

# Sugarcane Production Handbook 2014





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## Section I. Sugarcane planting recommendations for Louisiana producers

The success of a sugarcane farming operation depends on the ability to produce good stands of plant cane and maintain suitable stands for stubble crops. This section provides information to help growers make management decisions about planting practices that should result in excellent plant cane stands.

Keeping good records is an essential part of wise decision making and management of a sugarcane production operation. Growers are encouraged to keep good records of all planting practices as well as pest management practices.

These recommendations are based primarily on research results. Where research results are not available or are inconclusive, current farming practices are considered in making suggestions. The planting information does not include land preparation recommendations. It is essential that proper land preparation is carried out and that rows are built up and ready for furrow opening. Recommendations are made on variety selection, furrow width, planting rate, weed control, soil insect control, depth of cover, depth of planting, dates of planting, succession planting and use of starter fertilizers.

### Healthy seed cane

To maximize yield potential for all sugarcane varieties, it is essential plantings be made with seed cane that is free or nearly free of diseases. To accomplish this, healthy seed cane nurseries should be established with seed cane of recommended varieties from a heat treatment program or from seed cane that has been produced by tissue culture to meet the requirements for certification by the Louisiana Department of Agriculture and Forestry. Seed cane nurseries of all varieties expected to be grown should be planted with cane obtained from one of these sources every year. Special care should then be taken to minimize infection of seed cane by sugarcane pathogens.

Ratoon stunting disease, also referred to as RSD, will cause substantial yield losses in all of the varieties recommended for major planting. This disease can be controlled only by the continuous planting of RSD-free seed cane. In addition, ratoon stunting disease is spread mechanically, so equipment should be carefully cleaned before handling seed cane. Since ratoon stunting disease results in very few or no visible symptoms, seed cane fields should be tested at the LSU AgCenter's Sugarcane Disease Diagnostic Laboratory. Seed cane should be propagated as few

times as is economically feasible. A common mistake made by growers is to assume cane grown from heat-treated or certified seed cane that has been cut repeatedly is still disease free.

Cane of any variety containing more than 2 percent smut infected shoots should be avoided as a seed cane source. Where practical, smut infected plants should be rogued early in the season prior to the emergence of whips (sori). Avoid planting seed cane nurseries of smut susceptible varieties next to smut infected cane.

Some recommended varieties are susceptible or moderately susceptible to leaf scald. Leaf scald is transmitted through infected seed cane, mechanically on equipment and, to some extent, in wind-blown rain. Care should be taken to plant healthy seed cane. The heat treatment used to control ratoon stunting disease does not cure stalks of leaf scald.

Planting healthy seed cane also means using cane for seed that has low levels of damage caused by the sugarcane borer. Good sugarcane borer control helps to reduce damage by stalk rots following planting and helps to increase stands. Seed cane nurseries of highly susceptible varieties, such as HoCP 00-950 and L 03-371, should not be planted where insecticides cannot be applied and cane to be used for seed should be monitored closely for borer presence.

### Variety recommendations for planting

Variety recommendations are based on results from research provided by the following organizations: LSU AgCenter; USDA-ARS Sugarcane Research Unit; and the American Sugar Cane



League. Variety development has been a long-standing cooperative effort governed by the Three-way Agreement of 2007. Seven varieties, HoCP 96-540, L 99-226, HoCP 00-950, L 01-283, L 01-299, L 03-371 and HoCP 04-838, are recommended for general planting in Louisiana. Other varieties such as LCP 85-384, HoCP 85-845 and CP 89-2143 have been successful in some situations. It must be stressed that growers should plant a variety only if a disease-free seed source is available.

## Variety performance

The means of multiyear outfield tests from plant cane through third-stubble crops provide relative yield information about the recommended varieties (Tables 1-4). Actual yields and the relative performance of the varieties on your farm may vary from those reported. Traits other than yield, such as harvestability and insect and disease resistance, must also be considered in choosing a variety. Table 2 summarizes variety characteristics.

