

WEED CONTROL IN SOYBEANS

(Jeffrey L. Gunsolus)

- S1. Weeds can be most effectively managed in soybeans with a well-planned program that involves a thorough analysis of the field situation and use of a combination of cultural practices and appropriate herbicides. The most effective weed control system depends on the kinds of weeds in the field, soil characteristics, tillage practices, crop rotation, and soybean row width.

Weed-Soybean Competition

- S2. Weeds are vigorous competitors with soybeans. Weeds usually germinate and emerge with the soybeans. Therefore, soybeans cannot get ahead of the weeds. Soybeans are relatively short and susceptible to shading from taller weeds. Weeds also compete with soybeans for nutrients and water. Since soybeans are especially sensitive to moisture deficiencies in late summer, a few large weeds can severely reduce yields. Nearly complete weed control must be accomplished within three to four weeks after emergence of the soybeans in order to avoid yield losses due to early emerging weeds. Planting narrow rows and following production practices which encourage vigorous soybean growth increases the crops competitive advantage over the weeds. The idea is to “shade out” late emerging weeds. In wider row spacings, a grower should strive to have the soybeans lapped in the row middles as soon as possible.

Crop Rotation Practices

- S3. Crop rotation can be an important component of a weed management program. Most annual broadleaf weeds can be more easily and/or more economically managed in corn than in soybeans. The opposite is true for most annual grass weeds. In addition, crop rotation encourages the use of different types (families) of herbicides on the same field over the years. This helps to prevent the accelerated microbial degradation of some herbicides, the soil residue buildup of some other herbicides, and the build-up of difficult to control or herbicide resistant weeds. See the *Herbicide Mode of Action and Injury Symptoms* bulletin, BU-3832, for more details about the classification of herbicide families.

Tillage Practices

- S4. Several tillage practices aid weed management in soybeans. Seedbed preparation immediately prior to planting will kill weeds that have germinated. Killing these weeds is important in obtaining good results from preemergence herbicides. For effective weed control, herbicides applied preemergence need to be moved into the soil by rainfall before weed seeds germinate. If rainfall has not been sufficient for herbicide activation, control the weed seedlings with a rotary hoe, harrow, or cultivator as soon as they emerge. Cultivation of weed escapes is an effective and economical weed control tool. Cultivation should be done when weeds are small and should be shallow (1 to 2 inches) to avoid soybean root damage.

Herbicides

- S5. Herbicides are the newest and often the most efficient weed management tool. Although herbicides have become a necessity in most soybeans production systems, far too many growers equate weed management solely with herbicides. Remember that herbicides are only one of the available weed control tools and that weed management is most successful and economical when all the tools for weed control are utilized in an integrated program.
- S6. A herbicide or herbicide combination should be selected on the basis of its effectiveness on the different weed species in the field. The correct herbicide rate must be used to obtain good weed control results and to minimize soybean injury. Apply the proper herbicide at the prescribed time and rate with a carefully calibrated applicator to provide the best return on your investment. Always consult the herbicide labels for specific rates and instructions. Only chemicals that are cleared by the Environmental Protection Agency for the specific use intended should be used.

No-Till or Minimum Till Herbicides

- S7. In no-till or minimum till soybean production, herbicides may be required to control or suppress emerged weeds. **Glyphosate (numerous formulations)** or **paraquat (Gramoxone Max or Gramoxone Inteon)** are non-selective herbicides that will kill emerged weeds. These herbicides have no soil activity and are usually tank-mixed with other herbicides that provide residual control of later-germinating weeds.
- S8. **Glyphosate (Roundup WeatherMax, Roundup Original Max)** is applied prior to soybean emergence for annual and perennial weed control in reduced tillage situations. For difficult to control annual weeds such as crabgrass up to two inches tall and Pennsylvania smartweed up to six inches tall, apply at 22 ounces/acre to actively growing weeds. Apply at 32 ounces/acre when weeds exceed six inches in height. Perennial weeds may not be at the proper stage of growth for control. However, 52 to 104 oz/acre may suppress emerged perennials. See the perennial weed control section for additional information. Do Not add buffering agents or pH adjusting agents to these products. Surfactants may be added to Roundup Original MAX, but should NOT be added to Roundup WeatherMAX. Ammonium sulfate (AMS) should be added if one of the following conditions exists: hard water (greater than 500 ppm), cool temperatures (below 55F),

* or generic equivalent.

drought, or in tank mixtures with certain residual herbicides (see label). Roundup Original MAX has the same rate structure as Roundup WeatherMAX.

- S9. Glyphosate Formulations** are increasing in the marketplace. Current formulations are as follows: Dow AgroSciences – Glyphomax XRT and Durango (similar to Roundup Ultra Max); Syngenta - Touchdown Total and Hi-Tech. Glyphosate formulations vary in amount of a.e./A, type of salt formulation and adjuvant system. See labels for specific application instructions
- S10. Gramoxone Max or Gramoxone Inteon (paraquat)** is applied prior to soybean emergence for annual weed control in reduced tillage situations. Apply Gramoxone Max 3L at 1.3 to 1.7 pt/A on 1-3 inch weeds, 1.7 to 2 pt/A on 3-6 inch weeds, and 2 to 2.7 pt/A on 6-inch weeds. Increase rates by 50% for Gramoxone Inteon as the formulation is 2 lbs./gal. When applying by ground, paraquat should be mixed with 0.125 to 0.25% v/v nonionic surfactant and applied at 10 gallons/A. Aerial applications require 0.25% v/v nonionic surfactant applied at 5 gallons/A. **Paraquat is a restricted use pesticide.**
- S11. Sencor (metribuzin)** can be applied up to 30 days prior to soybean planting or preemergence as part of a herbicide program for burndown of existing vegetation. Tank mixtures with paraquat (Gramoxone Max or Inteon) or glyphosate (Roundup formulations, Touchdown) are common to pick up grass control. Mixtures with 2,4-D ester or 2,4-DB will increase broadleaf weed spectrum. Metribuzin is effective on horseweed (*Coryza canadensis*) if applied to small (less than 2 inch) plants.
- S12. 2,4-D ester and 2,4-DB** can be applied prior to soybean planting for broadleaf weed control. 2,4-DB can be applied before soybean planting or before crop emergence. Use a nonionic surfactant (0.5% v/v) with 2,4-DB. When **less than 0.5 lb a.i./A** is used, 2,4-D ester should be applied at least 7 days before soybean planting. If 0.5 to 1.0 lb a.i./A is applied, you must wait 30 days before planting soybean. When using 2,4-D products in no-till, make sure you plant seed at least 1.5 to 2 inches deep to reduce the chance of crop injury.

Preplant Incorporated Herbicide Applications

- S13.** Proper herbicide application and incorporation as well as favorable soil conditions are necessary for optimum herbicide performance. Ideally, the soil should be dry on the surface and moist, but not wet, just below the surface to ensure maximum mixing of herbicide and soil. To provide good control, adequate moisture is needed at the point where the emerging weed seedling contacts the herbicide. Good incorporation thoroughly mixes the herbicide with 2 to 3 inches of soil. For best results, incorporate the herbicide twice with a disk, field cultivator with sweep shovels, or similar implement, or once with a power-driven rotary tiller. The second incorporation should be carried out at a right angle to the direction of the first incorporation to ensure thorough mixing of the herbicide with the soil. Ethalfuralin (Sonalan), clomazone (Command*), and pendimethalin (Prowl*) labels indicate that one herbicide incorporation may be adequate. The one pass incorporation may be effective, but is dependent upon the incorporation implement, soil type, moisture, and till and plant residue cover. Observe label instructions for specific incorporation procedures.
- S14. Prowl* (pendimethalin), Sonalan (ethalfuralin), and Treflan* (trifluralin)** all need to be incorporated for adequate weed control in soybeans. Trifluralin may also be applied and incorporated in the fall, after September 1. Delays of incorporation of up to 24 and 48 hours and 7 days after application are indicated on the labels for trifluralin, ethalfuralin, and pendimethalin, respectively. Although delays in incorporation are allowed for some preplant incorporated herbicides there are circumstances that may void these delay times. Whenever possible, immediate incorporation is recommended. See the label for more details on timing of incorporation.
- S15. Command 3ME* (clomazone)** entered the soybean herbicide market in 1986 and was labeled for preplant incorporated and preemergence application. However, application of clomazone preemergence to moist or wet soil enhanced the volatilization of clomazone and allowed it to move off-target and injure sensitive species such as apple and peach trees, rose bushes, alfalfa, and oats. Clomazone has a distinct whitening or yellowing effect on a sensitive plant's foliage. In order to reduce the potential for off-target movement **Command 3 ME*** is formulated to significantly reduce volatility concerns and **is to be used preemergence or shallowly incorporated. Do Not** apply clomazone aerially or through irrigation equipment. See appropriate clomazone label for restrictions on set-backs for sensitive plants, commercial production of vegetables or fruits and nurseries, greenhouses, towns or subdivisions.

Preemergence Applications

- S16.** Several herbicides including **alachlor (Lasso*), dimethenamid-p (Outlook), flufenacet (Define), s-metolachlor (Dual II Magnum*), and metribuzin (Sencor)** are suggested for use either preplant incorporated or preemergence. These herbicides may be left on the soil surface or incorporated with one or two tillage operations. Preplant incorporated applications of these herbicides are most effective when there is inadequate rainfall to activate preemergence applications. However, preemergence applications provide more effective weed control when adequate rainfall does occur. If weed seedlings begin to emerge following a preemergence application, due to lack of rainfall, an early harrowing, rotary hoeing, or shallow cultivation will improve weed control. **Lasso*, Outlook, Dual II Magnum*** control annual grasses, nutsedge, redroot pigweed, and nightshade. Control of other broadleaf weeds has been erratic. Preplant incorporation of Lasso*, Outlook, or Dual* has resulted in more consistent yellow nutsedge control than preemergence applications. **Alachlor is a restricted use pesticide. For alachlor, metolachlor, and metribuzin Current**

* or generic equivalent.

