail. • *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.
Annual broadleaves	ethofumesate *(Nortron)*	¾	4 pt EC OR 1.5 pt SC	• Provides full season control because of soil persistence of *Nortron.*
				• Refer to remarks under *Betamix* plus *H-273.*
	+	+	+	• DO NOT add crop oil concentrate.
	desmedipham + phenmedipham *(Betamix)*	1	6.2 pt	• DO NOT apply if *Ro-Neet* was preplant incorporated.
				• Apply when beets are in the 4 true leaf stage or larger.

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SUGAR BEETS — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves (including smartweed)	ethofumesate *(Nortron)*	¾	4 pt EC OR 1.5 pt SC	• Provides full season weed control because of soil persistence of *Nortron.* • Refer to remarks under *Betamix* plus *H273.*
	+	+	+	• DO NOT add crop oil concentrate.
	desmedipham *(Betanex)*	1	6.2 pt	• DO NOT apply if *Ro-Neet* was preplant incorporated. • Apply when beets are in the 4 true leaf stage or larger. • 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 OR 3.1 lb	• *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. • 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. • Maximum total amount of pyrazon that can be used for beets grown and processed in Michigan is 7¼ qt/A OR 11.7 lb/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.
	+	+	+	
	desmedipham + phenmedipham *(Betamix)*	1	6.2 pt	
	+	+	+	
	endothall *(H273)*	½	1⅓ pt	
	pyrazon *(Pyramin)*	2	2 qt OR 3.1 lb	• Refer to remarks under *Pyramin* plus *Betamix* plus *H273.* • More effective pigweed control than *Betamix.* • Does not control green or yellow foxtail. • Less effective than *Betamix* on lambsquarters and common ragweed.
	+	+	+	
	desmedipham *(Betanex)*	1	6.2 pt	
	+	+	+	
	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.
Velvetleaf	pyrazon *(Pyramin)*	1	1 qt	• TWO APPLICATIONS ARE NEEDED FOR BEST VELVETLEAF CONTROL. MAKE SECOND APPLICATION 5 to 7 DAYS FOLLOWING INITIAL TREATMENT. • Make first application when velvetleaf has cotyledonary leaves and one true leaf. • Application to velvetleaf at two true leaves will NOT provide consistent control. • If only one application can be made, apply 2-3 qt/A of *Pyramin* plus 1 qt/A of Dash. • DO NOT TANK MIX with *Betamix, Betanex,* or *H-273* as crop injury may occur. • *Pyramin L* may provide better control than *Pyramin DF.*
	+	+	+	
	Dash	1 qt	1 qt	

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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	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. • 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 when applying for perennial sowthistle control. • 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.
Canada thistle	clopyralid *(Stinger)* + crop oil concentrate OR ammonium sulfate	0.125 + 1 qt OR 2½ lb	⅓ 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. • Increase rate to ½ 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. • Add COC when tankmixing ⅓ pt of *Stinger* with *Betamix* and/or *H-273.* COC is not necessary when ½ pt/A of *Stinger* is applied. • 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.

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SUGAR BEETS — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
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.
Annual grasses **Annual broadleaves**	sethoxydim *(Poast)* + desmedipham + phenmedipham *(Betamix)*	0.29 + ½-1	1.5 pt + 3-6 pt	• Treat actively growing barnyardgrass or foxtails up to 2 in. • DO NOT add crop oil concentrate or other additives if beets have less than 2 true leaves. • Adjust *Betamix* rate to size of broadleaf weeds. • No soil activity from *Poast*. Controls only grasses present when sprayed.
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 7B—WEED RESPONSE TO HERBICIDES IN SUGAR BEETS*