**Table 1. Means for plant cane through third stubble crops across outfield locations from 2011 to 2013**

Plant Cane					
Variety	Sugar Yield (pounds/acre)	Cane Yield (tons/acre)	Sugar Content (pounds/ton)	Stalk Weight (pounds)	Population (number/acre)
HoCP 96-540	9222	33.4	276	2.47	27458
L 99-226	9459	32.3	293	2.85	23188
HoCP 00-950	9194	30.9	299	2.11	29600
L 01-283	8620	29.8	289	2.00	29900
L 01-299	9334	33.7	277	2.20	31291
L 03-371	9198	31.1	296	2.16	29312
HoCP 04-838	9528	34.1	281	2.20	31499
First Stubble					
Variety	Sugar Yield (pounds/acre)	Cane Yield (tons/acre)	Sugar Content (pounds/ton)	Stalk Weight (pounds)	Population (number/acre)
HoCP 96-540	8708	30.3	288	2.23	27814
L 99-226	9038	30.0	303	2.51	24411
HoCP 00-950	8492	27.5	311	1.82	30603
L 01-283	9132	30.9	296	1.84	33952
L 01-299	9767	33.9	291	1.96	34907
L 03-371	8245	27.7	298	1.93	29182
HoCP 04-838	8609	29.8	289	1.84	32959
Second Stubble					
Variety	Sugar Yield (pounds/acre)	Cane Yield (tons/acre)	Sugar Content (pounds/ton)	Stalk Weight (pounds)	Population (number/acre)
HoCP 96-540	7441	27.0	277	1.91	28941
L 99-226	7671	26.3	294	2.14	25046
HoCP 00-950	7404	24.5	303	1.65	30367
L 01-283	8275	28.8	289	1.61	36381
L 01-299	9397	33.7	282	1.70	40101
L 03-371	7565	26.2	291	1.81	29675
HoCP 04-838	7572	27.0	281	1.67	33032
Third Stubble					
Variety	Sugar Yield (pounds/acre)	Cane Yield (tons/acre)	Sugar Content (pounds/ton)	Stalk Weight (pounds)	Population (number/acre)
HoCP 96-540	6598	24.8	266	1.82	27757
L 99-226	6900	24.4	284	2.05	24182
HoCP 00-950	7101	23.8	301	1.56	30830
L 01-283	8052	27.9	290	1.52	37193
L 01-299	8594	30.9	282	1.61	39317
L 03-371	7288	25.8	282	1.74	30095
HoCP 04-838	6508	23.9	273	1.54	31367

## Varieties recommended for planting

**HoCP 96-540** was selected from a cross of LCP 86-454 x LCP 85-384 and released in 2003. The variety responds extremely well to ripeners and has excellent post-freeze processing qualities. HoCP 96-540 is an erect variety that has withstood hurricane force winds well and is often a choice for planting after such events. It is resistant to smut and leaf scald but is susceptible to ratoon stunting disease and brown rust. Research shows HoCP 96-540 is moderately resistant to the sugarcane borer. The variety has excellent yield potential and has been the leading sugarcane variety in Louisiana since 2008.

**L 99-226** was selected from a cross of HoCP 89-846 x LCP 81-30 and was released in 2006. L 99-226 is a high yielding, excellent stubbling variety. The variety produces a lower population of large diameter stalks and has high sugar per ton of cane. L 99-226 frequently lodges and is difficult to plant. L 99-226 is susceptible to brown rust and is moderately susceptible to smut. The variety deteriorates quickly after being subjected to freezing temperatures. The variety is moderately resistant to the sugarcane borer and is a good choice in areas where insecticides cannot be applied. L 99-226 responds well to the ripener glyphosate.

**HoCP 00-950** was selected from the cross HoCP 93-750 x HoCP 92-676 and was released in 2007. This variety has the highest sugar per ton of any variety released by the Louisiana sugarcane breeding program. HoCP 00-950's sugar per acre yield in plant cane is very good, but there can be a decrease in stubble cane yields that cannot always be offset by high sugar per ton. HoCP 00-950's best fit is on well-drained sandier land. It is a good choice when growers run out of ripened cane or on rainy days. This variety has a good disease package and has performed well after freezes. The variety can have some top breakage in high winds.