Voluntary Best Management Practices for Minnesota can be found at:

<http://www.mda.state.mn.us/appd/bmps/finalcoreherbicide.pdf>

- S17. Boundary (s-metolachlor + metribuzin)** provides control of many annual grass and broadleaf weeds (including waterhemp). Boundary will reduce weed competition for approximately a 30-day period and **must** be followed by a planned postemergence herbicide. You can apply up to 14 days before planting. **To avoid crop injury:** plant seed at least 1.5 inches deep; see the label for restrictions on various soil types and sensitive soybean varieties. Soybean injury is more likely on alkaline (high pH) and sandy soils, or where soils contain <0.5% organic matter. **For metolachlor, and metribuzin Current Voluntary Best Management Practices for Minnesota can be found at:**
<http://www.mda.state.mn.us/appd/bmps/finalcoreherbicide.pdf>
- S18. Define (flufenacet)**, provides **only** early season (3 to 6 weeks) residual weed control of many annual grass and broadleaf weeds and should be used in conjunction with additional tank mix partners and/or a planned postemergence weed control program. You can apply up to 14 days before planting.
- S19. FirstRate (cloransulam methyl)** is labeled for soil and postemergence control of many broadleaf weeds. Cloransulam methyl soil applied rates are 0.6 oz/A on soils with 3% or less organic matter and 0.76 oz/A on soils with greater than 3% organic matter. Soil applications on soils exceeding 5% organic matter may result in reduced weed control and a post emergence application is recommended. Under Minnesota environmental conditions, preplant incorporated applications will provide more consistent weed control than preemergence applications due to the need for sufficient and timely rainfall to move the herbicide into the weed germination zone. Heavy pressures of cocklebur and giant ragweed will not be consistently controlled with soil applications and may require a postemergence application for season long control. Chloransulam methyl can be tank mixed with trifluralin (Treflan*), alachlor (Lasso*), s-metolachlor (Dual II Magnum*), dimethenamid (Outlook), pendimethalin (Prowl*) or clomazone (Command*) for grass control.
- S20. Python (flumetsulam)** controls a number of broadleaf weeds. Python is labeled for field corn and soybeans. **Do Not** apply on peat or muck soils. **Do Not** apply to soils with a pH less than 5.9 and organic matter greater than 5% or to soils with a pH greater than 7.8.
- S21. Sencor (metribuzin)** has provided good control of several hard-to-control broadleaf weeds. Crop safety can be improved by using lower labeled tank mix rates. See the label for restrictions on various soils and soybean varieties. Soybean injury is more likely on alkaline (high pH) soils, sandy soils, or where atrazine residues are present. **For metribuzin Current Voluntary Best Management Practices for Minnesota can be found at:** <http://www.mda.state.mn.us/appd/bmps/finalcoreherbicide.pdf>
- S22. Valor (flumioxazin)** applied preemergence provides control of small-seeded broadleaf weeds and suppression of several annual grasses. **Gangster (flumioxazin + cloransulam methyl)** improves control of several composite weed species (e.g. common cocklebur and sunflower). Susceptible plants emerging from soil treated with Valor or Gangster will turn brown and die within a couple of days. **Do Not** apply Valor or Gangster to emerged soybeans. Foliar contact with emerged soybeans will cause severe injury or rapid plant death. Risk of crop injury can be minimized by using on well-drained soils, planting at least 1.5 inches deep, using high-quality seed, and completely covering seeds with soil prior to application. The best weed control occurs when Valor or Gangster is applied to moist soil and followed by a minimum of 0.5 inches of rainfall. **Do Not** incorporate Valor or Gangster. **Do Not** tank mix Valor or Gangster with acetanilide herbicides such as **Boundary, Dual*, Outlook, or Lasso***, or crop injury may occur.

Postemergence

- S23.** Weeds are much easier to control postemergence when they are young. This is especially true under adverse environmental conditions and with certain weed species, such as velvetleaf and lambsquarters. For example, a split application of **Basagran** at 1 pt/A approximately two weeks after soybean planting followed by 1 pt/A 10 to 14 days later, if necessary, can prove to be quite effective and economical. Basagran is more effective if applied to young weeds. Often, removing the first flush of weeds is all that is necessary, because later weed flushes can be cultivated or may be shaded out by the soybeans. See the label for more detailed instructions and maximum allowable weed heights and leaf stages.
- S24.** Herbicide additives such as surfactants, petroleum (crop) and vegetable oils, stickers, and fertilizers (28% N, 10-34-0, ammonium sulfate) often increase weed control. Misuse of additives can often result in crop injury. For example, the addition of oil concentrate to **Ultra Blazer (acifluorfen), Cobra (lactofen), or Reflex (fomesafen)** increases the potential for soybean injury. The liquid fertilizers, 10-34-0 and 28% N, can be mixed with Basagran for improving the control of velvetleaf. However, addition of liquid fertilizers will result in poor control of common lambsquarters. If common lambsquarter is present in addition to velvetleaf, a mixture of oil concentrate and the liquid fertilizer can be used with Basagran. **Do Not** mix oil concentrate and liquid fertilizer in Basagran + Ultra Blazer tank mixtures, as severe crop injury may occur. Read the herbicide label carefully to determine if an additive is needed and which one is recommended. Usually, the herbicide rate cannot be decreased by adding an additive.
- S25. Assure II* (quizalofop), Fusilade DX (fluazifop), Fusion (fenoxaprop & fluazifop), Poast / Poast Plus (sethoxydim), and Select* and Select Max (clethodim)** are postemergence herbicides for annual and perennial grass control. Soybeans have excellent tolerance to these herbicides, however, none of these herbicides has activity on broadleaf weeds. A crop oil concentrate must be used with most all of these herbicides to provide herbicidal activity. Select Max has more adjuvant options than Select*, see label for

* or generic equivalent.

details. A nonionic surfactant may be used with Assure II* but **Do Not** use a vegetable oil as an additive. Tank mixtures with most postemergence broadleaf herbicides may reduce the effectiveness of grass weed control. Therefore, when tank mixing one of the postemergence grass herbicides with a broadleaf herbicide consider several different strategies: 1) Increase the rate of the grass herbicide by 50% over the use rate when applied by itself. 2) Plan on reduced effectiveness on certain weed species (e.g. yellow foxtail). 3) Apply the grass and broadleaf herbicides separately in sequential applications. In general, the minimum waiting period for application of a broadleaf herbicide if the grass herbicide is applied first is 24 hours; the minimum waiting period for a grass herbicide if the broadleaf herbicide is applied first is 7 days or until weed growth resumes. See the appropriate labels for more specific details. In most instances, broadleaf herbicides should be applied first because they generally need to be applied to smaller (younger) weeds to be effective.

- S26. Basagran (bentazon)** may cause some leaf burn if applied to soybeans under stress, especially when an oil concentrate is added to improve weed control effectiveness. A split application may be necessary to control Canada thistle, yellow nutsedge, and annual broadleaf weeds that continue to germinate throughout the growing season. **Rezult (bentazon & sethoxydim)** at 3.2 pt/A will provide control of several broadleaf and many grass weed species. Apply to small actively growing weeds after soybeans have one fully expanded trifoliolate. Always add 1 pt/A of COC plus 1-2 lbs of AMS.
- S27. Crinkling, bronzing, or burning of young soybean leaves is a common response to Ultra Blazer (acifluorfen), Cobra (lactofen), and Reflex/Flexstar (fomesafen) treatments but soybeans typically recover and develop normally. Hot, humid weather, active growth at application, and the addition of surfactants or oil concentrates increase both herbicidal effectiveness and the possibility of soybean injury. Do Not apply acifluorfen or lactofen to weeds under stress because effectiveness may be reduced. Lactofen has shown control of buffalo bur and lanceleaf sage.**
- S28. Classic (chlorimuron)** is a postemergence broadleaf herbicide that controls some major broadleaf weeds and is most effective if applied to actively growing weeds in the 1 to 3 leaf stage. A surfactant or crop oil concentrate is required. Under hot, dry conditions crop oil concentrate may be used instead of a surfactant. However, the crop oil concentrate may increase soybean injury. Crops other than soybeans can be extremely sensitive to low concentrations of chlorimuron. Therefore, clean all traces of chlorimuron from the sprayer immediately after use and prior to spraying other crops. **Do Not** apply over 1/3 oz/A to soils with a pH greater than 7.0 due to carryover to sensitive crops.
- S29. FirstRate (cloransulam methyl)** Postemergence applications of cloransulam methyl at 0.3 oz/A will provide excellent control of cocklebur, common ragweed, velvetleaf, and common sunflower. An adjuvant system of 0.125 to 0.25% v/v of nonionic surfactant plus 2.5% UAN or 1.2% v/v COC must be used for postemergence applications. Postemergence applications should be made when weeds are 3-4 inches in height and actively growing. Cloransulam methyl should be applied before soybean bloom. Postemergence, cloransulam methyl is weak on the control of common lambsquarters, pigweeds, and nightshade, and can be tank mixed with glyphosate, (Roundup Ready Soybeans only) and other postemergence grass and broadleaf herbicides. Under certain conditions, tank-mixing cloransulam methyl with Assure II* and Fusion will reduce annual grass control. If necessary, a postemergence grass herbicide may be applied before or after an application of cloransulam methyl.
- S30. Flexstar/Reflex (fomesafen)** is a postemergence broadleaf herbicide. Fomesafen may **Not** be used in all counties in Minnesota. See the label for rate restrictions and approved counties. **Do Not** apply fomesafen to any field more than once every 2 years. Fomesafen is most effective if applied to young weeds that are actively growing. Apply fomesafen before soybeans bloom.
- S31. Harmony GT XP (thifensulfuron)** is a postemergence broadleaf herbicide. Thifensulfuron controls some major broadleaf weeds in conventional, or Roundup Ready (1/12 oz/A) and Roundup Ready/ STS stacked or STS tolerant soybeans (1/12 oz/A up to 0.33 oz/A) and is most effective if applied to young weeds that are actively growing. See the label for details on maximum weed sizes controlled. A nonionic surfactant is always required, at a rate of 0.125% v/v to 0.25% v/v plus either 4 to 8 pts/A of 28% N or 2 to 4 lb/A of ammonium sulfate, when velvetleaf is present. In Roundup Ready/ STS stacked varieties always add 4.25 to 17 lbs./ 100 gal of AMS and if the glyphosate does not have a built-in adjuvant system and NIS as well. Severe crop injury due to application of thifensulfuron or tank mixture of thifensulfuron + chlorimuron (Classic) is most likely when applied under hot conditions (greater than 90°F) , high humidity (greater than 70% R.H.), when the wrong adjuvant is used, or when herbicide is misapplied. In addition, to avoid crop injury, **Do Not** tank mix or apply thifensulfuron within 14 days of application of organophosphate insecticides.
- S32. Phoenix (lactofen + adjuvant)** is a postemergence herbicide with a built-in adjuvant system. Phoenix provides effective control of waterhemp, nightshade species, pigweed species, and common ragweed. Phoenix should be used primarily as a tank mix partner with other postemergence soybean herbicides such as Harmony GT XP, FirstRate, Pursuit, or Raptor. The built-in adjuvant system enhances weed control of the tank mix partner with minimal crop response. Phoenix can be tank mixed with Select*/Select Max with little additional adjuvants required. Non-ionic surfactant is required at 0.125-0.25% v/v. However, best results are achieved by adding 0.125 to 0.25% v/v of crop oil concentrate or methylated seed oil to the surfactant. Ammonium sulfate or another nitrogen source is recommended for most applications. Refer to the label for additional use restrictions.
- S33. Pursuit (imazethapyr)** controls many grass and broadleaf weed species. Imazethapyr can also be used at