	ANNUAL BROADLEAVES										ANNUAL GRASSES							PERENNIALS				
	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (BLACK)	PIGWEED (REDROOT)	RAGWEED (COMMON)	SMARTWEED	VELVETLEAF	WILD MUSTARD	WILD BUCKWHEAT	BARNYARDGRASS	CRABGRASS	GIANT FOXTAIL	GREEN FOXTAIL	YELLOW FOXTAIL	FALL PANICUM	WITCHGRASS	BINDWEED (FIELD)	BINDWEED (HEDGE)	CANADA THISTLE	QUACKGRASS	YELLOW NUTSEDGE
Preplant Incorporated																						
RO-NEET	P	P	F	F	**G**	F	P	**G**	P	F	**G**	**G**	**G**	**G**	**G**	**G**	**G**	N	N	N	F	**G**
Preemergence																						
NORTRON	F	F	**G**	**G**	**G**	P	**G**	F	**G**	**G**	P	F	F	F	F	P	P	N	N	N	N	P
PYRAMIN	P	P	**E**	**G**	**G**	**G**	**G**	F	**G**	**G**	P	P	P	P	P	P	P	N	N	N	N	N
Postemergence																						
BETAMIX	F	F	**E**	F	**G**	**G**	**G**	P	**G**	F	P	P	P	F	F	P	P	N	N	N	N	N
BETANEX	F	F	**G**	F	**G**	F	**G**	P	**G**	F	P	P	P	P	P	P	P	N	N	N	N	N
H273	P	P	P	P	P	P	**E**	P	P	**E**	N	N	N	N	N	N	N	N	N	P	N	N
NORTRON	P	P	F	F	F	P	**G**	P	**G**	**G**	P	P	F	F	F	P	P	N	N	N	N	P
POAST	N	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	P	F	P	F	F	F	F	P	P	P	P	P	P	P	N	N	N	N	N
STINGER	**E**	**G**	P	P	P	**E**	F	P	P	F	N	N	N	N	N	N	N	P	P	**G**	N	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 8—CHEMICAL WEED CONTROL IN FORAGE SORGHUM

FORAGE SORGHUM, SORGHUM/SUDANGRASS HYBRIDS — 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.

FORAGE SORGHUM — PREEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
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. See Table 1F. • May be applied preplant incorporated. • Do not apply to sudangrass or sorghum-sudangrass hybrids.

FORAGE SORGHUM, SORGHUM/SUDANGRASS HYBRIDS — 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 but before it exceeds 12 in. in height. • 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.

FORAGE SORGHUM — POSTEMERGENCE

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
Annual broadleaves	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.

(Continued on next page)

FORAGE SORGHUM — POSTEMERGENCE (continued)

Weed Controlled	Herbicide	Rate lb/A a.i.	Formulation/A	Remarks and Limitations
(continued)				
Annual broadleaves	bromoxynil *(Buctril)*	3/8	1½ pt 2L OR ¾ pt Gel	• 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.
	bentazon *(Basagran)*	¾	¾ qt	• Do not apply to sorghum that is headed out. • Do not graze treated area or feed treated forage to livestock for 21 days following application. • Do not make more than one application per season. • Do not treat when plants are under stress. • 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 mitrate (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. See Table 1F. • Rates may be reduced to 1/2 lb ai. for each herbicide if weeds are small. See *Laddok* label for details. • Do not apply to sudangrass or sorghum-sudangrass hybrids.
	+	+	+	
	atrazine (commercial product)	¾	¾ qt 4L OR 0.8 lb 90% DG	
	+	+	+	
	crop oil concentrate	1 qt	1 qt	

TABLE 9—WEED RESPONSE TO NON-SELECTIVE HERBICIDES*

	ANNUAL BROADLEAVES									ANNUAL GRASSES								PERENNIALS				
	COCKLEBUR	JIMSONWEED	LAMBSQUARTERS	NIGHTSHADE (BLACK)	PIGWEED (REDROOT)	RAGWEED (COMMON)	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 10 — RAINFREE PERIOD FOR POSTEMERGENCE HERBICIDE APPLICATIONS

HERBICIDE	RAINFREE PERIOD (in hours)	HERBICIDE	RAINFREE PERIOD (in hours)
Accent	4	Express	Several
Assure	1	Fusilade 2000; DX	1
Assure II	1	Fusion	1
Atrazine	1–2**	Galaxy	NL*
Banvel	6–8	Gramoxone Extra	0.5
Basagran	NL*	Harmony Extra	Several
Beacon	4	Herbicide 273	NL
Betamix	6	Laddok	NL*
Betanex	6	Marksman	4
Bladex	1–2**	MCPA	4
Blazer	NL*	Option II	1
Bronco	6	Pinnacle	1
Buctril	1	Poast	1
Buctril/Atrazine	1	Poast Plus	1
Butoxone (2,4-DB)	NL	Pursuit	1
Butyrac (2,4-DB)	NL	Ranger	6
Classic	1	Reflex	4
Cobra	0.5	Roundup	6
2,4-D Amine	6–8	Scepter	NL
2,4-D Ester	1	Select	1
Diquat	NL	Stinger	6–8
Evik	NL	Storm	NL*

NL — not listed on label

*Old labels were 8 hr for Basagran, Laddok, Galaxy, and Storm; 6 hr for Blazer.

