

## GUIDELINES FOR MANAGING WINTER VEGETATION

### INTRODUCTION

Conservation tillage systems, whether no-till or stale seedbed, require herbicide programs that successfully control native winter vegetation or planted cover crops prior to planting. Elimination of competing vegetation helps to assure crop stand establishment, rapid early season crop growth, and efficient fertilizer utilization. Winter vegetation common to Northeast Louisiana ranges from easy to control weeds, such as annual bluegrass and common chickweed, to difficult to control species, such as curly dock and ryegrass. Cover crops may include wheat or legumes (vetch and winter peas). Consequently, proper weed identification and herbicide selection are keys to a successful preplant burndown weed control program.

More than 20 “winter weeds” are commonly found in fields throughout Northeast Louisiana. However, only a few key species dictate selection of the most effective herbicide program. Glyphosate<sup>1</sup> and paraquat continue to be the “backbone” of most burndown herbicide programs. Each product exhibits specific strengths and weaknesses. Tank-mixtures with other materials broaden the spectrum of control and/or provide residual control until planting. Glyphosate provides slow systemic control of weeds, while paraquat results in fast contact control requiring thorough weed coverage for maximum effectiveness. Addition of ammonium sulfate to glyphosate spray solution has not been beneficial in most cases and should not be used except where “hard water” (water containing mineral salts, including iron, calcium, and magnesium) is used as the carrier.

Glyphosate provides good to excellent control of annual bluegrass, Carolina foxtail, little barley, buttercup species (spp.), chickweed spp., dandelion, marestail, shepherdspurse, bittercress and Virginia pepperweed (Table 1). Control of geranium species, curly dock, henbit, cutleaf eveningprimrose, smartweed species and legume cover crops has been poor to fair. Tank-mixing Goal 2XL with glyphosate improves geranium, henbit, smartweed and legume cover crop control. Tank-mixing Harmony Extra with glyphosate improves geranium, curly dock, cutleaf eveningprimrose, henbit, smartweed and legume cover crop control. Including Clarity or 2,4-D as a tank-mix partner can aid in control of Carolina geranium, curly dock, cutleaf eveningprimrose, smartweed and legume cover crops. Clarity is more active on smartweed than 2,4-D, whereas 2,4-D is more active on cutleaf eveningprimrose and geranium. Currently, there is not a tank-mix partner that substantially improves ryegrass control more than glyphosate alone. Multiple applications of glyphosate are generally required to control ryegrass, unless applications are made prior to 5 leaves.

<sup>1</sup>Glyphosate and paraquat are sold under various trade names and formulations. Observations in this document are based primarily on field experiments with glyphosate formulations Roundup Ultra, Roundup D-Pak, Touchdown and Gramoxone Inteon.

Paraquat provides good to excellent control of annual bluegrass, little barley, buttercup species, geranium species, chickweed species, henbit and shepherdspurse. Control of ryegrass, curly dock, cutleaf eveningprimrose, marestail, smartweed species, swinecress, legume cover crops and Virginia pepperweed has been poor. Including Goal 2XL as a tank-mix partner aids in the control of cutleaf eveningprimrose, marestail, smartweed, legume cover crops and Virginia pepperweed. Control of curly dock, cutleaf eveningprimrose, marestail, smartweed, swinecress, legume cover crops and Virginia pepperweed is increased with the addition of Harmony Extra. Some materials tank-mixed with paraquat increase ryegrass control, but not to an acceptable level. Consequently, paraquat is not recommended when ryegrass is the main target weed.

Ignite 280 is a relatively new herbicide to Louisiana growers. With the introduction of Liberty Link technology (crops tolerant to glufosinate, the active ingredient in Ignite 280) growers will become more familiar with this herbicide. Ignite is effective on numerous winter weeds found in Louisiana (Table 1). Adding 2,4-D or Clarity to Ignite 280 in a burndown program is sometimes needed but not always advantageous. Since a phenoxy herbicide is not always needed to control cutleaf eveningprimrose or geranium, it may have an advantage in “phenoxy-sensitive” areas. Ammonium sulfate, however, must be used according to label directions. Though, Ignite is only labeled for preplant weed control in corn, cotton and soybean it has an active replant interval for several crops (Table 2). Although, this is an excellent burndown herbicide producers are limited on the amount of Ignite that can be used in the season. As of 2009, at the rates needed for effective burndown (29 oz/A), Ignite cannot be used in-season on Liberty Link soybeans or corn and will be limited to two applications on Liberty Link cotton when used preplant. **Note all the ratings listed in Table 1 are based on 32 oz/A.** Lower rates will likely reduce winter weed control and it is unknown by how much. In many cases, producers are well-advised to save their Ignite for in-crop use until such time a new label is issued, allowing more product per acre per season.