* or generic equivalent.

the 4 oz/A (2 AS) or 1.44 oz/A (70 DG) rate in southern Minnesota up to the northern boundary defined by state highway 210. Imazethapyr can also be used postemergence at the 3 oz/A (2 AS) or 1.08 oz/A (70 DG) rate in Minnesota north of state highway 210. This northern label applies only to nightshade, kochia, pigweed, and mustard. Imazethapyr has both soil and postemergence herbicide activity. Under Minnesota's environmental conditions, preemergence applications will be less successful than preplant incorporated applications due to the need for sufficient and timely rainfall to move the herbicide into the weed germination zone. Incorporation of imazethapyr into the top 2 to 3 inches of soil will result in more consistent soil-applied weed control, see the label for incorporation details. However preplant incorporated applications of imazethapyr will not consistently control high populations of foxtail or large-seeded broadleaf weeds, such as cocklebur and common ragweed. Tank mixtures of imazethapyr with either trifluralin (Treflan*), alachlor (Lasso*), s-metolachlor (Dual II Magnum*), or pendimethalin (Prowl* or the package mixture Pursuit Plus) will improve foxtail control. Postemergence application of imazethapyr will be necessary to control cocklebur or common ragweed. Postemergence applications of imazethapyr will be most successful if tank mixed with 0.25% v/v of nonionic surfactant or 2 pt/A of crop oil concentrate or 1.5 pt/A of a methylated seed oil such as Sun-It and 1-2 qt/A of liquid fertilizer and applied to weeds that are less than 3 inches tall and actively growing. Imazethapyr has been known to cause severe crop injury when applied under hot (greater than 90°F) conditions, cold conditions (less than 40°F), or when the wrong rate or adjuvant is used. Late applications of imazethapyr, to soybeans in mid-bloom, are also discouraged due to increased crop yield reduction and increased likelihood of crop rotation restrictions. **To prevent crop injury, imazethapyr should be applied before soybeans bloom.** Postemergence, imazethapyr is weak on the control of common lambsquarters. Imazethapyr should not be tank mixed with chlorimuron (Classic). Imazethapyr may be tank mixed with a postemergence grass herbicide for volunteer corn control, however, tank mixtures may antagonize control of annual grasses. If necessary, a postemergence grass herbicide may be applied before or after an application of imazethapyr. However wait at least one week before applying the postemergence grass herbicide.

- S34. Raptor (imazamox)** controls many grass and broadleaf weed species. Imazamox can be used at the 4 oz/A rate when following a soil-applied grass herbicide or at the 5 oz/A rate when used alone. Only one application of imazamox may be made per growing season. Apply to weeds that are actively growing and before they exceed 5 inches, unless the label states otherwise. Always use either 2 pts/A of crop oil concentrate or 0.25% of nonionic surfactant plus either 1 to 2 qts/A of liquid nitrogen or 2.5 lb/A of ammonium sulfate.
- S35. Resource (flumiclorac)** controls several broadleaf weed species in soybean. Velvetleaf is especially susceptible to Resource. Resource is a contact herbicide and a temporary burning or spotting of soybean leaves is to be expected. Adjuvant rate is dependent upon tank mix partner but crop oil concentrate or nonionic surfactant either with or without nitrogen fertilizer increases Resources' effectiveness.
- S36. Roundup Ready tolerant soybean varieties** will allow for postemergence applications of glyphosate. Varieties must be designated as Roundup Ready. **Do Not** allow spray to contact desirable vegetation other than crops tolerant to glyphosate. Glyphosate does not have soil residual activity. Therefore use in conjunction with a soil residual herbicide or plan on two applications of glyphosate if weed populations or environmental conditions would enhance weed / crop competition. Roundup may be applied from emergence until 14 days before harvest. The total in-crop applications from emergence through flowering is 1.5 lbs. a.i./A (2.4 qts./A); the maximum for any single in-crop application is 1 lbs a.i./A (1.6 qts./A).
- S37. Scepter (imazaquin)** has a label that extends into Minnesota. The northern boundary for imazaquin use in Minnesota is state highway 210. Technically, imazaquin can be applied preplant incorporated or postemergence. However, in Minnesota, you cannot rotate to corn, wheat, barley, or oats in the fall or in the spring of the year following a soil application of imazaquin or a postemergence application exceeding 1.4 oz/A. These same crop rotation restrictions apply to postemergence applications of imazaquin at 1.4 oz/A, if less than 10 inches of rainfall is received from time of application through October 31. If the minimum rainfall requirement is met then corn, barley, or oats can be planted 11 months after imazaquin application and wheat can be planted 4 months after application. Root crops such as sugarbeets and potatoes are extremely sensitive to imazaquin, please check the crop rotation periods specified on the current imazaquin label.
- S38. Synchrony XP (thifensulfuron + chlorimuron)** controls many broadleaf weed species in conventional, or Roundup Ready (0.375 oz/A) and Roundup Ready/ STS stacked or STS tolerant soybeans (0.375 oz/A). Apply anytime after first trifoliolate leaves have expanded and before soybean flowering on actively growing 1 to 4-inch weeds. Always add either a crop oil concentrate (COC) or a nonionic surfactant (NIS) with Synchrony. COC is the required adjuvant unless tank mixing with a product that precludes the use of COC. An ammonium nitrogen fertilizer may also be required and combinations of fertilizer and NIS or COC must meet all tank mixture requirements. For example, some forms of glyphosate require NIS and ammonium sulfate while other forms of glyphosate have a prepackaged adjuvant system. See the glyphosate manufacture's label for specific instructions.
- S39. 2,4-DB amine (Butoxone, Butyrac)** is labeled for postemergence control of common cocklebur in soybeans. Weed control is less satisfactory and the potential for crop injury greater when 2,4-DB is used than when other postemergence broadleaf herbicides are used. When using 2,4-DB at or above the .7 pt/A rate it must be applied as a post-directed spray. **Do Not** allow spray to contact the soybean growing point as excessive crop injury will result.

* or generic equivalent.

Table S1.

Package mixtures labeled for use in Soybeans are as follows:

Trade Name	Formulation	Common Name	Active Ingredient
Boundary	6.5 L	s-metolachlor & metribuzin	5.25 lb/gal & 1.25 lb/gal
Fusion	2.56 E	fluazifop-P & fenoxaprop	2 lb/gal & 0.56
Pursuit Plus	2.9 E	imazethapyr & pendimethalin	0.2 lb/gal & 2.9 lb/gal
Rezult	1E + 5S	sethoxydim + bentazon	1 lb/gal + 5 lb/gal
Storm	4 S	bentazon & acifluorfen	2.67 lb/gal & 1.33 lb/gal
Synchrony XP	28.4 DF	chlorimuron & thifensulfuron	21.5% & 6.9%

Package mixtures labeled for use in Herbicide Resistant Soybeans are as follows:

Trade Name	Formulation	Common Name	Active Ingredient
Extreme	2.175 L	imazethapyr & glyphosate	0.17 lb/gal & 2 lb/gal
Synchrony XP	28.4 DF	chlorimuron & thifensulfuron	21.5% & 6.9%