**Rainfall will improve control from root uptake.

TABLE 11—HERBICIDE CROP ROTATION RESTRICTIONS

		(in months)												
	SOIL pH RESTRICTION	SOYBEANS	FIELD CORN	SEED CORN	WHEAT	OATS	BARLEY	RYE	ALFALFA	DRY BEANS	SUGAR BEETS	POTATOES	CANOLA	CUCUMBERS
Command[d] 1½ pt	≤5.9	0	9[g,h]	9[n]	12	16	16	16	16	9	9	9	16	9
Scepter[b,e]														
⅓ pt (Post)	None	0	11	11	4	4	4	4	18	11	26	18	26	18
⅔ pt	None	0	18[r]	18	4	18	18	18	18	11	26	18	26	18
Pursuit[f]	None	0	9½	9½[n]	4	18	4	4	18	4	40[j]	>26[j]	26[j]	18
Preview[m]	>6.8[m]	0	10	10[n]	4	*	4	*	10[a]	12	*	*	*	*
Lorox Plus[m]	>6.8[m]	0	10	10[n]	4	4	4	4	*	*	*	*	*	*
Classic[c,m]	>7.0[m]	0	9	9[n]	3	3	3	3	9	9	*	*	*	*
Reflex	None	0	10	10	4	4	4	4	18	18	18	18	18	18
Broadstrike+Treflan	>7.8[p]	0	8	8	4	12	4	4	4	4	26	—[q]	26	—[q]
Broadstrike+Dual	>7.8[p]	0	0	0	4.5	4.5	4.5	4.5	4	4	26	—[q]	26	—[q]
Beacon	None	8	½[g]	—	3	8	8	3	8	8	18[j]	18[j]	18[j]	18[j]
Accent	None	10	0	0	4	8	8	4	10	10	10/18[k]	10/18[k]	10/18[k]	10/18[k]
Stinger	None	12[l]	0	—	0	0	0	0	12	12[l]	0	18	12	18
Atrazine[o] 1 lb a.i./A	None	10	0	0	3	21	21	3	15	21	21	10	21	21
Atrazine[o] 2 lb a.i./A	None	18	0	0	15	21	21	15	21	21	33	18	33	33

* 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.
[j] Not recommended in fields where these crops are planned as rotation crops.
[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.
[m] **Soil pH may be quite variable in a field.** If the composite soil pH is near 6.8, areas in the field may be higher than 6.8 and herbicide carryover may occur. Know the pH variability in the field before applying *Preview, Lorox Plus,* or *Classic.* This may require sampling several smaller areas within a field. If only spots in the field exceed 6.8 a grower may apply these herbicides and then rotate the following year to either soybeans or an imidazolinone resistant corn hybrid.
[n] Seed corn inbred lines vary in their sensitivity. Damage or yield loss may occur.
[o] These are recommended time intervals which do not appear on atrazine labels. Carryover risk is affected by soil pH, tillage, rainfall, and temperature. Where risk of carryover exists, fields should be sampled and a bioassay conducted. See pg. 8 for details. Refer to an atrazine label for additional restrictions regarding rotational crops. Carryover risk with *Princep* is similar to or slightly greater than atrazine.
[p] DO NOT apply to areas where the soil pH is less than 5.9 AND organic matter is greater than 5%. Also DO NOT apply where soil pH is greater than 7.8 as this may result in decreased crop tolerance.
[q] Rotation to all other crops requires a 26 month rotation interval and a successful field bioassay.
[r] Rotation to field corn is 11 mo in southern two tiers of Michigan counties if 15″ rain falls after application. Imidazolinone resistant (IR or IMR) and imidazolinone tolerant (IT) corn hybrids can be planted the year following Scepter application.

