SUGARCANE WEED MANAGEMENT

This weed management guide is prepared as a joint effort between Dr. Jim Griffin, School of Plant, Environmental, and Soil Sciences, LSU AgCenter, Baton Rouge, LA, and Drs. Ed Richard and Caleb Dalley, USDA-ARS, Sugarcane Research Unit, Houma, LA. Herbicide rates provided are expressed on a broadcast basis. To calculate band rate, use the formula provided below. Soil texture, rainfall, temperature, and herbicide rate can affect level and duration of weed control obtained. On average, herbicide applied to the soil at the higher end of the rate range will provide residual weed control for about 60 days. When weeds are present and postemergence herbicides are used, a high quality nonionic surfactant with a minimum of 80% active ingredient or a crop oil concentrate containing 15 to 20% emulsifier should, in most cases, be added to the finished spray solution. The amount of surfactant or crop oil concentrate needed can vary depending on herbicide and is specified in each section of this guide. The herbicide label affixed to the container should also be consulted if questions arise.

Tables of weed control estimates for herbicides used in sugarcane are provided in the "Weed Control with Sugarcane Herbicides" section. Additional information related to weeds and weed management issues can be found at http://www.lsuagcenter.com/en/our_offices/departments/spess/.

Conversion of Broadcast Rate to Band Rate

To calculate band rate per *traveled* acre for a liquid or dry formulation use the following formula:

$$\frac{\text{Band width in inches}}{\text{Row width in inches}} \times \text{Broadcast RATE per acre} = \text{Band RATE per } \textit{traveled} \text{ acre}$$

AT PLANTING PREEMERGENCE WEED CONTROL

Sugarcane is planted following the spring/summer fallow using whole stalks or cut stalks (billets). Weeds not controlled at planting have enough time before the first killing frost to reestablish and produce rhizomes or seed, reducing the long term benefit of controlling weeds during the fallow period. Herbicide may be applied at planting either as a band to the top of the row or broadcast. A broadcast application will help reduce weed encroachment from the row middles, especially where cultivation is not practiced. Herbicide should be applied immediately after the row has been rolled or packed. **When preemergence herbicides are applied prior to late-September, a follow up application of herbicide will be needed to prevent reestablishment of summer weeds and to control winter weeds. See "Single Application vs. Split Application Programs" and "Postemergence Weed Control (September-October)" at the end of this section. Herbicide application will also be needed on fields harvested for seed, especially where bermudagrass, johnsongrass, and itchgrass are a problem**.

Rate of Formulated Material for 1 Acre Broadcast	Rate/Acre Active Ingredient	Weeds Controlled (see "Weed Control with Sugarcane Herbicides" section)	Remarks
AAtrex 4L, Atrazine 4L 2.0 – 4.0 qt OR AAtrex Nine-O, Atrazine 90DF, 90WDG 2.22 – 4.44 lb	atrazine 2.0 – 4.0 lb/A	Annual summer broadleaf weeds and winter grass and broadleaf weeds	Use higher rate on heavy soils or when sugarcane is planted prior to late-September.

Authority MTZ 45 DF 16 – 33 oz	sulfentrazone 0.18 – 0.37 lb/A plus metribuzin 0.27 – 0.56 lb/A	Morningglory (tie-vine) and other broadleaf weeds, seedling grasses, and nutsedge	Use higher rate on clay soils and/or soils with organic mater content higher than 2%. A 33 oz/A rate of Authority MTZ contains the same rate of sulfentrazone active ingredient as 12 oz/A of Spartan 4F and the same rate of metribuzin active ingredient as 0.75 lb/A Sencor/Metri DF. May be applied with other herbicides.
Command 3ME 2.66 – 3.33 pt	clomazone 1.0 – 1.25 lb/A	Seedling johnsongrass, itchgrass, browntop panicum, and other annual summer grasses	Use higher rate on heavy soils or when sugarcane is planted prior to late-September. Addition of Direx/Karmex or Sencor/Metri DF/others can provide broadleaf weed control and increased bermudagrass suppression when applied at planting if preceded by a good fallow weed control program.
Direx 4L 2.4 – 3.0 qt OR Direx 80DF, Karmex 80DF 3.0 – 3.75 lb	diuron 2.4 – 3.0 lb/A	Annual summer and winter grass and broadleaf weeds	Use higher rate on heavy soils or when sugarcane is planted prior to late-September.
DuPont K-4 60DG 3.75 – 4.0 lb	hexazinone 0.50 – 0.53 lb/A plus diuron 1.75 – 1.87 lb/A	Seedling johnsongrass, browntop panicum, and other annual summer and winter grass and broadleaf weeds	Use of the higher rate can provide bermudagrass suppression when applied at planting if preceded by a good fallow program. Can be applied with Prowl or other pendimethalin product to improve itchgrass control. A combination of Velpar 2L at 1 qt/A and Direx 4L at 1.8 qt/A closely represents the equivalent rate of 4 lb/A of DuPont K4.
Prowl, Pendimax, Stealth, Pendimethalin, Pendant, Acumen (3.3EC formulations) 2.4 – 3.6 qt OR Prowl H_2O 3.8CS 2.1 – 3.1 qt	pendimethalin 2.0 – 3.0 lb/A	Seedling johnsongrass, itchgrass, browntop panicum, and other annual summer grasses	May be applied to soil surface or incorporated. Use higher rate on heavy soils if surface applied, when sugarcane is planted prior to late-September, or when itchgrass is a problem. Aatrex/Atrazine, Direx/Karmex, DuPont K-4, Sencor/Metri DF/others, Authority MTZ, or Spartan may be applied to the soil surface with Prowl or other pendimethalin product for additional summer and winter weed control.
Sencor 75DF, Metri 75DF, TriCor DF, Dimetric 75 DF, others 2.0 - 4.0 lb	metribuzin 1.5 – 3.0 lb/A	Seedling johnsongrass and other summer and winter grasses and broadleaf weeds	This product is safe to use on all soils and varieties of sugarcane. Use higher rate on heavy soils or when sugarcane is planted prior to late-September. Can provide suppression of bermudagrass at higher rates when applied at planting if preceded by a good fallow program. Addition of Prowl or other pendimethalin product will improve control of browntop panicum and itchgrass.
Sinbar 80WP 1.0 – 1.5 lb <u>except</u> 1.0 lb on very sandy soils	terbacil 0.8 – 1.2 lb/A	Seedling johnsongrass and other summer grasses and broadleaf weeds	Use higher rate on heavy soils or when sugarcane is planted prior to late-September. Can provide suppression of bermudagrass at higher rates when applied at planting if preceded by a good fallow program. Addition of Prowl or other pendimethalin product can increase control of browntop panicum and itchgrass.
Spartan 4F 10.0 – 12.0 oz	sulfentrazone 0.313 – 0.375 lb/A	Annual summer and winter broadleaf weeds and nutsedge	Use higher rate on heavy soils and when sugarcane is planted prior to late-September. **Spartan may be applied more than once during the growing season but total usage per twelve-month period can not exceed 12 oz/A.**
Treflan, Trifluralin, Trilin, Tri-4, Trific, Treflan HFP (4EC formulations) 2.0 qt (36 inch band)	trifluralin 2.0 lb/A	Seedling johnsongrass, itchgrass, browntop panicum, and other annual warm and cool season grasses	Roll or pack rows and incorporate herbicide on row top and sholders within 24 hours after application. Avoid incorporation at a depth that will damage seed pieces. After incorporation, other herbicides should be applied to soil surface for broadleaf weed control. See “Single Application vs. Split Application Programs” on following page.
Valor SX 51WG 6.0 – 8.0 oz	flumioxazin 0.19 - 0.25 lb/A	Annual summer and winter grasses and broadleaf weeds	Must be applied prior to sugarcane emergence to avoid significant injury. Use higher rate on heavy soils or when sugarcane is planted prior to late-September.