**L 01-283** was selected from the cross between L 93-365 x LCP 85-384. When L 01-283 was released in 2008, the new variety held much promise – good sugar per acre, erect, excellent stubbling ability and cold tolerance. Off-types began appearing in the variety soon after release however. Yield trials have determined high levels of off-types can decrease sugar per acre in L 01-283. The off-types are stress induced and normally begin to appear in July. The variety stubbles extremely well and early spring growth is impressive. At harvest, sugar yields in many fields have been good. The variety is susceptible to brown



rust and the sugarcane borer. L 01-283 should be planted on your better land to decrease stress induced off-types.

**L 01-299** was selected from the cross between L 93-365 x LCP 85-384. This variety has a very erect growth habit and is an extremely good stubbling variety. L 01-299 has excellent sugar yields, especially in older stubble crops. Its sugar per ton levels are similar to HoCP 96-540. The variety is resistant to brown rust but susceptible to brown stripe disease. L 01-299 is susceptible to smut and has resistance to the sugarcane borer and leaf scald. Because of its stubbling ability, the variety should be a good fit on heavy land.

**L 03-371** is an offspring from the cross of CP 83-644 x LCP 82-89. It is an early maturing variety with high sugar per ton of cane. L 03-371 is not erect and should be planted early before lodging. It is resistant to smut and leaf scald and moderately susceptible to brown rust. L 03-371 has a poor rating for post-freeze deterioration of the stalk. Research shows L 03-371 produces good sugar per acre yields but is susceptible to the sugarcane borer. This variety should not be planted where insecticides cannot be applied.

**HoCP 04-838** was selected from the cross HoCP 85-845 and LCP 85-384. This variety was released to growers in 2011. HoCP 04-838 has a very good disease package in addition to good harvesting characteristics. The variety also is rated as resistant to the sugarcane borer, making it a good choice to plant where insecticide applications may be limited. HoCP 04-838 has very good sugar yield potential. This new variety is most impressive in regard to freeze tolerance. Position the variety for late harvest to take advantage of HoCP 04-838's ability to withstand freezing temperatures.



**Table 2. Sugarcane variety characteristics**

Varietal Characteristics	HoCP 96-540	L 99-226	HoCP 00-950	L 01-283	L 01-299	L 03-371	HoCP 04-838
Year of Release	2003	2006	2007	2008	2009	2010	2011
Sugar per acre	VG	VG	G	VG	VG	VG	G
Sucrose content (TRS)	M-G	VG	VG	VG	G	VG	M-G
Tonnage	G	G	G	VG	VG	VG	G
Harvestability	G	P-M	G	G	VG	P-M	G
Maturity	M	M-E	E	E	M	M-E	M
Stubbling	M-G	G	G	VG	VG	G	G
Sugarcane Borer	S	R	S	MR	R	S	R
Brown Rust	S	S	MR	M	R	MS	R
Smut	R	S	R	R	S	R	R
Leaf scald	R	MS	MR	R	R	R	R
Post-freeze deterioration	G	P-M	G	G	G	P	VG
Shading	M	VG	VG	G	M	G	G

E = Early      R = Resistant      P = Poor      M = Moderate, Medium      MR = Moderately Resistant  
 G = Good      MS = Moderately Susceptible      VG = Very Good      S = Susceptible

## New variety release

Ho 07-613 was released in 2014. Ho 07-613 is a variety developed from a cross between HoCP 00-905 and HoCP 96-540. The new variety is similar to its female parent HoCP 96-540 except that it has higher sucrose content. Ho 07-613 is among the earliest maturing varieties and comparable to L 01-283 in its maturity profile. Fiber content averaged 10.6% for Ho 07-613. The new variety is prone to lodging and tends to become brittle when recumbent. Ho 07-613 lacks cold tolerance and has been rated similar to L 99-226.