TABLE 12 — 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	RESTRICTED ENTRY INTERVAL[3]
Accent	5,050	—	70 (pH 7.0)	—	—	—	12 hrs
Assure	1,670	—	<1	moderate	½	L/M	12 hrs
Atrazine	1,780	7,500	33	strong	2-8	M/L	12 hrs
Balan	>10,000	—	1	v. strong	4-5	L/S	SL
Banvel	2,629	>2,000	4500	weak	1-6	S/L	48 hrs
Basagran	2,063	2,500	500	weak	½	S/L	SL
Beacon	5,050	2,010	18,000 (pH 7.2)	—	—	—	12 hrs
Betamix	4,100	>2,000	1	moderate	1	L/S	24 hrs
Betanex	>10,250	>2,000	7	moderate	1	L/S	24 hrs
Bladex	288	>2,000	171	strong	2-3	M/M	12 hrs
Blazer	1,540	>2,000	infinite	strong	1	M/M	SL
Broadstrike + Treflan	>5,000	>2,000	49	—	2-8	—	SL
Broadstrike + Dual	>5,000	>2,000	49	—	2-8	—	SL
Buctril	260	3,660	50	moderate	0.5	M/S	12 hrs
Classic	>4,000	>2,000	300	strong	1-10	M/L	12 hrs
Cobra	>5,000	2,000	0.1	strong	0.5	M/S	12 hrs
Command	2,077	2,000	1100	v. strong	3-6	M/M	S/L
2,4-D	699	—	900	weak	1	M/M	48 hrs
2,4-DB	1,960	—	insoluble	weak	1	S/M	48 hrs
Defol 6	1,200	—	—	—	—	—	12 hrs
Des-i-cate	200	—	100,000	moderate	¼	S/M	48 hrs
Diquat	235	433	infinite	v. strong	—	L/S	24 hrs
Dowpon	970	—	110	v. weak	—	S/L	12 hrs
Dual	2,780	>10,000	530	strong	1-3	M/L	12 hrs
Enquik	1,200	>2	—	—	—	—	SL
Eptam	1,630	1,460	370	strong	1.5-2	M/S	12 hrs
Eradicane	2,000	—	370	strong	1.5-2	M/S	12 hrs
Evik	1,950	8,160	185	v. strong	1-3	M/M	SL
Express	>5,000	>2,000	286	—	½	S/S	12 hrs
Frontier	2,400	>2,000	1174	moderate	1-2	M/L	SL
Fusilade 2000	2,712	>2,420	2	moderate	¼	L/S	12 hrs
Fusion	—	—	2 to 0.9	moderate	½	L/S	24 hrs
Gramoxone Extra	150	236	infinite	v. strong	1	L/S	48 hrs
Harmony Extra	>5,000	>5,000	*	*	½	S/S	12 hrs
Herbicide 273	51	—	100,000	moderate	0.25	S/M	48 hrs
Hoelon	563	—	3000	strong	½	L/S	12 hrs
Kerb	8,350	—	15	strong	2-9	M/L	12 hrs
Lasso/Microtech/ Partner	1,800	3,500	242	strong	1-2	M/M	12 hrs
Lexone/Sencor	2,300	>20,000	1200	moderate	2-4	M/L	12 hrs
Lorox/Linex	4,000	—	75	v. strong	2-4	L/M	12 hrs
Lorox Plus	2,300	—	**	v. strong	1-10	—	12 hrs
MCPA	1,160	—	insoluble	v. weak	1-4	S/L	12–48 hrs
Nortron	6,400	1,400	110	strong	1-4	M/M	12 hrs
Option II	>2,300	>1,000	0.9	moderate	1	L/S	24 hrs
Pinnacle	>5,000	>2,000	2,400	—	¼	L/L	SL
Poast	2,676	—	48	moderate	¼	M/S	12 hrs
Preview	1,500	—	***	v. strong	1-10	—	12 hrs
Princep	>5,000	>3,100	5	strong	2-8	M/L	12 hrs
Prowl	2,679	>2,260	<1	v. strong	3-6	L/S	12 hrs
Pursuit	>5,000	>2,000	1,400	weak	2-8	S/M	12 hrs
Pyramin	3,030	—	1	strong	1-2	M/M	12 hrs
Ramrod	710	380	380	moderate	1-1.5	M/S	48 hrs
Reflex	1,858	—	600,000	weak	6	M/L	24 hrs

(Continued on next page)