### TIMING OF VEGETATION REMOVAL

Timing of vegetation removal is another critical factor for successfully implementing reduced tillage programs. Conservation tillage practices provide an environment favorable to insect pest populations, primarily cutworms. Cutworm larvae feed on existing winter vegetation until it is removed or decomposed to a point no longer adequate as a food source. If present at planting, cutworm larvae may threaten stands of emerging crops. Research has shown that destroying winter vegetation at least three to four weeks prior to cotton planting is critical (Figure 1). Cutworms are able to feed on decaying vegetation, therefore, a herbicide application six to eight weeks prior to planting is preferable. Pyrethroid insecticides can be used in combination

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with a burndown herbicide or at-planting<sup>2</sup> when the potential for cutworm infestation is high. If any living vegetation remains on the seedbed at planting, insecticide should be used for cutworm management. The LSU AgCenter has long recommended that weeds be removed 6 to 8 weeks before planting to avoid increased problems with insects. Recent research has shown that even when insects are managed weeds like cutleaf eveningprimrose and swinecress will reduce crops yield when not removed well in advance of planting. In a five year study, corn yields were 15 to 25% higher when weeds were removed 4 weeks before planting compared to 2 weeks before planting.

### USE OF RESIDUAL HERBICIDES FOR MANAGING TROUBLESOME WEEDS

Weeds may regrow from initial burndown application or new weeds may germinate when herbicides are applied six to eight weeks prior to planting. In these situations, use of residual herbicides such as Goal 2XL, Valor or Resolve (in corn) can be beneficial. In recent years, problems in managing several winter annuals like henbit, mouseear chickweed and cudweed has led to the increased use of residual products. These products are often added for increased knockdown of existing weeds. However, they perform best as residual herbicides and should be used earlier in the season (January and early-February). The use of residual herbicides earlier in the season will improve the control of troublesome winter weeds and help protect crops from yield losses associated with late burndown timings. Sequential applications of glyphosate or paraquat are also very effective, and often eliminate the need for tank-mixes. Glyphosate applied six weeks prior to planting followed by paraquat at planting is an excellent weed control program.

### GLYPHOSATE RESISTANT MARESTAIL

Although glyphosate-resistant marestail (horseweed), *Conyza canadensis*, has been confirmed in states surrounding Louisiana it has not been confirmed in Louisiana. As of the time of this printing, most identified populations exhibit an 8-13 fold level of resistance, meaning that these resistant biotypes can survive a glyphosate application 13 times the normal use rate. In Louisiana, few acres receive a burndown herbicide composed strictly of glyphosate, since we have weeds that are difficult to control with glyphosate alone. These, of course, include Carolina geranium, curly dock and cutleaf eveningprimrose to name a few. Since most of our treated acreage will include a tank-mix herbicide such as 2,4-D or dicamba (Banvel/Clarity, most of the marestail present will be controlled by the phenoxy herbicide if there is glyphosate-resistant marestail present; thus, these plants will not go to seed. Through vigilance and tank-mixes with herbicides that will control marestail, Louisiana producers should not have great difficulty dealing with glyphosate-resistant marestail. As a precaution, we

<sup>2</sup> Infurrow application is the least effective method for controlling cutworms.

recommend that 8 oz/A (0.25 lb ai/A) dicamba be mixed with 22 oz/A (1 lb ai/A) glyphosate plus 24 oz/A (0.75 lb ai/A) 2,4-D when marestail is present. The three-way tank-mix is recommended because 2,4-D is more active on cutleaf eveningprimrose than dicamba. 2,4-D can be left out the mix when primrose is small or absent, but the dicamba rate should be increased to 16 oz/A (0.5 lb ai/A). Ignite 280 is another choice for controlling marestail and numerous other weeds found in Louisiana field but control can be temperature dependent. Ignite 280 works best if daytime temperatures are 60 degrees or above. Consult Table I for specific levels of control.