Single Application vs. Split Application Programs:
Herbicides applied at planting in July through September will likely break down by the time winter weeds begin to emerge. A common practice is to reapply a broad spectrum preemergence herbicide in late-October for residual control of winter weeds. When bermudagrass, johnsongrass, and itchgrass problems are expected, a split application program with herbicide applied at planting and around 60 days later will be more effective than a single application. In some cases where split application programs are used, beds in the spring are essentially free of winter weeds. Programs that can be successful in suppressing bermudagrass include split applications (60 days apart) of Command 3ME at 3.3 pt/A plus Direx at 2.5 lbs/A or DuPont K-4 at 4 lb/A at planting followed by Sencor/Metri DF/others (metribuzin) at 1.5 lb/A; metribuzin at 2 to 3 lb/A followed 60 days later with metribuzin at 1.5 lb/A; and Treflan or other trifluralin product at 2 qt/A banded (4 qt/A broadcast rate) and incorporated followed by metribuzin at 1.5 lb/A. Another option would be to apply herbicide at planting on a band and sink middles prior to the follow up application. This program will reduce cost up front but will require an additional tillage operation and cooperating weather conditions. If tillage can not be performed encroachment of bermudagrass from the row middles can result in a severe weed problem the following spring.

Postemergence Weed Control (September-October):
Johnsongrass and Itchgrass - In early-planted sugarcane or in sugarcane harvested for seed, johnsongrass may reinfest fields prior to the winter dormancy period. When applied in September or October to actively growing johnsongrass 12 to 18 inches tall and above the crop canopy, Asulox/Asulox XP/Asulam (asulam) at 3 qt/A or Envoke at 0.2 oz/A plus asulam at 2 qt/A plus nonionic surfactant at 1 to 2 qt/100 gal of water or crop oil concentrate at 4 qt/100 gal of water has controlled johnsongrass and reduced reinfestation the following spring. Asulam alone and with Envoke also controls large itchgrass (more than 6 inches). For additional information on asulam and Envoke see the "Postemergence Control Programs for Johnsongrass and Other Weeds" section.

Purple and Yellow Nutsedge - To control nutsedge 4 to 12 inches in height in early planted sugarcane apply Permit/Halomax/Profine (halosulfuron) at 1.0 to 1.33 oz/A. To control 2 to 6 inch yellow nutsedge or to suppress 2 to 4 inch purple nutsedge, apply Envoke at 0.2 oz/A with nonionic surfactant at 1 to 2 qt/100 gal of water or crop oil concentrate at 4 qt/100 gal of water. The higher rate of halosulfuron is needed when nutsedge is large and the population is dense. For best results herbicide application should be made before nutsedge is 6 inches tall. If application is delayed until nutsedge forms a dense mat on the soil surface a sizeable tuber population will have developed underground and control will be reduced. Activity of both halosulfuron and Envoke is slow and four weeks may be needed to maximize control. Sugarcane is very tolerant to overtop application of halosulfuron. No more than three applications of halosulfuron can be made per year and no more than 2.33 oz should be applied per acre per year. Envoke can cause some yellowing and white banding on sugarcane leaves as well as slight stunting but no negative effect on sugarcane growth and emergence in spring has been observed. Envoke will also provide some residual control of winter weeds. Other herbicides may be applied with halosulfuron or Envoke for additional weed control. Yukon, a 67.5% DG premix of halosulfuron and dicamba (the active ingredient in Clarity/Vision) can provide control of both nutsedge and broadleaf weeds. A 6 oz/A rate of Yukon is equivalent to a 1.0 oz/A rate of halosulfuron and a 6 oz/A rate of Clarity/Vision. For additional information on halosulfuron and Envoke see the "Postemergence Control Programs for Johnsongrass and Other Weeds" section. Preemergence application of Spartan 4F at 8 to 12 oz/A or Authority MTZ at 22 – 33 oz will also control both purple and yellow nutsedges as well as many broadleaf weeds (pigweed, morningglory, and winter annuals). Rates vary with soil type with higher rates needed for heavy soils.

Broadleaf Weeds - To control emerged broadleaf weeds apply Weedmaster/Brash/Kambamaster at 0.5 to 1.0 qt/A, 2,4-D (3.8L formulation) at 0.5 to 1.5 qt/A, or Clarity/Vision at 0.5 to 1.0 pt/A when air temperature is above 65° F. Information related to these herbicides and 2,4-D formulations is provided in the "Postemergence Weed Control After Layby" section.

Succession Planting:
Herbicides listed in the "At Planting Preemergence Weed Control" section may also be used when sugarcane is succession planted. Rates may be reduced slightly (25%) due to the later planting date and to minimize the chance of sugarcane injury.

Use of Shielded or Hooded Sprayers:
Shielded application of glyphosate herbicide to row middles after planting or fall harvest has provided good to excellent control of emerged bermudagrass. Apply 2 to 3 qt/A of the 4.0 L formulation or equivalent rate based on active ingredient for other formulations in 5 to 20 gal of water per acre as a shielded application to the row middles. Information on glyphosate formulations can be found in the "Fallow Weed Control" section. Severe injury will occur if glyphosate comes in contact with green sugarcane foliage.

WINTER WEED CONTROL

Preemergence (October-November):
Apply Aatrex/Atrazine, Direx/Karmex, DuPont K-4, Sencor/Metri DF/others, or Sinbar to early-harvested sugarcane, or reapply to newly planted cane, or sugarcane harvested for seed for preemergence control of winter grass and broadleaf weeds. Herbicide rates specified in the "At Planting Preemergence Weed Control" section can be reduced by 25% for the later applications. **If weeds are present, nonionic surfactant at 1 to 2 qt/100 gal or crop oil concentrate at 2 to 4 qt/100 gal should be added to the spray solution.**

Postemergence (January-March):
Apply Weedmaster/Brash/Kambamaster at 0.5 to 1.0 qt/A, 2,4-D (3.87L formulation) at 0.5 to 1.5 qt/A, or Clarity/Vision at 0.5 to 1.0 pt/A after broadleaf weeds have emerged and when air temperature is above 65° F. The higher rate should be used when broadleaf weeds are large and clover or vetch is present. Information related to these herbicides and 2,4-D formulations is provided in the "Postemergence Weed Control After Layby" section. Aatrex/Atrazine, Direx/Karmex, DuPont K-4, Sencor/Metri DF/others, or Valor (winter killed sugarcane only) may be added to improve postemergence weed control and to provide soil residual activity.

To control ryegrass, rescuegrass, timothy grass, annual grass as well as some broadleaf weeds, apply Gramoxone Inteon 2L at 3 pt/A plus nonionic surfactant at 1 to 2 qt/100 gal or crop oil concentrate at 2 to 4 qt/100 gal prior to sugarcane emergence or when sugarcane has no more than 4 leaves. Aatrex/Atrazine, Direx/Karmex, DuPont K-4, Sencor/Metri DF/others, or Valor (if sugarcane has not emerged) may be added to improve burndown and provide soil residual activity. Annual bluegrass can be controlled with Direx at 2.5 lb/A, DuPont K-4 at 3 lb/A, Sencor/Metri DF/others at 1.33 lb/A, or Sinbar at 1.25 lb/A plus a non-ionic surfactant or crop oil concentrate,

SPRING PREEMERGENCE WEED CONTROL

The preemergence herbicide programs described below should be implemented in late winter (February or early March) after residue from the previous harvest has been removed and before weeds emerge**. If weeds are present nonionic surfactant at 1 to 2 qt/100 gal or crop oil concentrate at 2 to 4 qt/100 gal should be added to the spray solution.** Herbicides may be applied broadcast, but in most cases are banded on the top of the row when some cultivation of the row middles is planned. If scattered infestations of winter broadleaf weeds are present Weedmaster/Brash/ Kambamaster at 0.5 to 1.0 qt/A, 2,4-D (3.8L formulation) at 0.5 to 1.5 qt/A, or Clarity/Vision at 0.5 to 1.0 pt/A can be added. The higher rate should be used when broadleaf weeds are large and clover or vetch is present. Information related to these herbicides and 2,4-D formulations is provided in the "Postemergence Weed Control After Layby" section.