Table S2. Crop Stage and Harvest Restrictions for Soybeans

Herbicide Name	Minimum Crop Stage	Maximum Crop Stage	Grain Harvest Restriction (days)
<u>Conventional Soybean</u>			
Aim (carfentrazone-ethyl)	V3	V10	none
Arrow (clethodim)	none	none	60
Assure II (quizalofop)	none	before pod set	80
Basagran (bentazon)	none	none	none
Boundary 6.5 (s-metolachlor & metribuzin)	n.a.	n.a.	none
Butoxone (2,4-DB)	7-10 days prior to bloom (broadcast)	mid-bloom	60
Butyrac (2,4-DB)	7-10 days prior to bloom (broadcast)	mid-bloom	60
Charger MAX (s-metolachlor & benoxacor)	n.a.	n.a.	none
Cinch (s-metolachlor & benoxacor)	n.a.	n.a.	none
Classic (chlorimuron)	after first trifoliolate	none	60
Cobra (lactofen)	none	R6 (full seed) growth stage	45
Command (clomazone)	n.a.	n.a.	none
Define (flufenacet)	n.a.	n.a.	none
Dual II Magnum (s-metolachlor & benoxacor)	n.a.	n.a.	none
Dual Magnum (s-metolachlor)	n.a.	n.a.	none
FirstRate (chloransulam-methyl)	none	prior to 50 % flowering	65
Flexstar (fomesafen)	none	prior to bloom	none
Fusilade DX (fluazifop-P)	none	prior to bloom	none
Fusion (fluazifop-P & fenoxaprop)	none	prior to bloom	none
glyphosate, others (glyphosate)	n.a.	n.a.	7
Gramoxone (paraquat)	65% of seedpods brown	none	15
Harmony GT XP (thifensulfuron)	after first trifoliolate has fully expanded	none	60
Intrro (alachlor)	n.a.	n.a.	none
Lasso (alachlor)	n.a.	n.a.	none
Outlook (dimethenamid-P)	n.a.	third trifoliolate	none
Parallel (metolachlor & benoxacor)	n.a.	n.a.	none
Parallel PCS (metolachlor)	n.a.	n.a.	none
Pendant (pendimethalin)	n.a.	n.a.	none
Pendimax (pendimethalin)	n.a.	n.a.	none
Phoenix (lactofen)	none	R6 (full seed)	45
Poast (sethoxydim)	none	none	75
Poast Plus (sethoxydim)	none	none	75
Prism (clethodim)	none	none	60
Prowl (pendimethalin)	n.a.	n.a.	none
Prowl H20 (pendimethalin)	n.a.	n.a.	none
Pursuit (imazethapyr)	none	before bloom	85
Pursuit Plus (imazethapyr & pendimethalin)	n.a.	n.a.	85

Table S2. Crop Stage and Harvest Restrictions for Soybeans

Herbicide Name	Minimum Crop Stage	Maximum Crop Stage	Grain Harvest Restriction (days)
Python (flumetsulam)	n.a.	n.a.	85
Raptor (imazamox)	none	prior to bloom	85
Reflex (fomesafen)	none	prior to bloom	none
Resource (flumiclorac)	none	none	60
Rezult (sethoxydim + bentazon)	none	none	75
Section (clethodim)	none	none	60
Select (clethodim)	none	none	60
Select Max (clethodim)	none	none	60
Sencor (metribuzin)	n.a.	n.a.	none
sodium chlorate, others (sodium chlorate)	n.a.	n.a.	7 to 10
Sonalan (ethalfluralin)	n.a.	n.a.	none
Spartan (sulfentrazone)	n.a.	n.a.	none
Storm (bentazon & acifluorfen)	none	none	50
Synchrony XP (chlorimuron & thifensulfuron)	after first trifoliolate is open	none	60
Targa (quizalofop)	none	none	80
Treflan (trifluralin)	n.a.	n.a.	none
trifluralin, others (trifluralin)	n.a.	n.a.	none
Trust (trifluralin)	n.a.	n.a.	none
Ultra Blazer (acifluorfen)	none	none	50
Valor (flumioxazin)	n.a.	n.a.	none
<u>Roundup Ready Soybean</u>			
Cornerstone (glyphosate)	none	none	7
Durango (glyphosate)	none	none	7
Extreme (imazethapyr & glyphosate)	none	before bloom	85
Glyphomax XRT (glyphosate)	none	none	7
glyphosate, others (glyphosate)	emergence	6 leaf	60
Roundup Original MAX (glyphosate)	none	throughout flowering	7
Roundup WeatherMAX (glyphosate)	none	throughout flowering	7
Touchdown (glyphosate)	n.a.	flowering	14
<u>Sulfonylurea Tolerant Soybean</u>			
Harmony GT XP (thifensulfuron)	after first trifoliolate has fully expanded	none	60
Synchrony XP (chlorimuron & thifensulfuron)	after first trifoliolate is open	none	60

Table S3. Summary of herbicides for use in Soybeans

Application Type			
Herbicide / Formulation	Rate Range	Crop Tolerance	Remarks
<u>Conventional Soybean</u>			
<u>No-Till or Minimum Till</u>			
2,4-D LV Ester 4 E (2,4-D)	0.75 to 2 pts (0.36 to 1 lb ai/A)	-	Controls small emerged broadleaf weeds prior to planting of soybeans. If rate less than 0.5 lb/A wait 7 days before planting soybeans. If rate 0.5 to 1.0 lb/A, wait 30 days before planting soybeans.
Butoxone 200 2 L (2,4-DB)	0.7 to 0.9 pts (0.18 to 0.22 lb ai/A)	-	Controls small emerged broadleaf weeds prior to planting or emergence of soybeans.
Butyrac 175 2 S Butyrac 200 2 S (2,4-DB)	0.8 to 1 pt 0.7 to 0.9 pt (0.18 to 0.22 lb ai/A)	-	Controls small emerged broadleaf weeds prior to planting or emergence of soybeans.
Cornerstone 3 S Durango 4 S Glyphomax XRT 4 S Roundup Original MAX 4.5 S Roundup WeatherMAX 4.5 S (glyphosate)	0.5 to 8 pts 0.5 to 8 pts 0.5 to 8 pts 10 to 83 oz 10 to 83 oz (0.19 to 3 lb ai/A)	-	Apply prior to soybean emergence. At lower rates, controls emerged annual grass and broadleaf weeds. At higher rates, suppresses emerged perennial weeds. A nonselective translocated herbicide with no soil activity so commonly combined with residual herbicides.
Gramoxone Inteon 2 S Gramoxone Max 3 S (paraquat)	2 to 4 pts 1.3 to 2.7 pts (0.5 to 1 lb ai/A)	-	Apply prior to soybean emergence. Controls emerged annual grass and broadleaf weeds. A nonselective contact herbicide with no soil activity so commonly combined with residual herbicides. Rate of application will vary with weed size. Apply with 1 to 2 pts of nonionic spreader per 100 gal of spray solution (.125 to .25% v/v) or 1.0% v/v of oil concentrate. A restricted use pesticide.
Sencor 75 DF (metribuzin)	2 to 5.3 oz (0.09 to 0.25 lb ai/A)	-	Adds burndown and preemergence control of some broadleaf weeds. Can be applied up to 30 days prior to soybean planting. Effective on less than 2 inch tall horseweed (<i>Conyza canadensis</i>).
Touchdown Hi-Tech 5 L Touchdown Total 4.17 L (glyphosate)	0.8 to 6.4 pts 0.8 to 6.8 pts (0.5 to 4 lb ai/A)	-	Apply prior to soybean emergence. At lower rates, controls emerged annual grass and broadleaf weeds. At higher rates, suppresses emerged perennial weeds. A nonselective translocated herbicide with no soil activity so commonly combined with residual herbicides.
<u>Preplant Incorporated</u>			
Boundary 6.5 L (s-metolachlor & metribuzin)	1.25 to 3 pts (0.98 to 2.44 lb ai/A)	F/G	Provides control of many annual grass and broadleaf weeds (including waterhemp). Boundary will reduce weed competition for approximately a 30-day period and must be followed by a planned postemergence herbicide.
Charger MAX 7.64 E (s-metolachlor & benoxacor)	1 to 2 pts (0.96 to 1.91 lb ai/A)	G	Controls annual grasses and some broadleaves. Apply preplant incorporated or preemergence. Also cleared for fall preplant, early preplant for no-till and minimum-till, where it can be applied as a split application treatment.
Cinch 7.64 E (s-metolachlor & benoxacor)	1 to 2.6 pts (0.96 to 2.48 lb ai/A)	G	Controls annual grasses and some broadleaves. Apply preplant incorporated or preemergence. Also cleared for fall preplant, early preplant for no-till and minimum-till, where it can be applied as a split application treatment.