TABLE 12 — 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	RESTRICTED ENTRY INTERVAL[3]
Ro-Neet	4,000	3,000	85	strong	1-3	M/M	12 hrs
Roundup/Ranger	2,500	>5,000	infinite	v. strong	1	S/S	12 hrs
Scepter	>5,000	2,000	60	moderate	2-8	S/L	12 hrs
Select	2,920	>5,000	infinite	moderate	¼	M/S	SL
Sinbar	5,000	—	710	moderate	5-6	M/L	12 hrs
Sonalan	>10,000	—	1	v. strong	3-5	L/S	12 hrs
Stinger	>5,000	>2,000	1000	moderate	1-10	S/L	48 hrs
Sutan +	3,500	>4,640	45	v. strong	1.5-2	M/S	12 hrs
Treflan	>10,000	—	<1	v. strong	3-6	L/S	12 hrs
Velpar	1,690	5,278	33,000	strong	4-6	M/L	24 hrs
(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 and RTECS.

[2] These leaching/runoff potential ratings are from the ARS/SCS pesticide properties database and were developed for use with the SCS soils ratings for water quality in the SCS "Soil-Pesticide Interaction Ratings."
S-small, M-medium, L-large

[3] Read and follow label directions. Post areas that have been treated to warn others not to enter until the REI has elapsed as required by the label. SL = See Label.

* Combination of Express and the active ingredient in Pinnacle

** Combination of Lorox plus chlorimuron

*** Combination of Lexone plus chlorimuron

**** Data for Broadstrike component

TABLE 13—GLOSSARY OF CHEMICAL NAMES

TRADE NAME** AND (MANUFACTURER)	COMMON NAME	CONCENTRATION AND COMMERCIAL FORMULATION†
ACCENT (DuPont)	NICOSULFURON	75% DF, SP
ASSURE II (DuPont)	QUIZALOFOP-P-ETHYL	0.88 lb/gal L
*ATRAZINE Several (various)	ATRAZINE	4 lb/gal L; 90% DG
BALAN (DowElanco)	BENEFIN	1½ lb/gal L, 60% DF
BANVEL (Sandoz)	DICAMBA	4 lb/gal L
BASAGRAN (BASF)	BENTAZON	4 lb/gal L
BEACON (Ciba)	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)	ATRAZINE + METOLACHLOR	6.0 lb/gal L (2.7 + 3.3)
*BICEP LITE (Ciba)	ATRAZINE + METOLACHLOR	5.0 lb/gal L (1.7 + 3.3)
*BICEP II (Ciba)	ATRAZINE + METOLACHLOR (+ SAFENER)	5.9 lb/gal L (2.7 + 3.2)
*BLADEX (DuPont)	CYANAZINE	4L; 90% DF
BLAZER 2L (BASF)	ACIFLUORFEN	2 lb/gal L
BROADSTRIKE + TREFLAN (DowElanco)	FLUMETSULAM + TRIFLURALIN	3.65 lb/gal L (0.25 + 3.4)
BROADSTRIKE + DUAL (DowElanco/Ciba)	FLUMETSULAM + METOLACHLOR	7.67 lb/gal L (0.2 + 7.47)
*BRONCO (Monsanto)	ALACHLOR + GLYPHOSATE	3.6 lb/gal L (2.6 + 1)
*BUCTRIL (Rhone-Poulenc)	BROMOXYNIL	2 lb/gal L; 4 lb/gal GEL
*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
CLARITY (Sandoz)	DICAMBA	4 lb/gal L
CLASSIC (DuPont)	CHLORIMURON ETHYL	25% DF
COBRA (Valent)	LACTOFEN	2 lb/gal L
COMMAND (FMC)	CLOMAZONE	4 lb/gal EC
COMMENCE (FMC/DowElanco)	CLOMAZONE + TRIFLURALIN	5.25 lb/gal L (2.25 + 3)
*CYCLE (Ciba)	CYANAZINE + METOLACHLOR	4 lb/gal L (2 + 2)
2,4-D Several (various)	2,4-D	various
DIQUAT (Zeneca)	DIQUAT	2 lb/gal L
DUAL (Ciba)	METOLACHLOR	8 lb/gal L; 25% G
DUAL II (Ciba)	METOLACHLOR (+ SAFENER)	7.8 lb/gal L
EPTAM (Zeneca)	EPTC	7 lb/gal L; 10% G
ERADICANE (Zeneca)	EPTC + R-25788	6.7 lb/gal L
EVIK (Ciba)	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)
FRONTIER (Sandoz)	DIMETHENAMID	7.5 lb/gal L
FUSILADE 2000; FUSILADE DX (Zeneca)	FLUAZIFOP-P-BUTYL	1 lb/gal L; 2 lb/gal L
FUSION (Zeneca)	FLUAZIPOP-P-BUTYL + FENOXAPROP	2.66 lb/gal L (2.0 + 0.66)
GALAXY (BASF)	BENTAZON + ACIFLUORFEN	3.68 lb/gal L (3 + 0.68)
*GRAMOXONE EXTRA (Zeneca)	PARAQUAT	2.5 lb/gal L
HARMONY EXTRA (DuPont)	THIFENSULFURON METHYL + TRIBENURON METHYL	75% DF
HERBICIDE 273 (Atochem)	ENDOTHALL	3 lb/gal L
KERB (Rohm and Haas)	PRONAMIDE	50% WP (in soluble pouches)