Rate of Formulated Material for 1 Acre Broadcast	Rate/Acre Active Ingredient	Weeds Controlled (see "Weed Control with Sugarcane Herbicides" section)	Remarks
AAtrex 4L, Atrazine 4L 2.0 – 4.0 qt OR AAtrex Nine-O, Atrazine 90 DF, 90 WDG 2.22 – 4.44 lb	atrazine 2.0 – 4.0 lb/A	Seedling broadleaf weeds and some annual grasses	Use higher rate on heavy soils. Other herbicides should be applied for grass control.
Command 3ME 2.66 – 3.33 pt	clomazone 1.0 – 1.25 lb/A	Seedling johnsongrass, itchgrass, browntop panicum, and other annual grasses	Bleaching/whitening of sugarcane foliage can occur if crop is emerged at application. Can suppress bermudagrass regrowth at higher rates if applied with Direx/Karmex prior to bermudagrass emergence from the winter dormant period.
Direx 4L 2.4 – 3.0 qt OR Direx 80DF, Karmex 80DF 3.0 – 3.75 lb	diuron 2.4 – 3.0 lb/A	Seedling broadleaf weeds and some annual grasses	Use higher rate on heavy soils. Other herbicides should be applied for grass control.

DuPont K-4 60DG 3.75 – 4.0 lb	hexazinone 0.5 – 0.53 lb/A plus diuron 1.75 – 1.87 lb/A	Seedling johnsongrass, browntop panicum, and other annual grass and broadleaf weeds	For bermudagrass suppression, apply at the higher rate prior to emergence from the winter dormant period. **Can be applied overtop of sugarcane until daily maximum temperatures for the week preceding application average 80 degrees F or greater.** Addition of Prowl or other pendimethalin product can improve itchgrass control. A combination of Velpar 2L at 1 qt/A and Direx 4L at 1.8 qt/A closely represents the equivalent rate of 4 lb/A of DuPont K4.
Prowl, Pendimax, Stealth, Pendimethalin, Pendant, Acumen (3.3EC formulations) 2.4 – 3.6 qt OR Prowl H_2O 3.8CS 2.1 – 3.1 qt	pendimethalin 2.0 – 3.0 lb/A	Seedling johnsongrass, itchgrass, browntop panicum, and other annual grasses	May be surface applied or soil incorporated. Use higher rate on heavy soils if surface applied or if itchgrass is a problem. Aatrex/Atrazine, Direx/Karmex, DuPont K-4, or Sencor/Metri DF may be applied to the soil surface with Prowl or other pendimethalin product for additional weed control.
Sencor 75DF, Metri 75DF, TriCor DF, Dimetric 75 DF, others 2.0 - 4.0 lb	metribuzin 1.5 – 3.0 lb/A	Seedling johnsongrass and other annual grass and broadleaf weeds	Safe to sugarcane on all soil types. Addition of Prowl or other pendimethalin product can improve control of browntop panicum and itchgrass. For bermudagrass suppression, apply at the higher rate prior to emergence from the winter dormant period.
Treflan, Trifluralin, Trilin, Tri-4, Trific, Treflan HFP (4EC formulations) 2.0 qt	trifluralin 2.0 lb/A	Seedling johnsongrass, itchgrass, browntop panicum, and other annual grasses	Incorporate within 24 hours after application. Can provide suppression of bermudagrass at higher rates. Aatrex/Atrazine, Direx/Karmex, or Sencor/Metri DF may be applied to the soil surface for broadleaf weed control.
Valor SX 51WG 4.0 – 8.0 oz	flumioxazin 0.13 – 0.26 lb/A	Annual summer and winter grass and broadleaf weeds	**Must be applied prior to sugarcane emergence to avoid significant injury**. Can provide residual control when applied at 6 to 8 oz/A.

POSTEMERGENCE CONTROL PROGRAMS FOR JOHNSONGRASS AND OTHER WEEDS

Asulox/Asulox XP/Asulam Programs for Control of Johnsongrass and Other Grasses:

Asulox/Asulox XP/Asulam (asulam) can be applied broadcast, banded, or as a spot treatment. **Nonionic surfactant at 1 to 2 qt/100 gal of water or crop oil concentrate at 1 gal/100 gal of water should be added to the spray solution.** If water pH is above 9.0, addition of a buffer may be beneficial. At application, average air temperature should be at least 60°F with johnsongrass 12 to 18 inches tall and actively growing. DO NOT cultivate, fertilize, or otherwise disturb the johnsongrass root system 7 days before or after asulam application. With some variation caused by weather conditions, johnsongrass will be at the recommended treatment size in late March or early April. A 20-hour rain-free period following asulam application may be needed to maximize control.

First Application - Apply 4 qt/A asulam broadcast (or the correct proportion if applying on a band) in 15 to 30 gal of water per acre. If applying on a band, outside nozzles should be mounted on drops and band width should be wide enough to ensure thorough wetting of foliage. Asulam applied at 3 to 4 qt/A also controls browntop panicum, foxtails, goosegrass, and barnyardgrass/junglerice when 6 to 8 inches tall. Itchgrass less than 8 inches tall may be controlled with 4 qt/A. Vaseygrass that is less than 8 inches tall can be partially controlled with asulam at 4 qt/A, but activity is very slow.

Second Application - A second application of asulam at 3 to 4 qt/A plus nonionic surfactant or crop oil concentrate can increase johnsongrass control, but may not increase yield over that obtained with a single asulam application in March/April. This may be beneficial in the plant cane or first stubble crop to reduce infestations in subsequent crops. The second application of asulam should be made to johnsongrass regrowth, usually about eight weeks after the first application. Sugarcane injury is more likely when asulam is applied at 4 qt/A to sugarcane stressed from drought, excessive temperature, or flooded soils, especially after June 1. Therefore, the first application should be made as early as possible.

Spot Application - The most accurate and economical method of spot treating is to use a calibrated sprayer at a constant speed with the operator turning the spray nozzles on and off as needed. If a high-volume “cattle gun” nozzle is used for spot treatment, apply a 2% solution of asulam (2 gal of herbicide plus 98 gal of water). When using a high volume “cattle gun” nozzle, spray to wet foliage but do not drench as sugarcane injury can be greater compared with spot treating using a calibrated sprayer.

Aerial Application - Asulam may also be applied by air using the same rates specified above. Spray volume should be a minimum of 5 gal per acre. After calculating the actual sugarcane acreage to be treated, acreage should be increased to account for ditchbanks and headlands also receiving application.

Envoke Programs for Control of Johnsongrass and Itchgrass:

First Application - Envoke 75DF can be applied postemergence overtop to plant or ratoon cane up to 24 inches tall at 0.3 oz/A broadcast (or the correct proportion if applying on a band) or as a directed application at 0.3 to 0.6 oz/A to sugarcane 18 inches tall at layby. As a directed application spray should be directed away from the upper plant parts (whorl) to minimize contact with the crop and to maximize contact with the target weeds. Envoke alone at 0.3 oz/A will suppress but not control of rhizome johnsongrass or large itchgrass. Combinations of Envoke with Asulox/Asulox XP/Asulam (asulam) provide complementary broadleaf and grass weed control. Envoke at 0.3 oz/A applied with asulam at 2 qt/A (half rate) **plus nonionic surfactant or crop oil concentrate** controls large rhizome johnsongrass (more than 18 inches) equal to asulam applied alone at 4 qt/A (full rate). Envoke at 0.2 oz/A applied with asulam at 2 qt/A has provided control of large itchgrass (more than 6 inches) better than asulam applied alone at 4 qt/A.