Table S3. Summary of herbicides for use in Soybeans

<u>Application Type</u>		Crop	
Herbicide / Formulation	Rate Range	Tolerance	Remarks
<u>Conventional Soybean</u>			
<u>Preplant Incorporated</u>			
Define SC 4 SC (flufenacet)	8 to 14 fl oz (0.23 to 0.45 lb ai/A)	G	Controls early season (3 to 6 weeks) annual weeds and some broadleaf weeds. Can apply up to 14 days before planting. Can be tank mixed with other herbicides registered for use in soybeans, unless prohibited by another label.
Dual II Magnum 16 G Dual II Magnum 7.64 E (s-metolachlor & benoxacor)	6 to 12 lbs 1 to 2 pts (0.96 to 1.91 lb ai/A)	G	Controls annual grasses and some broadleaves. Apply preplant incorporated or preemergence. Also cleared for fall preplant, early preplant for no-till and minimum-till, where it can be applied as a split application treatment.
Dual Magnum 7.62 E (s-metolachlor)	1 to 2 pts (0.96 to 1.91 lb ai/A)	G	Controls annual grasses and some broadleaves. Apply preplant incorporated or preemergence. Also cleared for fall preplant, early preplant for no-till and minimum-till, where it can be applied as a split application treatment.
FirstRate 84 DG (chloransulam-methyl)	0.6 to 0.75 oz (0.0315 to 0.39 lb ai/A)	F/G	Controls many annual broadleaf weeds. Rate and effectiveness is affected by soil organic matter. FirstRate is registered for use with other herbicides registered for soil application. For best results apply within 2 weeks of planting.
Intro 4 EC (alachlor)	3 to 6 pts (1.75 to 3 lb ai/A)	G	Controls annual grass and some broadleaf weeds including nightshade. Weak on wild mustard. Cleared postemergence but less effective on emerged weeds. Cropstar is for custom application only. Alachlor is a restricted use pesticide.
Lasso 10 G Lasso 4 EC Micro-Tech 4 MT (alachlor)	16 to 20 lbs 3 to 6 pts 3 to 6 pts (1.75 to 3 pts lb ai/A)	G	Controls annual grass and some broadleaf weeds including nightshade. Weak on wild mustard. Cleared postemergence but less effective on emerged weeds. Cropstar is for custom application only. Alachlor is a restricted use pesticide.
Outlook 6 E (dimethenamid-P)	10 to 21 fl oz (0.47 to 0.98 lb ai/A)	G	Controls annual grass and some broadleaf weeds. If applied preplant incorporated, restrict tillage to 1-2 inches in depth. Can apply early preplant for no-till and minimum till if applied as a split application treatment. Can be applied through third trifoliolate leaf stage.
Parallel 7.8 E (metolachlor & benoxacor)	1 to 2 pts (0.96 to 1.95 lb ai/A)	G	Controls annual grasses and some broadleaves. Apply preplant incorporated or preemergence. Also cleared for fall preplant, early preplant for no-till and minimum-till, where it can be applied as a split application treatment
Parallel PCS 8 E (metolachlor)	1 to 2 pts (1 to 2 lb ai/A)	G	Controls annual grasses and some broadleaves. Apply preplant incorporated or preemergence. Also cleared for fall preplant, early preplant for no-till and minimum-till, where it can be applied as a split application treatment
Pendant 3.3 E (pendimethalin)	1.2 to 3.6 pts (0.5 to 1.5 lb ai/A)	F/G	Controls annual grass and some broadleaf weeds. Apply preplant incorporated only. Do Not exceed recommended rates for the soil type or carryover may injure sensitive crops the following year.
Pendimax 3.3 E (pendimethalin)	1.2 to 3.6 pts (0.5 to 1.5 lb ai/A)	F/G	Controls annual grass and some broadleaf weeds. Apply preplant incorporated only. Do Not exceed recommended rates for the soil type or carryover may injure sensitive crops the following year.
Prowl 3.3 E (pendimethalin)	1.2 to 3.6 pts (0.5 to 1.5 lb ai/A)	F/G	Controls annual grass and some broadleaf weeds. Apply preplant incorporated only. Do Not exceed recommended rates for the soil type or carryover may injure sensitive crops the following year.
Prowl H20 3.8 CS (pendimethalin)	1 to 3 pts (0.5 to 1.5 lb ai/A)	F/G	Controls annual grass and some broadleaf weeds. Apply preplant incorporated only. Do Not exceed recommended rates for the soil type or carryover may injure sensitive crops the following year.

Table S3. Summary of herbicides for use in Soybeans

<u>Application Type</u>		Crop	
Herbicide / Formulation	Rate Range	Tolerance	Remarks
<u>Conventional Soybean</u>			
<u>Preplant Incorporated</u>			
Pursuit 70 DG (imazethapyr)	1.44 oz (0.063 lb ai/A)	F/G	Controls some annual grass and broadleaf weeds. Two-pass incorporation is recommended, see the label for details. Application can be made up to 45 days prior to planting.
Pursuit Plus 2.9 E (imazethapyr & pendimethalin)	2.5 pts (0.9 lb ai/A)	F/G	Controls some annual grass and broadleaf weeds. Two-pass incorporation is recommended, see the label for details. Application can be made up to 45 days prior to planting.
Python 80 WDG (flumetsulam)	0.8 to 1.3 oz (0.04 to 0.07 lb ai/A)	F/G	Python controls many annual broadleaf weeds. Can be tank mixed with all preplant or preemergence grass herbicides labeled for soybeans.
Sencor 75 DF (metribuzin)	0.3 to 1.2 lbs (0.25 to 0.88 lb ai/A)	F/G	Controls many broadleaf weeds including wild mustard. Apply early preplant, preplant incorporated or preemergence. Use in mixtures with grass herbicides. Soybean tolerance is marginal. In early preplant application, a second preemergence application can be used to extend weed control.
Sonalan 10 G Sonalan 3 E (ethalfluralin)	5.5 to 13 lbs 1.5 to 3.5 pts (0.56 to 1.31 lb ai/A)	F/G	Controls annual grasses and some broadleaf weeds. At 3 to 3.5 pts/A and two incorporation passes, partial control of eastern black is achieved.
trifluralin 10 G trifluralin 4 E (trifluralin)	5 to 10 lbs 1 to 2 pts (0.5 to 1 lb ai/A)	F/G	Controls annual grass and some broadleaf weeds. Apply preplant incorporated in the fall or spring. Do Not exceed recommended rates for the soil type or carryover may injure sensitive crops the following year.
<u>Preemergence</u>			
Boundary 6.5 L (s-metolachlor & metribuzin)	1.25 to 3 pts (0.98 to 2.44 lb ai/A)	F/G	Provides control of many annual grass and broadleaf weeds (including waterhemp). Boundary will reduce weed competition for approximately a 30-day period and must be followed by a planned postemergence herbicide.
Charger MAX 7.64 E (s-metolachlor & benoxacor)	1 to 2 pts (0.96 to 1.91 lb ai/A)	G	Controls annual grasses and some broadleaves. Apply preplant incorporated or preemergence. Also cleared for fall preplant, early preplant for no-till and minimum-till, where it can be applied as a split application treatment.
Cinch 7.64 E (s-metolachlor & benoxacor)	1 to 2.6 pts (0.96 to 2.48 lb ai/A)	G	Controls annual grasses and some broadleaves. Apply preplant incorporated or preemergence. Also cleared for fall preplant, early preplant for no-till and minimum-till, where it can be applied as a split application treatment.
Cobra 2 E (lactofen)	12.5 to 19 oz (0.2 to 0.3 lb ai/A)	F/G	Preemergence application targeted for nightshade, pigweed spp. and common lambsquarter. May be applied in a preemergence/postemergence sequence but must not exceed 0.4 lb a.i./A/season.
Command 3 ME (clomazone)	1.3 to 2.6 pts (0.5 to 1 lb ai/A)	G	Controls some annual grass and broadleaf weeds, especially good on velvetleaf. Apply preemergence or shallow incorporation. If cultivation is necessary Command 3ME may be rotary-hoed or shallow-cultivated.
Define SC 4 SC (flufenacet)	8 to 14 fl oz (0.23 to 0.45 lb ai/A)	G	Controls early season (3 to 6 weeks) annual weeds and some broadleaf weeds. Can apply up to 14 days before planting. Can be tank mixed with other herbicides registered for use in soybeans, unless prohibited by another label.
Dual II Magnum 16 G Dual II Magnum 7.64 E (s-metolachlor & benoxacor)	6 to 12 lbs 1 to 2 pts (0.96 to 1.91 lb ai/A)	G	Controls annual grasses and some broadleaves. Apply preplant incorporated or preemergence. Also cleared for fall preplant, early preplant for no-till and minimum-till, where it can be applied as a split application treatment.

Table S3. Summary of herbicides for use in Soybeans

<u>Application Type</u>		Crop	
Herbicide / Formulation	Rate Range	Tolerance	Remarks
<u>Conventional Soybean</u>			
<u>Preemergence</u>			
Dual Magnum 7.62 E (s-metolachlor)	1 to 2 pts (0.96 to 1.91 lb ai/A)	G	Controls annual grasses and some broadleaves. Apply preplant incorporated or preemergence. Also cleared for fall preplant, early preplant for no-till and minimum-till, where it can be applied as a split application treatment. Controls annual grasses and some broadleaves. Apply preplant incorporated or preemergence. Also cleared for fall preplant, early preplant for no-till and minimum-till, where it can be applied as a split application treatment.
FirstRate 84 DG (chloransulam-methyl)	0.6 to 0.75 oz (0.0315 to 0.39 lb ai/A)	F/G	Controls many annual broadleaf weeds. Rate and effectiveness is affected by soil organic matter. FirstRate is registered for use with other herbicides registered for soil application. For best results apply within 2 weeks of planting.
Intro 4 EC (alachlor)	3 to 6 pts (1.75 to 3 lb ai/A)	G	Controls annual grass and some broadleaf weeds including nightshade. Weak on wild mustard. Cleared postemergence but less effective on emerged weeds. Cropstar is for custom application only. Alachlor is a restricted use pesticide.
Lasso 10 G Lasso 4 EC Micro-Tech 4 MT (alachlor)	16 to 20 lbs 3 to 6 pts 3 to 6 pts (1.75 to 3 pts lb ai/A)	G	Controls annual grass and some broadleaf weeds including nightshade. Weak on wild mustard. Cleared postemergence but less effective on emerged weeds. Cropstar is for custom application only. Alachlor is a restricted use pesticide.
Outlook 6 E (dimethenamid-P)	10 to 21 oz (0.47 to 0.98 lb ai/A)	G	Controls annual grass and some broadleaf weeds. If applied preplant incorporated, restrict tillage to 1-2 inches in depth. Can apply early preplant for no-till and minimum till if applied as a split application treatment. Can be applied through third trifoliolate leaf stage.
Parallel 7.8 E (metolachlor & benoxacor)	1 to 2 pts (0.96 to 1.95 lb ai/A)	G	Controls annual grasses and some broadleaves. Apply preplant incorporated or preemergence. Also cleared for fall preplant, early preplant for no-till and minimum-till, where it can be applied as a split application treatment
Parallel PCS 8 E (metolachlor)	1 to 2 pts (1 to 2 lb ai/A)	G	Controls annual grasses and some broadleaves. Apply preplant incorporated or preemergence. Also cleared for fall preplant, early preplant for no-till and minimum-till, where it can be applied as a split application treatment
Python 80 WDG (flumetsulam)	0.8 to 1.3 oz (0.04 to 0.07 lb ai/A)	F/G	Python controls many annual broadleaf weeds. Can be tank mixed with all preplant or preemergence grass herbicides labeled for soybeans.
Sencor 75 DF (metribuzin)	0.3 to 1.2 lbs (0.25 to 0.88 lb ai/A)	F/G	Controls many broadleaf weeds including wild mustard. Apply early preplant, preplant incorporated or preemergence. Use in mixtures with grass herbicides. Soybean tolerance is marginal. In early preplant application, a second preemergence application can be used to extend weed control.
Valor 51 WDG (flumioxazin)	2 to 3 oz (0.063 to 0.094 lb ai/A)	F/G	Apply up to 14 days prior to soybean planting or preemergence. Provides residual control of small seeded broadleaf weeds and suppression of some annual grasses; flumioxazin + chloransulam methyl improves control of several composite weed species (common cocklebur and sunflower). Do Not apply to emerged beans. Do Not incorporate. Do Not tank mix with acetanilide herbicides like Dual, Axiom, Domain, Boundary, Lasso, or Outlook, or crop injury may occur.
<u>Postemergence</u>			
Arrow 2 EC (clethodim)	4 to 16 fl oz (0.063 to 0.25 lb ai/A)	G	Controls annual grasses, corn and quackgrass. For best results apply when grasses are 2-6 inches and actively growing. Use low rate on corn up to 12 inches tall and grasses up to 4 inches tall. Quackgrass may require two applications. Always add a crop oil concentrate at 1% v/v but not less than 1 pt/A. Weed control is often improved by addition of a nitrogen source.