### GLYPHOSATE RESISTANT RYEGRASS

As with glyphosate-resistant marestail, glyphosate resistant ryegrass has not been confirmed in Louisiana. However, unlike marestail, herbicides that can be tank-mixed with glyphosate for improved ryegrass control are not readily available. Especially, when glyphosate-resistant ryegrass is present. Though, glyphosate ryegrass has not been confirmed in Louisiana it is suspected and samples from suspect fields are being evaluated. At the same time, the number of calls/complaints about glyphosate resistant ryegrass increases each year. Producers are encouraged to closely monitor ryegrass populations. To date, recommendations for managing glyphosate-resistant ryegrass have not been formalized but are expected to include fall programs. Fall applications of Dual II may help reduce ryegrass populations; see the corn, soybean and cotton weed control sections for recommendations. In the meantime, the best strategy for managing suspect ryegrass will be to make adjustments in both preplant and in-season weed control programs. Ignite and paraquat can be effective at reducing ryegrass populations, but often require multiple applications. Ryegrass control from paraquat is often improved when mixed with linuron or atrazine, but labels should be closely consulted before using these mixes. In corn, products containing nicosulfuron (Accent) have been very effective at controlling ryegrass. In broadleaf crops, graminicides such as Assure, Select and Poast can be effective at controlling ryegrass.

### FALL BURNDOWN

Increased problems in managing weeds like henbit and ryegrass in the spring has led increased interest fall herbicide programs. Two of the more popular choices for fall applications have been Goal and Valor. Either of these two products will control winter vegetation if applied shortly after emergence of the vegetation. Valor may be applied at 2-3 oz/A in combination with glyphosate and/or 2, 4-D. Applications in Louisiana should not be made prior to November 15. Goal may be applied at 1-2 pt/A and tank-mixed with glyphosate to control emerged weeds including suppression of marestail and ryegrass. In most cases, the herbicide must be tilled, moved, or in some way disturbed prior to planting. Be certain to check the product labels for specific recommendations. Although, these treatments will result in a relatively weed-free seed bed at plant, the soil will be exposed to weathering. Therefore, these treatments should not be used on highly erodible or sloping soil. Be certain to

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consult with your local FSA or NRCS office to determine if you can use these treatments without conflicting with your conservation plan.

### VOLUNTEER ROUNDUP READY CROPS

Volunteer roundup ready crops, especially soybean, can sometimes be present in the spring following the previous crop. Oftentimes, they germinate after the primary burndown application has been made. In this case we need to opt for a preplant burndown with a short or no replant interval. Table 3 lists several herbicides that can be used in this situation. Remember, volunteer Roundup Ready plants are more easily controlled prior to crop emergence than in-crop, especially in a glyphosate-based cropping systems.

### SUMMARY

Burndown herbicide decisions should be based on activity of glyphosate or paraquat on the most difficult to control weed species present. Appropriate tank-mixtures should be considered based on their ability to enhance control with glyphosate or paraquat and/or to provide residual activity. A list of guidelines for choosing appropriate burndown programs are as follows:

#### Guidelines for Choosing a Burndown Program

1. Vegetation should be destroyed at least three to four weeks prior to planting, preferably six to eight weeks.
2. Choice of herbicide program depends on the most difficult to control weed species present.
3. Use glyphosate if annual ryegrass, marestalk, swinecress, speedwell, groundsel, Virginia pepperweed, or wheat is the target vegetation. Use paraquat if geranium spp. or henbit is the primary weed present.
4. Carolina geranium, curly dock, cutleaf eveningprimrose, clover spp., henbit, smartweed, swinecress and legume cover crop control can be increased when glyphosate is tank-mixed with other herbicides.
5. Carolina foxtail, curly dock, cutleaf eveningprimrose, clover spp., dandelion, groundsel, henbit, marestalk, smartweed, speedwell, swinecress, Virginia pepperweed, and legume cover crop control can be increased when paraquat is tank-mixed with other herbicides.
6. Consider using an insecticide program that controls cutworms if any live vegetation is present at planting.