Envoke applied overtop of sugarcane can cause some yellowing and white banding on leaves present in the whorl at application as well as slight stunting but recovery is rapid and no negative effect on sugarcane yield has been observed. For ground application use a minimum of 10 gal of water per acre (broadcast basis). Higher spray volume of at least 20 gal per acre should be used for heavy weed infestations to ensure adequate spray coverage. **Envoke can not be applied aerially**. Do not apply Envoke to sugarcane under stress due to drought, standing water, heavy insect and/or disease pressure, or low soil fertility. As specified for asulam, DO NOT cultivate, fertilize or otherwise disturb the johnsongrass root system 7 days before or after Envoke application.

Nutsedge Control Programs:

Permit 75DF/Halomax/Profine (halosulfuron) can be applied postemergence prior to planting or after crop emergence anytime during the growing season until row closure. Sugarcane is very tolerant to overtop applications of halosulfuron. No more than three applications can be made per year and no more than 2.33 oz should be applied per acre per year. Apply halosulfuron at 1.0 to 1.33 oz/A with nonionic surfactant at 1 to 2 qt/100 gal of water or crop oil concentrate at 1 gal/100 gal of water. The higher rate is needed when nutsedge is large and the population is dense. Activity of halosulfuron is slow and four weeks may be needed to maximize control. Long-term nutsedge control has been greater when halosulfuron was applied in fall compared with spring. Other herbicides may be applied with halosulfuron for additional weed control. Yukon, a 67.5% DG premix of halosulfuron and dicamba (the active ingredient in Clarity/Vision) can provide control of both nutsedge and broadleaf weeds. A 6 oz/A rate of Yukon is equivalent to 1.0 oz/A rate of Permit and a 6 oz/A rate of Clarity/Vision. Envoke at 0.2 oz/A with nonionic surfactant at 1 to 2 qt/100 gal of water or crop oil concentrate at 4 qt/100 gal of water also provides some control of nutsedge. Application over the top of the crop may not ensure adequate coverage of nutsedge growing under the crop canopy and can result in poor control.

LAYBY PREEMERGENCE WEED CONTROL

Herbicides at layby should be directed underneath the sugarcane canopy usually following the last cultivation and prior to weed emergence. Spray coverage of row tops and middles is critical to provide weed control until harvest. Directed application is necessary to increase herbicide coverage of smaller emerged weeds not destroyed by tillage and to avoid contact of newly emerging sugarcane shoots and leaves that can result in injury with some herbicides. **If small weeds are present nonionic surfactant at 1 to 2 qt/100 gal or crop oil concentrate at 2 to 4 qt/100 gal should be added to the spray solution when using herbicides with postemergence activity.** For morningglory (tie-vine) control, delaying herbicide application until after the layby cultivation can extend the period of residual weed control and will decrease the potential for crop injury with certain herbicides.

Rate of Formulated Material for 1 Acre Broadcast	Rate/Acre Active Ingredient	Weeds Controlled (see "Weed Control with Sugarcane Herbicides" section)	Remarks
AAtrex 4L, Atrazine 4L 2.0 – 4.0 qt OR AAtrex Nine-O, Atrazine 90DF, Atrazine 90WDG 2.22 – 4.44 lb	atrazine 2.0 – 4.0 lb/A	Seedling broadleaf weeds and some annual grasses	Use higher rate on heavy soils and where morningglory (tie-vine) control in excess of 45 days is needed. Can provide residual morningglory control later into the growing season when application is delayed until late May or early June. Other herbicides should be applied for grass control.

Authority MTZ 45 DF 16 – 33 oz	sulfentrazone 0.18 – 0.37 lb/A plus metribuzin 0.27 – 0.56 lb/A	Morningglory (tie-vine) and other broadleaf weeds, seedling grasses, and nutsedge	Use higher rate on clay soils and/or soils with organic mater content higher than 2%. A 33 oz/A rate of Authority MTZ contains the same rate of sulfentrazone active ingredient as 12 oz/A of Spartan 4F and the same rate of metribuzin active ingredient as 0.75 lb/A Sencor/Metri DF. Apply as a directed treatment. May be applied with other herbicides. Injury can occur if herbicide contacts newly emerging sugarcane shoots and leaves. Do not apply more than 33 oz/A in one growing season. Do not apply within 120 days of harvest.
Direx 4L 2.4 – 3.0 qt OR Direx 80DF, Karmex 80DF 3.0 – 3.75 lb	diuron 2.4 – 3.0 lb/A	Seedling broadleaf weeds and some annual grasses	Apply as a directed treatment when sugarcane is 30 inches or taller. Injury can occur if herbicide contacts newly emerging sugarcane shoots and leaves. Other herbicides should be applied for grass control.
DuPont K-4 60DG 2.0 – 3.0 lb	hexazinone 0.27 – 0.4 lb/A plus diuron 0.94 – 1.4 lb/A	Seedling broadleaf weeds and some annual grasses	Apply as a directed treatment when sugarcane is 30 inches or taller. Injury can occur if herbicide contacts newly emerging sugarcane shoots and leaves. **If DuPont K-4 was applied in the spring do not apply more than 2 lb/A at layby. Allow 8 weeks between spring and layby applications and do not apply within 180 days of harvest.** Addition of Prowl or other pendimethalin product can improve itchgrass control. A combination of Velpar 2L at 0.8 qt/A and Direx 4L at 1.4 qt/A closely represents the equivalent rate of 3 lb/A of DuPont K4.
Prowl, Pendimax, Stealth, Pendimethalin, Pendant, Acumen (3.3EC formulations) 2.4 – 3.6 qt OR Prowl H_2O 3.8CS 2.1 – 3.1 qt	pendimethalin 2.0 – 3.0 lb/A	Seedling johnsongrass, itchgrass, browntop panicum, and other annual grasses	May be surface applied or soil incorporated. Use higher rate if surface applied or if itchgrass is a problem. For additional weed control, such as morningglory, Aatrex/Atrazine, Direx/Karmex, DuPont K-4, Sencor/Metri DF, or Spartan may be applied with Prowl or other pendimethalin product.
Sencor 75DF, Metri 75DF, TriCor DF, Dimetric 75 DF, others 2.0 – 4.0 lb	metribuzin 1.5 – 3.0 lb/A	Seedling johnsongrass and other seedling grass and broadleaf weeds	Safe to use on all soils and varieties of sugarcane. Addition of Prowl or other pendimethalin product can improve control of browntop panicum and itchgrass.
Spartan 4F 6.0 – 8.0 oz	sulfentrazone 0.19 – 0.25 lb/A	Broadleaf weeds and nutsedge	Use high rate on heavy soils and where morningglory (tie-vine) control in excess of 45 days is needed. Injury can occur if herbicide contacts newly emerging sugarcane shoots and leaves. Other herbicides should be applied for grass control. **Spartan can be applied more than once during the growing season but total usage per twelve-month period can not exceed 12 oz/A.**
Treflan, Trifluralin, Trilin, Tri-4, Trific, Treflan HFP (4EC formulations) 2.0 qt	trifluralin 2.0 lb/A	Seedling johnsongrass, itchgrass, browntop panicum, and other annual grasses	Incorporate within 24 hours after application. Aatrex/Atrazine, Direx/Karmex, DuPont K-4, Sencor/Metri DF, or Spartan may be applied to the soil surface for broadleaf weed control.
Valor SX 51WG 3.0 – 8.0 oz	flumioxazin 0.10 – 0.26 lb/A	Broadleaf weeds	**Apply only as a directed treatment after sugarcane is at least 24 inches in height and has begun to joint. Spray solution should contact no more than the lower six inches of sugarcane plants**. At the 3 to 4 oz/A rate, good control of emerged morningglory can be obtained. If long term control is desired 6 to 8 oz/A should be applied. Other herbicides should be applied for grass control. Valor can be applied at a maximum rate of 12 oz/A per crop year.