Table S3. Summary of herbicides for use in Soybeans

<u>Application Type</u>		Crop	
Herbicide / Formulation	Rate Range	Tolerance	Remarks
<u>Conventional Soybean</u>			
<u>Postemergence</u>			
Assure II 0.88 E (quizalofop)	5 to 10 fl oz (0.03 to 0.06 lb ai/A)	G	Controls annual grasses, corn, and quackgrass. For best results apply when grasses are 2 to 4 inches and actively growing. Quackgrass may require two applications. Always add a surfactant or crop oil concentrate. Do Not use vegetable oils as an additive; they are not effective with Assure. Tank mixtures with the following labeled mixtures will not effectively control yellow foxtail, crabgrass, or quackgrass.
Basagran 4 S (bentazon)	1 to 2 pt (0.5 to 1 lb ai/A)	G	Controls many broadleaf weeds, nutsedge and Canada thistle. For best results apply to weeds in the 2 to 4 leaf stage and actively growing. Addition of 4 qt/A 28% N improves velvetleaf control, decreases lambsquarter control; 28% N and oil concentrate can be tank mixed for full spectrum weed control. May be applied in a split application.
Butoxone 175 1.75 L	1 to 1.75 pt	P	Mainly for cocklebur control. Apply as a post-directed spray to soybeans at least 8 inches tall. Cocklebur should not exceed 3 inches in height or other weeds 2 inches in height.
Butoxone 200 2 L	0.9 to 1.6 pts		
Butoxone 7500 75 DF (2,4-DB)	0.3 to 0.5 lbs (0.22 to 0.38 lb ai/A)		
Butyrac 175 2 S	0.8 to 1.8 pts	P	Mainly for cocklebur control. Apply as a post-directed spray to soybeans at least 8 inches tall. Cocklebur should not exceed 3 inches in height or other weeds 2 inches in height.
Butyrac 200 2 S (2,4-DB)	0.7 to 1.6 pts (0.18 to 0.35 lb ai/A)		
Classic 25 DF (chlorimuron)	0.5 to 0.75 oz (0.008 to 0.012 lb ai/A)	F	Controls some major broadleaf weeds. For best results apply to actively growing weeds in the 1 to 3 leaf stage. A surfactant is recommended. Oil concentrate may increase soybean injury. Do Not apply to soils with a pH greater than 7.0.
Cobra 2 E (lactofen)	6 to 12.5 fl oz (0.09 to 0.2 lb ai/A)	F	Controls many broadleaf weeds. For best results apply to weeds in the 2 to 4 leaf stage and actively growing. Contact burn of soybean leaves frequently occurs, especially when using 1 pt/A of crop oil concentrate. However, soybeans will recover under good growing conditions.
FirstRate 84 DG (chloransulam-methyl)	0.3 oz (0.016 lb ai/A)	G	Controls some major broadleaf weeds. For best results apply to 2 to 4 inch weeds that are actively growing and prior to soybean flowering. Use 0.125 to .25% v/v of nonionic surfactant plus 2.5% v/v of UAN or 1.2% crop oil concentrate.
Flexstar 1.88 L (fomesafen)	0.75 to 1 pt (0.176 to 0.235 lb ai/A)	F/G	Controls several annual broadleaf weeds. For best results apply to weeds in the 2- to 4-leaf stage and actively growing. It is necessary to use 0.25% to 0.50% nonionic surfactant or 0.50% to 1% oil concentrate. In addition, 1 to 2% v/v UAN or 28%N or 8.5 lbs of AMS / 100 gallons of spray solution may be added with the surfactant or oil concentrate. Do Not apply to any field more than once every two years. Is not approved for use in all MN counties, see label for details.
Fusilade DX 2 E (fluazifop-P)	0.38 to 0.75 pts (0.09 to 0.19 lb ai/A)	G	Controls annual grasses, corn and quackgrass. For best results apply when grasses are 2 to 4 leaf and actively growing. Quackgrass or volunteer corn may require two applications. Always add a surfactant or crop oil concentrate.
Fusion 2.56 E (fluazifop-P & fenoxaprop)	4 to 10 fl oz (0.08 to 0.2 lb ai/A)	G	Controls annual grasses, corn and quackgrass. For best results apply when grasses are 2 to 4 leaf and actively growing. Quackgrass or volunteer corn may require two applications. Always add a surfactant or crop oil concentrate.

Table S3. Summary of herbicides for use in Soybeans

Application Type		Crop	
Herbicide / Formulation	Rate Range	Tolerance	Remarks
Conventional Soybean			
Postemergence			
Harmony GT XP 75 DF (thifensulfuron)	0.08 oz (0.004 lb ai/A)	F	Controls several broadleaf weeds (eg. lambsquarters). For best results apply to young and actively growing weeds. A nonionic surfactant is always required, at a rate of 0.125% v/v to 0.25% v/v plus either 4 to 8 pts/A of 28% N or 2 to 4 lb/A of ammonium sulfate, when velvetleaf is present. In Roundup Ready/ STS stacked varieties always add 4.25 to 17 lbs./ 100 gal of AMS and if the glyphosate does not have a built-in adjuvant system and NIS as well . Avoid application during hot (greater than 90°F) or humid (greater than 70% R.H. conditions) else crop injury may occur.
Phoenix 2 E (lactofen)	8 to 12.5 fl oz (0.125 to 0.195 lb ai/A)	F/G	Controls several broadleaf weeds including common ragweed, nightshade, pigweed, and waterhemp. Apply 2-4 inch weeds that are actively growing. Non-ionic surfactant at 0.125 to 0.250% v/v required.
Poast 1.5 E (sethoxydim)	0.5 to 2 pts (0.09 to 0.38 lb ai/A)	G	Controls annual grasses and corn and suppresses quackgrass. For best results apply when grasses are 2 to 6 inches and actively growing. Quackgrass may require two applications; addition of ammonium sulfate or 28% N along with oil concentrate is necessary for the best quackgrass control.
Poast Plus 1 E (sethoxydim)	0.75 to 3 pts (0.09 to 0.38 lb ai/A)	G	Controls annual grasses and corn and suppresses quackgrass. For best results apply when grasses are 2 to 6 inches and actively growing. Quackgrass may require two applications; addition of ammonium sulfate or 28% N along with oil concentrate is necessary for the best quackgrass control. Poast Plus is a premixture of sethoxydim plus an additive.
Prism 0.94 E (clethodim)	0.51 to 2.1 pts (0.06 to 0.25 lb ai/A)	G	Controls annual grasses, corn and quackgrass. For best results apply when grasses are 2-6 inches and actively growing. Use low rate on corn up to 12 inches tall and grasses up to 4 inches tall. Quackgrass may require two applications. Always add a crop oil concentrate at 1% v/v but not less than 1 pt/A. Weed control is often improved by addition of a nitrogen source.
Pursuit 70 DG (imazethapyr)	1.08 to 1.44 oz (0.047 to 0.063 lb ai/A)	F	Controls several annual grass and broadleaf weeds. Use the 0.047 a.i./A rate north of Highway 210. Use of 0.25% v/v (2 pts/100 gal) of nonionic surfactant and 1 qt/A liquid fertilizer is recommended; see label for details. Apply when weeds are actively growing and less than 3 inches. Imazethapyr is available in a 70 DG water soluble pack. See label for rate information.
Raptor 1 S (imazamox)	4 to 5 fl oz (0.03 to 0.04 lb ai/A)	G	Controls several annual grass and broadleaf weeds. Use the 0.03 lb/A following a soil applied grass herbicide and the 0.04 lb a.i./A rate when used alone. Apply to weeds 5 inches or less in height. Use either a nonionic surfactant or crop oil plus liquid fertilizer as adjuvants.
Reflex 2 LC (fomesafen)	0.75 to 1 pt (0.188 to 0.25 lb ai/A)	F/G	Controls several annual broadleaf weeds. For best results apply to weeds in the 2- to 4-leaf stage and actively growing. It is necessary to use 0.25% to 0.50% nonionic surfactant or 0.50% to 1% oil concentrate. In addition, 1 gal/A of 28% N or 1 qt/A of 10-34-0 may be added with the surfactant or oil concentrate. Do Not apply to any field more than once every two years. Is not approved for use in all MN counties, see label for details.
Resource 0.86 L (flumiclorac)	4 to 8 fl oz (0.027 to 0.054 lb ai/A)	G	Controls several broadleaf weed species; especially effective on velvetleaf. Always add 1-2 pt/A crop oil concentrate.
Section 2 EC (clethodim)	0.25 to 1 pt (0.06 to 0.25 lb ai/A)	G	Controls annual grasses, corn and quackgrass. For best results apply when grasses are 2-6 inches and actively growing. Use low rate on corn up to 12 inches tall and grasses up to 4 inches tall. Quackgrass may require two applications. Always add a crop oil concentrate at 1% v/v but not less than 1 pt/A. Weed control is often improved by addition of a nitrogen source.