### ACKNOWLEDGMENTS

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### SELECTED REFERENCES

Listed below are additional Louisiana State University Ag Center publications relating to conservation tillage systems:

1. Conservation Tillage Systems for Energy Reduction: Preplant Weed Control in Cotton. Pub. 8909.
2. Conservation Tillage Systems for Energy Reduction: Soil Fertility. Pub. 8910.
3. Conservation Tillage Systems for Energy Reduction: Tillage Equipment. Pub. 8908.
4. Conservation Tillage Systems for Energy Reduction: Cotton Stand Establishment. Pub. 8906.
5. Conservation Tillage Systems for Energy Reduction: Insect Pest Management. Pub. 8907.
6. [www.lsuagcenter.edu](http://www.lsuagcenter.edu)

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**Table 1.** Effectiveness of selected herbicides and/or herbicide combinations for controlling winter vegetation<sup>1,2</sup>. For more specific examples, rates, and updates, refer to the burndown section for each commodity in the Louisiana Suggested Chemical Weed Control Guide<sup>3</sup>.

	Paraquat	Paraquat + Goal	Paraquat + Firstshot	Paraquat + Clarity	Paraquat + 2,4-D	Glyphosate	Glyphosate + Goal	Glyphosate + FirstShot	Glyphosate + Clarity	Glyphosate + 2,4-D	Clarity	2,4-D	Glyphosate + Valor	Ignite 280
Annual bluegrass (2-6")	90	90	90	90	90	90	90	90	90	90	0	0	90	90
Ryegrass <sup>4</sup> (6-10")	40	50	50	40	40	70	70	70	70	70	0	0	70	60
Carolina foxtail (2-6")	80	90	80	80	80	90	90	90	80	90	0	0	90	90
Little barley (2-6")	90	90	90	90	90	90	90	90	90	90	0	0	90	90
Buttercups <sup>4</sup> (2-6")	90	90	90	90	90	90	90	90	90	90	-	90	90	90
Geranium spp. <sup>4</sup> (2-6")	90	90	90	90	90	50	60	80	70	80	50	60	60	90
Chickweeds <sup>4</sup> (2-4")	90	90	90	90	90	90	90	90	90	90	30	30	90	90
Curly dock (6-8")	40	50	70	70	70	60	70	90	80	90	80	70	80	80
Cutleaf eveningprimrose (6-10")	40	70	80	80	90	40	60	70	80	90	80	90	60	80
Cutleaf eveningprimrose (2-5")	40	70	80	80	90	50	80	70	80	90	80	90	80	90
Clovers/medics <sup>4</sup> (2-6")	60	80	90	80	80	50	70	80	90	90	90	90	-	90
Dandelion (4-6")	80	90	90	90	90	90	90	90	90	90	90	90	90	90
Groundsel (2-4")	70	90	90	90	90	90	90	90	90	90	-	90	90	90
Henbit (6-8")	80	90	90	80	80	60	90	90	80	70	60	50	90	90
Marestail (4-10")	50	70	70	60	60	90	90	90	90	90	90	60	90	90
Smartweed spp. <sup>4</sup> (2-6")	40	70	90	80	60	70	80	90	90	80	80	60	90	-
Purslane speedwell (2-4")	70	80	90	80	80	90	90	90	90	90	-	50	90	-
Shepherd's purse (6-10")	90	90	90	90	90	90	90	90	90	90	90	90	90	80
Smallflower bittercress (6-10")	90	90	90	90	90	90	90	90	90	90	70	70	90	-
Swinecress (2-4")	20	30	70	60	60	70	80	90	80	80	70	60	80	90
Legume cover crops (6-8")	60	80	90	90	90	50	70	80	90	90	90	90	70	90
Virginia pepperweed (4-6")	20	70	70	90	90	90	90	90	90	90	-	30	90	-
Wheat (8-12")	70	80	70	60	60	90	90	90	80	90	0	0	90	70

<sup>1</sup> Ratings reflect control 28 days after treatment in mid-March. The average range for weed sizes are listed in parenthesis following each weed; consult labels for optimum rates and weed sizes. <sup>2</sup> Paraquat at 0.47-0.63 lb ai/A (1.5-2 pts/A Gramoxone Extra), glyphosate at 0.75-1.0 lb ai/A (1.5-2 pts/A Roundup Ultra, Touchdown IQ, 1.2-1.6 pts/A Touchdown 5, Roundup Ultra Max), Goal 2XLat 0.2-0.25 lb ai/A (0.8-1.0 pts/A), Harmony Extra at 0.014-0.023 lb ai/A (0.3-0.5 oz/A), Clarity at 0.25-0.5 lb ai/A (0.5-1 pt/A), and 2,4-D at 0.75-1.0 lb ai/A (0.5-1 pt/A). Ignite 280 at 0.5 lb ai/A (32 oz/A). <sup>3</sup> The "Louisiana Suggested Chemical Weed Management Guide" is updated annually and available online at [www.lsuagcenter.edu](http://www.lsuagcenter.edu). <sup>4</sup> This group of weeds has two or more species found in Louisiana.