POSTEMERGENCE WEED CONTROL AFTER LAYBY

Rainfall combined with high soil temperature contributes to rapid degradation and loss of weed control from herbicides applied at layby. Grass weeds emerging after layby generally do not reduce sugarcane yield or interfere with harvest. However, morningglory or tie-vines can cause significant problems at harvest. To control morningglory and other broadleaf weeds, herbicides can be applied over the crop canopy by air or by ground sprayer, or herbicides can be directed underneath the crop canopy using a high clearance sprayer. When crop injury from the herbicide is not of concern, coverage of the entire morningglory plant with spray solution will provide more consistent control. **Nonionic surfactant at 1 to 2 qt/100 gal or crop oil concentrate at 2 to 4 qt/100 gal should be added to the spray solution.**

2,4-D is commonly applied at this time of the year, however, its use is restricted in some parishes. Check local restrictions before application. **To avoid potential stand and yield loss in the subsequent plant cane crop, 2,4-D, Clarity, Vision, Weedmaster, Brash, or Kambamaster should not be applied to seed cane sources closer than 7 weeks prior to harvest and planting.**

Rate of Formulated Material for 1 Acre Broadcast	Rate/Acre Active Ingredient	Weeds Controlled (see "Weed Control with Sugarcane Herbicides" section)	Remarks
2,4-D products 3.8L 1.0 – 1.5 qt (see information below on 2,4-D formulations)	2,4-D 0.47 – 1.42 lb/A	Morningglory (tie-vine) and other broadleaf weeds	Apply higher rate if vines are climbing sugarcane plants. Complete control may take in excess of 5 weeks. Surfactant can be added but is not required. Note restrictions on use in some parishes and on sugarcane used for seed.
AAtrex 4L, Atrazine 4L 2.0 – 4.0 qt OR AAtrex Nine-O, Atrazine 90DF, Atrazine 90WDG 2.22 – 4.44 lb	atrazine 2.0 – 4.0 lb/A	Morningglory (tie-vine) and other broadleaf weeds	Can be applied overtop or directed before row closure occurs. Use higher rate if vines are climbing sugarcane plants.
Authority MTZ 45 DF 16 – 33 oz	sulfentrazone 0.18 – 0.37 lb/A plus metribuzin 0.27 – 0.56 lb/A	Morningglory (tie-vine) and other broadleaf weeds, seedling grasses, and nutsedge	Use higher rate on clay soils and/or soils with organic mater content higher than 2%. A 33 oz/A rate of Authority MTZ contains the same rate of sulfentrazone active ingredient as 12 oz/A of Spartan 4F and the same rate of metribuzin active ingredient as 0.75 lb/A Sencor/Metri DF. Apply as a directed treatment. May be applied with other herbicides. Injury can occur if herbicide contacts newly emerging sugarcane shoots and leaves. Do not apply more than 33 oz/A in one growing season. Do not apply within 120 days of harvest.
Clarity 4L 16.0 – 24.0 oz OR Vision 3.8L 17.0 to 25.0 oz	dicamba 0.5 – 0.75 lb/A	Morningglory (tie-vine) and other broadleaf weeds	Apply higher rate if vines are climbing sugarcane plants. Complete control may take in excess of 5 weeks. Surfactant can be added but is not required. Note restriction on sugarcane used for seed. **Can be used in parishes where 2,4-D use is restricted.**
Envoke 75DF 0.3 oz – 0.6 oz	trifloxysulfuron-sodium 0.014 – 0.028 lb/A	Morningglory (tie-vine) and other broadleaf weeds, itchgrass and other annual grasses, and purple and yellow nutsedge	Apply as a directed treatment. Cannot be applied aerially. Always apply with a high quality non-ionic surfactant at 1 qt per 100 gallons. Do not apply with a crop oil concentrate. Can be tank-mixed with all registered and commonly applied herbicides for sugarcane. Do not apply within 100 days of harvest. A maximum of 3 applications or 1.5 oz/A may be applied per growing season.
Gramoxone Inteon 2L 2.0 – 4.0 pt	paraquat 0.50 – 1.0 lb/A	Bermudagrass and small grass and broadleaf weeds	Application to the row middles in late June desiccates bermudagrass, and combined with shading from the crop canopy can reduce bermudagrass regrowth. Herbicide contact to young sugarcane tillers and leaves can cause significant injury. Application can reduce the amount of bermudagrass transported with seed cane.
Permit 75DF/Halomax 75/Profine 75 0.67 – 1.33 oz	halosulfuron 0.03 – 0.06 lb/A	Purple and yellow nutsedge	Apply until row closure occurs. A rate of 1 to 1.33 oz/A is recommended for control of nutsedge. Can be applied with other herbicides.

Spartan 4F 6.0 – 8.0 oz	sulfentrazone 0.19 – 0.25 lb/A	Morningglory (tie-vine) and other broadleaf weeds and nutsedge	Apply as a directed treatment and use higher rate if vines are climbing sugarcane plants. **Spartan can be applied more than once during the growing season but total usage per twelve-month period can not exceed 12 oz/A.** If applied in the spring or at layby do not reapply. An interval of at least 120 days between application and harvest is specified.
Valor SX 51WG 3.0 – 8.0 oz	flumioxazin 0.10 – 0.26 lb/A	Morningglory (tie-vine) and other broadleaf weeds and some annual grasses	**Apply only as a directed treatment after sugarcane has begun to joint. Spray solution should contact no more than the lower six inches of sugarcane plants**. At the 3 to 4 oz/A rate good control of emerged morningglory can be obtained. If long term control is desired 6 to 8 oz/A should be applied. Valor can be applied at a maximum rate of 12 oz/A per crop year. Treatment to harvest interval should be at least 90 days.
Weedmaster/Brash/ Kambamaster 3.87L 0.5 – 1.0 qt	2,4-D 0.36 – 0.72 lb/A plus dicamba 0.12 - 0.24 lb/A	Morningglory (tie-vine) and other annual broadleaf weeds	Apply higher rate if vines are climbing sugarcane plants. Complete control may take in excess of 5 weeks. Surfactant can be added but is not required. Note restrictions on use in some parishes and on sugarcane used for seed.
Yukon 67.5 WG 4 to 8 oz	halosulfuron 0.03 to 0.06 lb/A plus dicamba 0.14 to 0.28 lb/A	Purple and yellow nutsedge as well morningglory (tie vines) and other broadleaf weeds.	Always apply with a high quality non-ionic surfactant or crop oil concentrate. May be tank-mixed with Asulox/Asulam, Atrazine, or 2,4-D for additional weed control. Only two applications and up to 8 oz/A of product may be applied per growing season.

2,4-D Formulations:

Formulations of 2,4-D on the market include acid, amine salts, and esters. Since only the acid form of 2,4-D is active in controlling weeds, the herbicide concentration on the label is provided in lb of ae (acid equivalent)/gal instead of lb of ai (active ingredient)/gal, as is the case with most other herbicides. Formulations of 2,4-D range from 1.74 to 5.6 lb ae/gal. These numbers are important in determining the amount of formulated product to apply per acre. The lower the lb ae/gal the more formulated product required. For example, a 32 fluid oz rate (1 qt/A) of a 3.8L formulation would correspond to 21.7 oz for a 5.6L formulation and 70 oz for a 1.74L formulation. Unison is an acid formulation of 2,4-D and contains 1.74 lb ae/gal. Although this formulation of 2,4-D is not volatile (susceptible to converting to vapor and moving off-target) it would still be susceptible to physical drift as a liquid. Caution should be used anytime 2,4-D is applied near sensitive plants regardless of formulation.