Table S3. Summary of herbicides for use in Soybeans

<u>Application Type</u>		Crop	
Herbicide / Formulation	Rate Range	Tolerance	Remarks
<u>Conventional Soybean</u>			
<u>Postemergence</u>			
Select 2 EC (clethodim)	0.25 to 1 pt (0.063 to 0.25 lb ai/A)	G	Controls annual grasses, corn and quackgrass. For best results apply when grasses are 2-6 inches and actively growing. Use low rate on corn up to 12 inches tall and grasses up to 4 inches tall. Quackgrass may require two applications. Always add a crop oil concentrate at 1% v/v but not less than 1 pt/A. Weed control is often improved by addition of a nitrogen source.
Select Max 0.97 EC (clethodim)	6 to 12 fl oz (0.045 to 0.09 lb ai/A)	G	Controls annual grasses, corn and quackgrass. For best results apply when grasses are 2-6 inches and actively growing. Use low rate on corn up to 12 inches tall and grasses up to 4 inches tall. Quackgrass may require two applications.
Storm 4 S (bentazon & acifluorfen)	1.5 pt (0.75 lb ai/A)	F	Controls many broadleaf weeds. For best results apply to weeds in the, 2 to 4 leaf stage and actively growing. Contact burn of soybean leaves frequently occurs but recovery is rapid. Surfactant is needed for maximum effectiveness.
Synchrony XP 28.4 DF (chlorimuron & thifensulfuron)	0.375 oz (0.0067 lb ai/A)	F	Provides control of many annual broadleaf weeds. Always add either a crop oil concentrate (COC) or a nonionic surfactant (NIS) with Synchrony. COC is the required adjuvant unless tank mixing with a product that precludes the use of COC. An ammonium nitrogen fertilizer may also be required and combinations of fertilizer and NIS or COC must meet all tank mixture requirements. For example, some forms of glyphosate require NIS and ammonium sulfate while other forms of glyphosate have a prepackaged adjuvant system. See the glyphosate manufacturer's label for specific instructions.
Targa 0.88 E (quizalofop)	5 to 12 fl oz (0.034 to 0.083 lb ai/A)	G	Controls annual grasses, corn, and quackgrass. For best results apply when grasses are 2 to 4 inches and actively growing. Quackgrass may require two applications. Always add a surfactant or crop oil concentrate. Do Not use vegetable oils as an additive; they are not effective with Assure. Tank mixtures with the following labeled mixtures will not effectively control yellow foxtail, crabgrass, or quackgrass.
Ultra Blazer 2 S (acifluorfen)	1 to 1.5 pts (0.25 to 0.38 lb ai/A)	F	Controls many broadleaf weeds. For best results apply to weeds in the, 2 to 4 leaf stage and actively growing. Contact burn of soybean leaves frequently occurs but recovery is rapid. Surfactant is needed for maximum effectiveness.
<u>Desiccants</u>			
Cornerstone 3 S	1 to 6 qts	-	Preharvest aid for control of annual and perennial weeds. Activity will be slow on annual weeds. Apply after pods have set and lost all green color. Allow a minimum of 7 days between application and harvest. Not recommended for soybeans grown for seed.
Durango 4 S	24 oz to 4.5 qts		
Glyphomax XRT 4 S	24 oz to 4.5 qts		
Roundup Original MAX 4.5 S	21 oz to 3.8 qts		
Roundup WeatherMAX 4.5 S (glyphosate)	21 oz to 3.8 qts (0.75 to 4.5 lb ai/A)		
Gramoxone Inteon 2 S	8 to 16 oz	-	Soybean harvest aid. Desiccates soybeans, grasses and broadleaf weeds prior to harvest. Apply when at least 65% of the seed pods have reached a mature brown color or when seed moisture is 30% or less. Restricted use pesticide.
Gramoxone Max 3 S (paraquat)	5.4 to 10.7 oz (0.12 to 0.25 lb ai/A)		
sodium chlorate, others (sodium chlorate)	4 qts (6 lb ai/A)	-	Use as a harvest aid. Thorough coverage is essential. Apply 7 to 10 days before harvest when beans are ready for harvest. Do Not graze treated fields or feed treated soybeans.

Table S3. Summary of herbicides for use in Soybeans

Application Type			
Herbicide / Formulation	Rate Range	Crop Tolerance	Remarks
<u>Conventional Soybean</u>			
<u>Dessicants</u>			
Touchdown Hi-Tech 5 L	1.6 pt	-	Preharvest aid for control of annual and perennial weeds. Activity will be slow on annual weeds. Apply after pods have set and lost all green color. Allow a minimum of 7 days between application and harvest. Not recommended for soybeans grown for seed.
Touchdown Total 4.17 L (glyphosate)	1.7 pt (1.0 lb ai/A)		
<u>Roundup Ready Soybean</u>			
<u>Postemergence</u>			
Cornerstone 3 S	24 to 64 oz	G	Labeled for use only on soybeans designated as Roundup Ready Soybeans. This designation indicates that the soybeans have been genetically altered to be resistant to Roundup Ultra and Roundup Original herbicide. Avoid contact with any other desirable plants since injury is possible. Provides broadspectrum control of annual and some perennial weeds. If weeds emerge after glyphosate application a second application will be required. Applications can be made up to and including full bloom of soybeans. There are no crop rotation restrictions following glyphosate. Glyphosate can be tank mixed with most soil-applied and many postemergence soybean herbicides. See label for details.
Durango 4 S	18 to 48 oz		
Glyphomax XRT 4 S	18 to 48 oz		
Roundup Original MAX 4.5 S	16 to 43 oz		
Roundup WeatherMAX 4.5 S (glyphosate)	16 to 43 oz (0.56 to 1.5 lb ai/A)		
Touchdown Hi-Tech 5 L	0.8 to 3.2 pts	G	Labeled for use only on soybeans designated as Roundup Ready Soybeans. This designation indicates that the soybeans have been genetically altered to be resistant to Roundup Ultra and Roundup Original herbicide. Avoid contact with any other desirable plants since injury is possible. Provides broadspectrum control of annual and some perennial weeds. If weeds emerge after glyphosate application a second application will be required. Applications can be made up to and including full bloom of soybeans. There are no crop rotation restrictions following glyphosate. Glyphosate can be tank mixed with most soil-applied and many postemergence soybean herbicides. See label for details.
Touchdown Total 4.17 L (glyphosate)	0.9 to 3.4 pts (0.5 to 2 lb ai/A)		
<u>Sulfonylurea Tolerant Soybean</u>			
<u>Postemergence</u>			
Harmony GT XP 75 DF (thifensulfuron)	0.083 to 0.33 (0.0039 to 0.0156 lb ai/A)	G	Controls several broadleaf weeds (eg. lambsquarters). For best results apply to young and actively growing weeds. A nonionic surfactant is always required, at a rate of 0.125% v/v to 0.25% v/v plus either 4 to 8 pts/A of 28% N or 2 to 4 lb/A of ammonium sulfate, when velvetleaf is present. In Roundup Ready/ STS stacked varieties always add 4.25 to 17 lbs./ 100 gal of AMS and if the glyphosate does not have a built-in adjuvant system and NIS as well. Avoid application during hot (greater than 90°F) or humid (greater than 70% R.H. conditions) else crop injury may occur.
Synchrony XP 28.4 DF (chlorimuron & thifensulfuron)	0.375 oz (0.0067 lb ai/A)	G	Provides control of many annual broadleaf weeds. Always add either a crop oil concentrate (COC) or a nonionic surfactant (NIS) with Synchrony. COC is the required adjuvant unless tank mixing with a product that precludes the use of COC. An ammonium nitrogen fertilizer may also be required and combinations of fertilizer and NIS or COC must meet all tank mixture requirements. For example, some forms of glyphosate require NIS and ammonium sulfate while other forms of glyphosate have a prepackaged adjuvant system. See the glyphosate manufacture's label for specific instructions.