(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.

†DC—dry concentrate, DF—dry flowable, DS—dry soluble granule, EC—emulsifiable concentrate, G—granular, L—liquid, DG—dispersible granule, WP—wettable powder, WSP—wettable soluble powder.

TABLE 13—GLOSSARY OF CHEMICAL NAMES (continued)

TRADE NAME** AND (MANUFACTURER)	COMMON NAME	CONCENTRATION AND COMMERCIAL FORMULATION†
*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)
LEXONE (DuPont)	METRIBUZIN	75% DF; 4 lb/gal L; 75% DF Sencor Solupak
LOROX (DuPont)	LINURON	50% WP; 4 lb/gal L; 50% DF
LINEX (Griffin)	LINURON	4 lb/gal L
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; 4 lb/gal SC
*OPTION II (American Hoechst)	FENOXAPROP	0.79 lb/gal L
PARTNER (Monsanto)	ALACHLOR	65% DG
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
POAST PLUS (BASF)	SETHOXYDIM + DASH	1.0 lb/gal L
PREVIEW (DuPont)	METRIBUZIN + CHLORIMURON ETHYL	75% DG (68.5 + 6.5)
PRINCEP (Ciba)	SIMAZINE	4 lb/gal L; 80% WP; 4% G; 90% DG
PROWL (American Cyanamid)	PENDIMETHALIN	3.3 EC
PURSUIT (American Cyanamid)	IMAZETHAPYR	2 lb/gal L; 70% DG, ECO-PAK
PURSUIT PLUS (American Cyanamid)	IMAZETHAPYR + PENDIMETHALIN	3 lb/gal L (0.2 + 2.8)
PYRAMIN (BASF)	PYRAZON	4 lb/gal L; 67% DF
RAMROD (Monsanto)	PROPACHLOR	4 lb/gal L; 65% WP; 20% G
RANGER (Monsanto)	GLYPHOSATE	2 lb/gal L
REFLEX (Zeneca)	FOMESAFEN	2 lb/gal L
RO-NEET (Zeneca)	CYCLOATE	6 lb/gal L; 10% G
ROUNDUP (Monsanto)	GLYPHOSATE	3 lb/gal L
SALUTE (Miles Inc.)	METRIBUZIN + TRIFLURALIN	4 lb/gal L (1.33 + 2.67)
SCEPTER (American Cyanamid)	IMAZAQUIN	1.5 lb/gal L; 70% DG, ECO-PAK
SELECT (Valent, American Cyanamid)	CLETHODIM	2 lb/gal L
SENCOR (Miles Inc.)	METRIBUZIN	50% WP; 75% DF; 4 lb/gal L; Solupak
SINBAR (DuPont)	TERBACIL	80% WP
SONALAN (DowElanco)	ETHALFLURALIN	3 lb/gal L
STINGER (DowElanco)	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 (Zeneca)	BUTYLATE + R-25788	6.7 lb/gal L; 10% G
*SUTAZINE (Zeneca)	ATRAZINE + BUTYLATE + R-25788	6 lb/gal L (1.2 + 4.8)
TREFLAN (DowElanco)	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 (Miles Inc.)	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.

†DC—dry concentrate, DF—dry flowable, DS—dry soluble granule, EC—emulsifiable concentrate, G—granular, L—liquid, DG—dispersible granule, WP—wettable powder, WSP—wettable soluble powder.

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