FALLOW WEED CONTROL

The fallow year provides the opportunity to reduce weed problems by destroying rhizomes and decreasing weed seed reserves in the soil. Weed control programs during the fallow period can include use of tillage (deep plowing/disking) and herbicides. Frequent and timely cultivation, where weeds are destroyed and prevented from reestablishing can be an effective management tool especially in dry years. Tillage, especially tillage just prior to planting, can reduce soil moisture in the seedbed, which in dry years can hinder plant cane emergence and growth. Another option in fallow fields would be a no-till program where seedbeds are not disturbed until planting and where glyphosate herbicide is used to kill both the sugarcane and weeds. Several herbicides are labeled for use in fallowed sugarcane fields and can be used in no-till and conventional programs in conjunction with or as a substitute for fallow tillage. **If small weeds are present at application nonionic surfactant at 1 to 2 qt/100 gal or crop oil concentrate at 2 to 4 qt/100 gal should be added to the spray solution when using herbicides that have postemergence activity.**

Fallow Preemergence:

After bedding and at least 60 days prior to the anticipated planting date, apply preemergence herbicides to a weed and clod-free bed. Packing of the row top prior to application may improve weed control.

Rate of Formulated Material for 1 Acre Broadcast	Rate/Acre Active Ingredient	Weeds Controlled (see "Weed Control with Sugarcane Herbicides" section)	Remarks

AAtrex 4L, Atrazine 4L 2.0 – 4.0 qt OR AAtrex Nine-O, Atrazine 90DF, Atrazine 90WDG 2.22 – 4.44 lb	atrazine 2.0 – 4.0 lb/A	Broadleaf weeds and some annual grasses	Use higher rate on heavy soils and where control in excess of 45 days is needed.
Direx 4L 2.4 – 3.0 qt OR Direx 80 DF, Karmex 80 DF 3.0 – 3.75 lb	diuron 2.4 – 3.0 lb/A	Broadleaf weeds	Use higher rate on heavy soils and where control in excess of 45 days is needed.
DuPont K-4 60DG 3.75 – 4.0 lb	hexazinone 0.50 – 0.53 lb/A plus diuron 1.75 – 1.87 lb/A	Seedling johnsongrass, browntop panicum, doveweed, and other annual grass and broadleaf weeds	Can provide suppression of bermudagrass. Apply to a clean seedbed at least 60 days prior to planting. Can be reapplied at planting but no more than 11.25 lbs can be applied per acre per year. A combination of Velpar 2L at 1 qt/A and Direx 4L at 1.8 qt/A closely represents the equivalent rate of 4 lb/A of DuPont K4.
Eptam 7E 3.5 – 7 pt	EPTC 3.0 – 6.1 lbs/A	Annual grass and broadleaf weeds, bermudagrass, and purple and yellow nutsedge	Must be thoroughly incorporated to a depth of 2 to 4 inches immediately following application. For best control of bermudagrass and nutsedge, plants should be turned under and chopped up thoroughly prior to treatment. Must be applied 45 days prior to planting sugarcane.
Permit 75DF/Halomax 75/Profine 75 0.67 – 1.33 oz	halosulfuron 0.031- 0.062 lb/A	Purple and yellow nutsedge	1 to 1.33 oz rate is recommended for control of nutsedge. Can be applied with other herbicides including glyphosate. Do not exceed 2.67 oz/A in one growing season.
Prowl 3.3EC 3.0 qt OR Prowl H_2O 3.8CS 2.6 qt	pendimethalin 2.5 lb/A	Seedling johnsongrass, itchgrass, browntop panicum, other annual grasses	Apply to clean seedbed at least 60 days prior to planting. Deep incorporation (4 inches) by plowing, working rows with an opener/closer tool, or with a rotary tiller will increase the control of rhizome johnsongrass and bermudagrass. Atrazine, Direx/Karmex, or DuPont K-4 may be applied preemergence for broadleaf weed control.
Valor SX 51WG 3.0 – 8.0 oz	flumioxazin 0.10 - 0.26 lb/A	Morningglory (tie-vine) and other broadleaf weeds and some annual grasses	May be applied as a burndown 2 weeks prior to planting.
Yukon 67.5 WG 4 to 8 oz	halosulfuron 0.03 to 0.06 lbs/A plus dicamba 0.14 - 0.28 lbs/A	Purple and yellow nutsedge as well morningglory (tie vines) and other broadleaf weeds.	Always apply with a high quality non-ionic surfactant or crop oil concentrate. May be tank-mixed with glyphosate, Atrazine, or 2,4-D for additional weed control. Only two applications and up to 12 oz/A of product may be applied per growing season.

Fallow Postemergence (Glyphosate and Glyphosate Mixtures):
Postemergence herbicides should be applied to actively growing weeds. Several formulations of glyphosate are on the market with the most common being 4L and 5.5L formulations. The lower the active ingredient the more formulated product required. A 32 oz rate (1 qt/A) of a 4L formulation would correspond to 26 oz for a 5L formulation and 23 oz for a 5.5L formulation. Some glyphosate formulations contain surfactant but others do not. The herbicide label should be consulted concerning the need for surfactant. Apply glyphosate in 10 to 20 gal of water per acre for ground application and 3 to 5 gal of water per acre for aerial application.

Johnsongrass and Other Weeds - For most applications, rates of 1 to 2 qt/A of the 4L glyphosate formulation is sufficient. Do not cultivate for 7 days after application to allow adequate time for the glyphosate to be taken into the plant and moved to underground rhizomes. Under heavy weed infestation, two to three weeks between glyphosate application and planting will allow time for johnsongrass to desiccate and will promote more efficient opening of rows and covering of planted sugarcane. When applying 2,4-D in combination with glyphosate for additional broadleaf weed control use the high end of the glyphosate rate to avoid a possible reduction in grass control (antagonism).

Aatrex/Atrazine at 1 to 2 qt/A, Aim 2EC at 1 to 2 oz/A, and Valor at 3 to 4 oz/A can be applied to control broadleaf weeds and in particular morningglory (tie-vine). The higher rates should be applied to control large vining weeds. Aatrex/Atrazine and Aim can be applied any time during the fallow period. Valor can be applied from 2 weeks prior to planting to before sugarcane emerges. Some residual weed control can be expected with Aatrex/Atrazine and Valor,

but Aim has no soil residual activity. Nonionic surfactant at 1 to 2 qt/100 gal or crop oil concentrate at 2 to 4 qt/100 gal should be added to the spray solution. If Aim or Valor is applied with glyphosate and surfactant is already present in the glyphosate formulation additional surfactant is not needed.

Bermudagrass - In fields where bermudagrass population is high, tillage in combination with glyphosate is most effective. Apply 2 to 3 qt/A of the 4L glyphosate formulation for control of bermudagrass with less than 8 inch runners. Retreatment with 2 to 3 qt/A may be necessary to maintain control. Do not cultivate for 7 days after application to allow adequate time for the glyphosate to be taken into the plant and moved to underground rhizomes. Under heavy weed infestation, two to three weeks between glyphosate application and planting will allow time for bermudagrass to desiccate and will promote more efficient opening of rows and covering of planted sugarcane. **Multiple applications of glyphosate are more effective in controlling bermudagrass than a single application.**

Purple and Yellow Nutsedge – Permit/Halomax/Profine (halosulfuron) at 1.0 to 1.33 oz/A and Envoke at 0.15 to 0.2 oz/A applied with nonionic surfactant at 1 to 2 qt/100 gal of water or crop oil concentrate at 4 qt/100 gal of water will provide some control of nutsedge. The higher rate is needed when nutsedge is large and the population is dense. For best results herbicide application should be made before nutsedge is 6 inches tall. If application is delayed until nutsedge forms a dense mat on the soil surface a sizeable tuber population will have developed underground and control will be reduced. Halosulfuron and Envoke can be applied with glyphosate products without negatively affecting grass control and additional surfactant is not needed if surfactant is already present in the glyphosate formulation. If two applications of glyphosate are planned, halosulfuron should be applied with glyphosate in the first application. The follow up application of glyphosate alone should be effective on nutsedge regrowth. Both halosulfuron and Envoke have some soil residual activity but are more effective when applied postemergence. Yukon, a 67.5% DG premix of halosulfuron and dicamba (the active ingredient in Clarity/Vision) can provide control of both nutsedge and broadleaf weeds. A 6 oz/A rate of Yukon is equivalent to 1.0 oz/A rate of Permit and a 6 oz/A rate of Clarity/Vision. As also noted for glyphosate, do not cultivate for 7 days after application halosulfuron to allow adequate time for movement of herbicide to underground nutsedge tubers.