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**Table 2. Plant back restrictions (days before planting) for commonly used burndown herbicides.**

	Cotton	Corn	Soybeans	Rice	Grain sorghum
FirstShot	14	14	7	0	14
Harmony GT	7	Before emergence	Before emergence	0	45
Goal	8	See label	8	See label	See label
Clarity	21 <sup>1</sup>	Before emergence	14 (8 oz or less) <sup>1</sup>	See label	15
Valor	30 <sup>2</sup>	14 <sup>4</sup>	0	30 <sup>2</sup>	30 <sup>2</sup>
Aim	0	0	0	0	0
2,4-D	30 <sup>1</sup>	Before emergence <sup>5</sup>	15-30	30	15
Ignite 280 <sup>3</sup>	0	0	0	0	180
Direx	15-45	Following year	Following year	Following year	Following year

<sup>1</sup> Consult label.

<sup>2</sup> An accumulation of 1 inch of rainfall or irrigation is required.

<sup>3</sup> Only labeled for burndown in cotton, corn and soybeans.

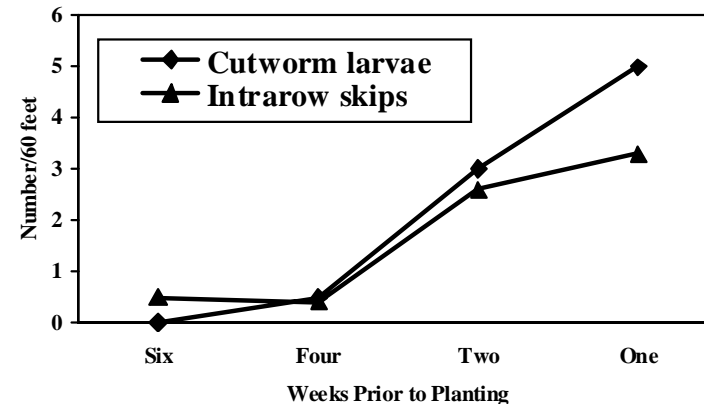
<sup>4</sup> Interval was shortened in 2009; see label for rainfall and other requirements. AgCenter data suggest 30 days.

<sup>5</sup> AgCenter suggest that not more than 0.5 lb ai/A be applied within 2 weeks of planting.

**Table 3. Approximate levels of control of volunteer Roundup Ready crops with selected herbicides when applied according to label directions and within size limits specified on the label when appropriate.**

	Cotton <sup>1</sup>	Corn <sup>2</sup>	Soybeans
<b>POSTEMERGENCE:<sup>3</sup></b>			
2,4-D	9	0	7
Aim	10	0	4
Clarity	7	0	10
Classic	8 <sup>5</sup>	7	0
Envolke	2	-	9
Gramoxone Inteon	9	7	9
Ignite 280	10	8	10
Select, Assure II, Poast Plus, Fusion, etc	0	10	0
Staple LX	0	8	7
Valor	4	0	4
<b>PREEMERGENCE:<sup>4,6</sup></b>			
Canopy <sup>7</sup>	7	5	0
Canopy XL <sup>7</sup>	8	5	0
Caparol	0	3	4
Direx	0	0	5
Prowl	0	0	0
Staple LX	0	4	-
Valor	9	0	0

<sup>1</sup>Four inches or less; <sup>2</sup>Size restrictions apply, see label; <sup>3</sup>Applied after the volunteer crop has emerged; <sup>4</sup>Applied before the volunteer crop has emerged; <sup>5</sup>May require more than one application; <sup>6</sup>More consistent when applied in combination with a POST application of Classic; <sup>7</sup>Consult label for recrop intervals and crop-use parameters where appropriate.