Table S4. Effectiveness of herbicides on major weeds in Soybeans

Herbicides	Grasses										Broadleaves										Perennials*			
	Barnyardgrass	Woolly Cupgrass	Giant Foxtail	Green Foxtail	Yellow Foxtail	Wild Proso Millet	Sandbur	Cocklebur	Kochia	Common Lambsquarters	Venice Mallow	Wild Mustard	Eastern Black Nightshade	Hairy Nightshade	Common Ragweed	Giant Ragweed	Smartweeds (annual)	Waterhemp	Wild Sunflower	Velvetleaf	Canada Thistle	Yellow Nutsedge	Quackgrass	
Conventional Soybean																								
Preplant Incorporated																								
Boundary 6.5 (s-metolachlor & metribuzin)	G	G	G	G	G	F	F	F	G	G	G	G	F	F	G	F/G	P	G	G	P/F	F/G	N	G	N
Charger MAX (s-metolachlor & benoxacor)	G	G	G	G	G	F	F	N	P	F/P	P	P	F	F	G	P	P	P	G	P	P	N	G	N
Cinch (s-metolachlor & benoxacor)	G	G	G	G	G	F	F	N	P	F/P	P	P	F	F	G	P	P	G	P	P	N	G	N	
Define (flufenacet)	G	F	G	G	G	F	F	N	P	F/P	P	P	F/G	F/G	F/G	P	P	P	F/G	P	P	N	F	N
Dual II Magnum (s-metolachlor & benoxacor)	G	G	G	G	G	F	F	N	P	F/P	P	P	F	F	G	P	P	G	P	P	N	G	N	
Dual Magnum (s-metolachlor)	G	G	G	G	G	F	F	N	P	F/P	P	P	G	F	G	P	P	P	G	P	P	N	F	N
FirstRate (chloransulam-methyl)	N	N	N	N	N	N	N	F/G	G	G	G	G	P	P	G	G	G	G	P	G	G	N	N	N
Intrro (alachlor)	G	G	G	G	G	F	F	N	P	F/P	P	P	F	F	G	P	P	P	G	P	P	N	G	N
Lasso (alachlor)	G	G	G	G	G	F	F	N	P	F/P	P	P	F	F	G	P	P	P	G	P	P	N	G	N
Outlook (dimethenamid-P)	G	G	G	G	G	F	F	N	P	F/P	P	P	F	F	G	P	P	P	G	P	P	N	G	N
Parallel (metolachlor & benoxacor)	G	G	G	G	G	F	F	N	P	F/P	P	P	F	F	G	P	P	G	P	P	N	G	N	
Parallel PCS (metolachlor)	G	G	G	G	G	F	F	N	P	F/P	P	P	F	F	G	P	P	G	P	P	N	G	N	
Pendant (pendimethalin)	G	G	G	G	G	F	G	N	F/G	F/G	P	N	P	P	G	N	N	F	G	N	F	N	N	P
Pendimax (pendimethalin)	G	G	G	G	G	F	G	N	F/G	F/G	P	N	P	P	G	N	N	F	G	N	F	N	N	P
Prowl (pendimethalin)	G	G	G	G	G	F	G	N	F/G	F/G	P	N	P	P	G	N	N	F	G	N	F	N	N	P
Prowl H20 (pendimethalin)	G	G	G	G	G	F	G	N	F/G	F/G	P	N	P	P	G	N	N	F	G	N	F	N	N	P
Pursuit (imazethapyr)	F/G	P	F/G	F/G	F/G	F/P	F/P	P	F/G	F/G	F	G	G	G	G	F	F	G	P	G	G	N	N	F/P
Python (flumetsulam)	N	N	N	N	N	N	N	P/F	G	G	G	G	G	G	G	F/G	F	G	P	F/G	G	N	N	N
Sencor (metribuzin)	F	P	F	F	F	P	P	F	G	G	G	G	P	P	G	G	P	G	G	F	G	P	P	P
Sonalan (ethalfuralin)	G	G	G	G	G	F	G	N	F/G	F/G	P	N	F	P	G	N	N	P	G	N	N	N	N	P
trifluralin, others (trifluralin)	G	G	G	G	G	F	G	N	F/G	F/G	P	N	P	P	G	N	N	P	G	N	N	N	N	P
Preemergence																								
Boundary 6.5 (s-metolachlor & metribuzin)	G	G	G	G	G	F	F	F	G	G	G	G	F	G	F/G	P	G	G	P/F	F/G	N	F	N	
Charger MAX (s-metolachlor & benoxacor)	G	G	G	G	G	F	F	N	P	F/P	P	P	G	F	G	P	P	P	G	P	P	N	F	N
Cinch (s-metolachlor & benoxacor)	G	G	G	G	G	F	F	N	P	F/P	P	P	G	F	G	P	P	P	G	P	P	N	F	N
Command (clomazone)	G	F	G	G	F	F	-	F	G	F/G	G	P	P/F	P	P	F	P	F/G	P	P	G	N	N	N
Define (flufenacet)	G	F	G	G	G	F	F	N	P	F/P	P	P	F/G	F/G	F/G	P	P	P	F/G	P	P	N	F	N
Dual II Magnum (s-metolachlor & benoxacor)	G	G	G	G	G	F	F	N	P	F/P	P	P	G	F	G	P	P	P	G	P	P	N	F	N
FirstRate (chloransulam-methyl)	N	N	N	N	N	N	N	F/G	G	G	G	G	P	P	G	G	G	G	P	G	G	N	N	N
Intrro (alachlor)	G	G	G	G	G	F	F	N	P	F/P	P	P	G	G	G	P	P	P	G	P	P	N	F	N
Lasso (alachlor)	G	G	G	G	G	F	F	N	P	F/P	P	P	G	G	G	P	P	P	G	P	P	N	F	N
Outlook (dimethenamid-P)	G	G	G	G	G	F	F	N	P	F/P	P	P	G	F	G	P	P	P	G	P	P	N	F	N
Parallel (metolachlor & benoxacor)	G	G	G	G	G	F	F	N	P	F/P	P	P	G	F	G	P	P	P	G	P	P	N	F	N
Parallel PCS (metolachlor)	G	G	G	G	G	F	F	N	P	F/P	P	P	G	F	G	P	P	P	G	P	P	N	F	N
Python (flumetsulam)	N	N	N	N	N	N	N	P/F	G	G	G	G	G	G	G	F/G	F	G	P	F/G	G	N	N	N
Sencor (metribuzin)	F	P	F	F	F	P	P	F	G	G	G	G	P	P	G	G	F	G	G	F	F	P	P	P
Valor (flumioxazin)	F/P	F/P	F	F	F/P	F/P	P	P	G	G	F	G	G	G	G	F/P	P	F/P	G	P	F/P	N	P	N

NOTE: G = Good; F= Fair; P = Poor; N = No control. Effectiveness ratings apply if herbicide is used according to label recommendations as to rate, time of application, etc., and favorable temperature and moisture conditions prevail.

* Only control of top, no control of roots.

Table S4. Effectiveness of herbicides on major weeds in Soybeans

Herbicides	Grasses							Broadleaves										Perennials*							
	Barnyardgrass	Woolly Cupgrass	Giant Foxtail	Green Foxtail	Yellow Foxtail	Wild Proso Millet	Sandbur	Cocklebur	Kochia	Common Lambsquarters	Venice Mallow	Wild Mustard	Eastern Black Nightshade	Hairy Nightshade	Common Ragweed	Pigweed spp.	Giant Ragweed	Smartweeds (annual)	Waterhemp	Wild Sunflower	Velvetleaf	Canada Thistle	Yellow Nutsedge	Quackgrass	
Postemergence																									
Arrow (clethodim)	G	G	G	G	G	G	G	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	G
Assure II (quizalofop)	G	F/G	G	G	G	G	-	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	G
Basagran (bentazon)	N	N	N	N	N	N	N	G	F	F	G	G	F	F	P	G	F	G	P	G	G	G	G	N	
Butoxone (2,4-DB)	N	N	N	N	N	N	N	F	-	P	P	P	P	-	P	P	F	P	P	P	P	P	P	N	
Butyrac (2,4-DB)	N	N	N	N	N	N	N	F	-	P	P	P	P	-	P	P	F	P	P	P	P	P	P	N	
Classic (chlorimuron)	N	N	N	N	N	N	N	G	P	P	F	G	P	P	G	G	F/G	G	P	G	F	-	G	N	
Cobra (lactofen)	P	P	P	P	P	P	P	G	F	P	F	G	G	F	G	G	G	F	G	F/G	F	P	P	N	
FirstRate (chloransulam-methyl)	N	N	N	N	N	N	N	G	P	P	G	G	P	P	P	G	G	G	P	G	G	N	N	N	
Flexstar (fomesafen)	P	P	P	P	P	P	P	F	P	P	F/G	G	G	F	G	G	G	F	G	F/G	P	P	N	N	
Fusilade DX (fluzifop-P)	G	F/G	G	G	G	G	G	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	G	
Harmony GT XP (thifensulfuron)	N	N	N	N	N	N	N	P	F	G	-	G	N	N	G	P	P	G	P	P	F/G	-	-	N	
Phoenix (lactofen)	P	P	P	P	P	P	P	F	F/P	P	F/P	F	G	F	G	F/G	F	P	G	P	P	N	N	N	
Poast (sethoxydim)	G	G	G	G	G	G	G	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	F	
Poast Plus (sethoxydim)	G	G	G	G	G	G	G	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	F	
Prism (clethodim)	G	G	G	G	G	G	G	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	G	
Pursuit (imazethapyr)	G	P/F	G	G	G	P	F	G	G	P	P	G	G	G	G	F/G	F	G	P	G	G	P	P	F/P	
Raptor (imazamox)	G	P/F	G	G	G	F/G	F	G	G	G	F/G	G	G	G	G	F/G	G	G	P	G	G	P	P	F/P	
Reflex (fomesafen)	P	P	P	P	P	P	P	F	P	P	F/G	G	G	F	G	G	G	F	G	F/G	P	P	N	N	
Resource (flumiclorac)	N	N	N	N	N	N	N	P	P/F	F	N	P/F	P	P	P/F	F/G	P	P	P/F	P	G	N	N	N	
Section (clethodim)	G	G	G	G	G	G	G	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	G	
Select (clethodim)	G	G	G	G	G	G	G	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	G	
Select Max (clethodim)	G	G	G	G	G	G	G	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	G	
Synchrony XP (chlorimuron & thifensulfuron)	N	N	N	N	N	N	N	G	F/G	F/G	F	G	P	P	G	G	F/G	G	P	G	F/G	-	G	N	
Targa (quizalofop)	G	F/G	G	G	G	G	-	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	G	
Ultra Blazer (acifluorfen)	P	P	P	P	P	P	P	F	P	P	F	G	G	F	G	G	G	G	G	F/G	P	P	P	N	

Roundup Ready Soybean

Postemergence																								
glyphosate, others (glyphosate)	G	G	G	G	G	G	G	G	F/G	G	F/G	G	F	F	G	F/G	F/G	F/G	G	G	F/G	F/G	F	F/G

Sulfonylurea Tolerant Soybean

Postemergence																								
Harmony GT XP (thifensulfuron)	N	N	N	N	N	N	N	P	F	G	-	G	N	N	G	P	P	G	P	P	F/G	-	-	N
Synchrony XP (chlorimuron & thifensulfuron)	N	N	N	N	N	N	N	G	F/G	F/G	F	G	P	P	G	G	F/G	G	P	G	F/G	-	G	N

NOTE: G = Good; F= Fair; P = Poor; N = No control. Effectiveness ratings apply if herbicide is used according to label recommendations as to rate, time of application, etc., and favorable temperature and moisture conditions prevail.

* Only control of top, no control of roots.