In situations where nutsedge and others weeds may interfere with row opening at planting, Gramoxone Inteon 2L at 3 pt/A plus nonionic surfactant at 1 to 2 qt/100 gal or crop oil concentrate at 2 to 4 qt/100 gal can be applied 1 to 2 weeks before planting to desiccate above ground plant material. Because herbicide does not move to underground nutsedge tubers rapid reestablishment should be expected and halsulfuron or Envoke application in September or October should be considered. See “Postemergence Weed Control (September-October)” in the “At Planting Preemergence Weed Control” section.

Doveweed - Doveweed is a summer annual weed that emerges from mid-June through September. Doveweed as well as many other members of the dayflower family are poorly controlled with glyphosate. In fallow programs where glyphosate is the only herbicide used for weed control, doveweed can form a dense mat across the row and can interfere with row opening at planting. In fields with a known history of doveweed, glyphosate should be applied with DuPont K-4 at 2 to 3 lb/A, Sencor/Metri DF/others at 1.3 lb/A, or Valor SX at 6 to 8 oz/A in June to control weeds on formed beds. This application should provide preemergence control of doveweed up to 60 days after application. For emerged doveweed, effective control may be obtained with Gramoxone Inteon 2L at 3 pt/A, atrazine at 4 qt/A, or Sencor/Metri DF/others at 1.5 lb/A applied 1 to 3 weeks before planting. Nonionic surfactant at 1 to 2 qt/100 gal or crop oil concentrate at 2 to 4 qt/100 gal should be added to the spray solution for postemergence applications. Application of Gramoxone Inteon at 2 pt/A with atrazine at 2 qt/A or application of Sencor/Metri DF/others at 1 lb/A with WeedMaster at 1.5 pt/A has increased control and provided residual control when planting was delayed beyond 3 weeks after application.

No-Tillage Fallow Program – In a no-till program sugarcane stubble must be destroyed with herbicides rather than tillage. To obtain around 90% control of sugarcane stubble, glyphosate rate based on a 4L formulation is 1.0 qt/A (6 inch stubble), 1.5 qt/A (10 inch stubble), 2.0 qt/A (16 inch stubble), and 2.5 qt/A (18 inch stubble). Typically in a no-till program a second glyphosate application will be needed to control weeds and any sugarcane regrowth that might occur. It is important that the first glyphosate application be made by the end of April to allow for sugarcane to completely decompose before rows are worked at planting. In fields where bermudagrass population is high, a no-till program where only glyphosate is used for weed control would not be as effective as glyphosate in combination with tillage.

Note: Glyphosate herbicides can be applied by air, but extreme caution should be used due to problems with off-target movement and damage to sugarcane and other crops in areas adjacent to treated fields.

DITCHBANK WEED CONTROL

Problem weeds such as johnsongrass, itchgrass, bermudagrass, poppingweed (Equisetum/horsetail), and Rubus species (briars) should be controlled on ditchbanks. This will aid in field drainage and prevent weed infestation into

adjacent sugarcane fields. These recommendations are for non-irrigation, drainage ditch use only. **DO NOT** apply herbicides to a ditch when water is present unless specifically allowed based on the herbicide label. Herbicides should be applied in a minimum of 20 gal of water per acre spray volume.

Rate of Formulated Material for 1 Acre Broadcast	Rate/Acre Active Ingredient	Weeds Controlled (see "Weed Control with Sugarcane Herbicides" section)	Remarks
Various MSMA formulations, check labels for rate (if 6L material is used the rate is 2.68 qt)	MSMA 4.0 lb/A	Johnsongrass and itchgrass	Apply and repeat as necessary. If nonionic surfactant is not present in the formulation, add nonionic surfactant at 1 qt/100 gal of water. If the objective of ditchbank weed control is to encourage bermudagrass growth for ditchbank stabilization, application of MSMA alone would be an excellent choice. Mixing can be a problem when MSMA is applied with some broadleaf herbicides.
Crossbow 3L 4.0 qt	2,4-D 2.0 lb/A plus triclopyr 1.0 lb/A	Poppingweed, briars, and woody species	Best control obtained when applied to young poppingweed, less than 2 years old. For control of briars and smaller diameter woody species, apply at 1.0 to 1.5 gal/100 gal of water and add nonionic surfactant at 1 qt/100 gal of water. Apply in a spray volume of 40 to 60 gal per acre to thoroughly soak all stems and plant crowns at the soil line. **This product contains 2,4-D and its use may be restricted in some areas of the state.**
Direx 4L 2.0 - 15.0 qt OR Direx 80DF, Karmex 80DF 2.5 - 18.75 lb	diuron 2.0 – 15.0 lb/A	Annual grass and broadleaf weeds	Provides residual control of many annual weeds. Addition of nonionic surfactant at 1 to 2 qt/100 gal of water will increase contact activity on small, emerged weeds no more than 3 in tall. Herbicide activity will be improved if soil in the ditch is moist at application. Do not allow herbicide to contact roots of desirable plants when applied at the higher rates.
DuPont K-4 60DG 3.75 – 4.0 lb	hexazinone 0.50 – 0.53 lb/A plus diuron 1.75 – 1.87 lb/A	Most ditchbank weeds including some control of poppingweed	Will not control rhizome johnsongrass or curly dock. Use only on split ditches. Do not use on out-flow ditches or ditches not directly between two cane fields. Very slow activity on poppingweed. Inclusion of 2 qt/A of a 4L glyphosate formulation OR 2.67 qt/A of a 6L MSMA formulation has increased rhizome johnsongrass and curly dock control. Apply in a spray volume of at least 40 gal per acre to thoroughly cover the soil and foliage and soak all stems and plant crowns at the soil line. Nonionic surfactant at 1 qt/100 gal of water or crop oil concentrate at 1 gallon/100 gal of water should be added. **Hexazinone (Velpar) is extremely water-soluble and may move down the ditch.**
Garlon 4L 2.0 – 3.0 qt OR Garlon 3A 2.7 – 4.0 qt	triclopyr 2.0 – 3.0 lb/A	Poppingweed, briars, and woody species	Control is greater when applied to young poppingweed, less than 2 years old. For control of briars and smaller diameter woody species, apply at 1.5 pt/A of 4L formulation or 2 pt/A of 3A formulation plus nonionic surfactant at 1 to 2 qt/100 gal of water. Apply in a spray volume of 40 to 60 gal per acre to thoroughly soak all stems and plant crowns at the soil line.
Prowl 3.3EC 3.0 – 4.0 qt OR Prowl H_2O 3.8CS 2.6 – 3.5 qt	pendimethalin 2.5 – 3.3 lb/A	Seedling johnsongrass, itchgrass, and other annual grasses	Apply in a minimum of 20 gal per acre spray volume prior to weed emergence; will NOT control emerged weeds. May apply with other labeled herbicides to provide residual activity.