**Figure 1.** Effect of burndown timing on cutworm population and cotton stand.

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General Preplant Programs<sup>1</sup>

Active Ingredient and Rate	Active Ingredient and Rate	Weeds Controlled	Remarks and Precautions
paraquat @ 0.47-0.94 lb/A	Gramoxone Inteon @ 1.9- 3.8 pt/A  Apply with NIS @ 1 qt/100 gal	All annual grassy and broadleaf weeds, not more than 6" tall	Apply near planting time. This treatment is most useful on heavy soil that should not be disturbed in the spring before planting. Apply 5 in gals of water by air or 20 gallons by ground.
thifensulfuron @ 0.023 + tribenuron @ 0.023 lb/A	FirstShot @ 0.5 oz/A  Apply with NIS @ 1 qt/100 gal or COC @ 1 gal/100 gal	Smartweed, knotweed, dock and cutleaf eveningprimrose	Apply with glyphosate or paraquat. Use table 3 as guide for planting intervals. Note labels are updated regularly and should be consulted.
glyphosate <sup>2</sup> @ 1.0-3.0 lb/A	Glyphosate (4 lb/gal formulations) @ 1.0-3.0 qt/A	Preplant knockdown of most emerged annual weeds; week on primrose and others (see Table 1). Controls johnsongrass from rhizomes.	Apply at least 1 week before planting. Apply after rhizomes have sprouted and johnsongrass is at least 18". Wait 7 days, disk under vegetation and plant. Follow label directions.
glyphosate <sup>2</sup> @ 1 lb/A + carfentrazone @ 0.016- 0.031 lb/A	Glyphosate (4 lb/gal formulations) + Aim @ 1.0 qt/A + 1.0-1.6 oz/A.	Morningglories and other broadleaves. May be used to remove failed cotton stands.	Apply prior to cotton emergence. Weed species controlled is rate dependent. Consult label for proper rate according to weed species and size.
glyphosate <sup>2</sup> @ 1 lb/A + 2,4 D @ 0.5-1.0 lb/A	Glyphosate (4 lb/gal formulations) + 2,4-D (4L) @ 1.0 qt/A + 1 - 2 pt/A	Same as glyphosate plus, primrose, geranium and others	Most common burndown program used in Louisiana. May not control large, flowering henbit on Delta soils. Use table 3 as guide for planting intervals. Note labels are updated regularly and should be consulted.
glyphosate <sup>2</sup> @ 1 lb/A + dicamba @ 0.25 lb/A	Glyphosate (4 lb/gal formulations) + Clarity 4 SL @ 1 qt/A + 8 oz/A	Glyphosate-resistant horseweed. Weak on primrose, geranium, and other winter broadleaf weeds. Add 2,4-D if primrose is present	At least 21 days prior to planting following 1-inch of rainfall or overhead irrigation. Use table 3 as guide for planting intervals. Note labels are updated regularly and should be consulted.
glyphosate <sup>2</sup> @ 1 lb/A + flumioxazin @ 0.032-0.064 lb/A	Glyphosate (4 lb/gal formulations) @ 1 qt/A + Valor @ 1 - 2 oz/A	Same as glyphosate plus some weeds that glyphosate may not control; very good residual control of smartweed	Valor provides excellent residual control plus some knock down of emerged weeds. Large flowering henbit may re-grow if application are made late. Use table 3 as guide for planting intervals. Note labels are updated regularly and should be consulted.
glyphosate <sup>2</sup> @ 1.0 lb/A + oxyfluorfen @ 0.1-0.25 lb/A	Glyphosate (4 lb/gal formulations) + Goal @ 1.0 qt/A + 6.4 - 16 oz/A	Same as glyphosate plus, henbit, geranium Pennsylvania smartweed and dock	Goal provides excellent residual control plus some knock down of emerged weeds. Large flowering henbit may re-grow if application are made late. Use table 3 as guide for planting intervals. Note labels are updated regularly and should be consulted.
glyphosate <sup>2</sup> @ 1.0 lb/A + diuron @ 0.53-0.80 lb/A	Glyphosate (4 lb/gal formulations) + Direx 4L @ 1.5 pt/A on light soil 2.0 pt/A on medium soil Karmex 80DF @ 10 oz/A on light soil 14 oz/A on medium soil	Most small-seeded annual grasses and broadleaf weeds	Apply 15 to 45 days prior to planting. Cover seed at least 1/2" deep. Apply to soil surface behind press wheel. To avoid possible cotton injury, do not use diuron following a soil applied organophosphate insecticide or injury may occur.

<sup>1</sup> Burndown programs limited a specific crop are listed in that crops section; <sup>2</sup> See "Appendix A" for glyphosate formulations and surfactant requirements.