Roundup Original, Glyphomax Plus, Touchdown IQ, others (4L formulations) 1.0 to 5.0 qt OR Roundup UltraMAX, others (5L formulations) 0.8 to 4.0 qt OR Roundup Original Max, Roundup UltraMax II, Roundup WeatherMax , Roundup PowerMax, Touchdown Total, others (5.5L formulations) 0.7 to 3.6 qt	glyphosate 1.0 – 5.0 lb/A	Grass weeds and some broadleaf weeds	Johnsongrass, itchgrass, other grass weeds and some broadleafs are controlled at 1 to 2 qt/A of the 4L glyphosate formulation. A 1 qt/A rate of a 4L formulation corresponds to 26 oz for a 5L formulation and 23 oz for a 5.5L formulation. Check herbicide label on need for surfactant. Apply 2 to 3 qt/A of a 4L glyphosate formulation for control of bermudagrass with less than 8 inch runners. Retreatment with 2 to 3 qt/A may be necessary to maintain bermudagrass control. Application with Direx or Karmex or DuPont K-4 at 3.75 to 4 lb/A (see information above) can increase initial control and provide extended control of many annual weeds. Do not allow glyphosate to contact foliage of desirable plants.
Weedmaster, Brash, Kambamaster 3.87L 0.5 – 3.0 qt	2,4-D 0.36 – 2.15 lb/A plus dicamba 0.12 - 0.75 lb/A	Broadleaf weeds	Use 1 qt/A to control annual broadleaf weeds and 1.0 to 3 qt/A for suppression of perennial weeds. **This product contains 2,4-D and its use may be restricted in some areas of the state.**

WEED CONTROL WITH SUGARCANE HERBICIDES

Planted Fields – Preemergence Soil-Applied (28 to 35 days after treatment)

The values listed in the tables below are estimates of weed control based on research and field experience and represent what can be expected with a specific herbicide or herbicide mixture at the ***high end of the rate range***. A value of 0 = no control and 10 = 100% control.

Planted Fields - Preemergence

Herbicide	Seedling Johnsongrass	Rhizome Johnsongrass	Itchgrass (Raoulgrass)	Bermudagrass[1]	Browntop Panicum	Annual Grasses	Morningglory (Tie-vines)	Other Broadleaf Weeds	Nutsedges	Winter Grasses[2]	Winter Broadleaf Weeds[3]
Atrazine	3	0	2	0	4	6	8	9	3	8	9
Authority MTZ	5	0	2	1	3	5	9	9	7	6	8
Command	8	2	8	6	8	8	3	3	2	7	2
Command plus Direx	9	2	8	8	9	9	6	8	2	7	8
Direx/Karmex	7	0	5	1	6	7	6	8	2	7	8
DuPont K-4	8	2	7	7	8	9	7	8	5	8	8
Prowl/others	8	5[4]	8	2	8	9	2	2	3	6	2
Prowl plus DuPont K-4	8	2	8	5	9	9	7	8	3	7	8
Prowl plus Sencor/Metri DF/others	9	2	8	5	9	9	8	9	4	8	8
Sencor/Metri DF/others	9	0	2	6	6	9	8	9	5	8	8
Sinbar	9	0	2	8	3	9	7	7	5	6	5
Spartan	4	0	2	0	3	4	9	8	7	4	8
Treflan/others[4]	9	5	9	7	9	9	2	2	5	8	2
Valor	3	0	2	0	3	4	8	9	2	8	9

[1]Control level expected when applied at planting prior to weed emergence and following a good fallow program or when applied in late winter prior to weed emergence from the winter dormant period.
[2]Includes ryegrass, rescuegrass, and timothy grass.
[3]Includes sowthistle, wild geranium, and clovers.
[4]Herbicide must be incorporated to obtain this level of control.

WEED CONTROL WITH SUGARCANE HERBICIDES

Planted Fields - Postemergence Foliar-Applied (14 to 21 days after treatment)

The values listed in the tables below are estimates of weed control based on research and field experience and represent what can be expected with a specific herbicide or herbicide mixture at the ***high end of the rate range***. A value of 0 = no control and 10 = 100% control.

Planted Fields - Postemergence

Herbicide	Seedling Johnsongrass	Rhizome Johnsongrass	Itchgrass (Raoulgrass)	Bermudagrass	Browntop Panicum	Annual Grasses	Morningglory (Tie-vines)	Other Broadleaf Weeds	Nutsedges	Winter Grasses[1]	Winter Broadleaf Weeds[2]
Asulox/Asulam[3]	8	7	7	2	8	9	0	0	0	5	0
Atrazine	2	0	2	0	2	6	9	9	4	4	7
Clarity/Vision	0	0	0	0	0	0	8	9	3	0	9
Direx/Karmex	6	2	5	0	5	8	8	8	3	6	6
Envoke + Asulox/Asulam[3]	8	7	9	2	8	9	6	8	7	7	7
Glyphosate herbicides (hooded application)	9	9	9	8	9	9	6	7	6	8	8
Gramoxone Inteon	8	4	8	6	8	9	8	8	2	8	8
Permit/Halomax/Profine[3]	0	0	0	0	0	0	0	0	8	0	0
Spartan	2	0	2	0	2	4	9	8	7	3	8
Valor	2	0	2	0	3	4	9	8	2	3	9
Weedmaster/Brash/ Kambamaster	0	0	0	0	0	0	9	9	3	0	9
Yukon	0	0	0	0	0	0	9	9	8	0	8
2,4-D	0	0	0	0	0	0	9	9	3	0	9

[1]Includes ryegrass, rescuegrass, timothy grass, and winter annual bluegrass.
[2]Includes sowthistle and wild geranium.
[3]Requires 28 to 35 days after treatment to reach maximum control levels.

WEED CONTROL WITH SUGARCANE HERBICIDES

Fallowed Fields - Preemergence Soil-Applied (28 to 35 days after treatment) and Postemergence Foliar-Applied (14 to 21 days after treatment)

The values listed in the tables below are estimates of weed control based on research and field experience and represent what can be expected with a specific herbicide or herbicide mixture at the ***high end of the rate range***. A value of 0 = no control and 10 = 100% control.

Fallowed Fields – Preemergence and Postemergence

Herbicide	Seedling Johnsongrass	Rhizome Johnsongrass	Itchgrass (Raoulgrass)	Bermudagrass	Browntop Panicum	Annual Grasses	Morningglory (Tie-vines)	Doveweed	Other Broadleaf Weeds	Nutsedges
Preemergence										
Atrazine	3	0	2	0	4	6	8	5	9	3
Direx/Karmex	7	0	5	1	6	7	6	3	7	2
DuPont K-4	8	2	7	7	8	9	7	9	8	5
Prowl/others	8	8[1]	8	6[1]	8	9	2	0	2	3[1]
Eptam[1]	8	6	-	6	-	-	7	-	-	7
Postemergence										
Aim	0	0	0	0	0	0	9	0	8	0
Atrazine	2	0	2	0	2	6	9	7[2]	9	4
Envoke	7	4	8	1	7	9	6	2	8	7
Glyphosate herbicides	9	8	9	7	9	9	5	4	8	5
Gramoxone Inteon	8	4	8	6	8	9	8	8[3]	8	2
Permit/Halomax/Profine	0	0	0	0	0	0	0	0	0	8
Valor	2	0	2	0	3	4	9	5[3]	8	2
Weedmaster/Brash/Kambamaster/ 2,4-D/Clarity/Vision	0	0	0	0	0	0	9	6	9	3
Yukon	0	0	0	0	0	0	9	-	9	8

[1]Herbicide must be incorporated to obtain this level of control.
[2]Requires 4 qt/A to obtain satisfactory control.
[3]Addition of atrazine improves control.