Ho 07-613 is resistant to smut, moderately resistant to brown rust, and moderately resistant to leaf scald. Ho 07-613 is considered moderately resistant to the sugarcane borer. Seed cane of Ho 07-613 will be distributed by the American Sugar Cane League during 2014.

## Sugarcane variety survey

The annual sugarcane variety census is conducted by the LSU AgCenter's Louisiana Cooperative Extension Service and provides acreage data on variety plantings by growers. A better understanding of variety preference by growers can be seen in a comparison of several years of variety surveys. Table 3 shows the 2008-2012 variety survey results

as compiled and reported by county agents in the sugarcane-producing parishes of Louisiana.

HoCP 96-540 continues as the most widely grown sugarcane variety in Louisiana. The varieties HoCP 85-845, L 01-299, L 03-371 and HoCP 04-838 increased in acreage from the previous year. All other varieties either decreased or remained the same as reported the previous year. L 99-226 was the second most widely grown variety followed by L 01-283 and L 01-299. All other varieties are grown on only limited acreage.

## Planting recommendations and suggestions

**Selection of seed cane:** Growers should plant seed cane that is as close to being disease-free as possible. Cane that is growing well and is free of the sugarcane borer should be selected as seed cane. Healthy seed cane will provide the best possible stands if adverse environmental conditions such as drought, water logging or freezing temperatures occur. Mechanical planters should be operating so as to minimize stalk damage.

Stalk cold tolerance should be considered when selecting varieties, especially in the northern parishes. HoCP 96-540, L 01-283, L 01-299 and HoCP 04-838 have shown better stalk cold tolerance than other varieties.



**Table 3. Louisiana sugarcane variety trends by variety and year 2009-2013<sup>1</sup>**

Variety	Area planted to sugarcane by variety and years ( percent)					One-year Change
	2009	2010	2011	2012	2013	
LCP 85-384	6	1	<1	<1	<1	0
HoCP 85-845	<1	1	1	1	2	+1
HoCP 96-540	50	48	43	39	39	0
L 97-128	17	11	6	2	-	-2
L 99-226	11	17	19	21	17	-4
L 99-233	6	10	11	9	6	-3
HoCP 00-950	1	2	4	6	4	-2
L 01-283	<1	<1	4	11	10	-1
L 01-299	<1	<1	1	7	15	+8
L 03-371	0	<1	<1	2	3	+1
HoCP 04-838	0	0	<1	1	3	+2
Others	1	2	1	1	2	+1
<b>Totals</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	

<sup>1</sup> Based on annual variety surveys by LSU AgCenter county agents, 2009-2013.

**Billet planting:** Whole stalk planting will continue to be a recommended practice because research has shown the highest yields, over time, will be obtained with the least risk by planting whole stalks. When seed cane is badly lodged, however, one option likely will be to cut and plant billets. Current varieties vary in tolerance of billet planting. Stand problems in billet plantings have been encountered most frequently with HoCP 96-540, L 99-226 and L 03-371. Plantings of whole stalks have out-yielded billet plantings in the plant cane crop and some stubble crops in the majority of experiments.

The effects of stalk rots are greater in billets because of their shorter length and the wounding that occurs during cutting and planting. Billet plantings suffer greater damage if there is any kind of planting problem or environmental stress, and the risk of stand reduction therefore is greater. Because of greater stalk rot damage, billets possess less energy reserves than whole stalks by spring, and few buds remain to germinate and replace shoots killed by disease and adverse weather conditions.

**If you choose to plant billets, follow these practices:**

1. Plant longer (20-24 inch) billets.
2. Remove every other slat in the elevator chain to

accommodate longer billets.

3. Run the primary extractor fan but do not run the secondary extractor fan.
4. Use a planting rate averaging at least six billets running in the planting furrow.
5. Use good planting practices (good soil preparation and proper depth of cover) and provide good drainage and careful weed control.

**Planting furrow width:** Research has shown increases in cane yield and sugar yield when the planted row was widened from the V-furrow to the 18-24 inch furrow. Based on this research, it is suggested that growers use an 18-24 inch furrow for planting. It also is suggested that the furrow opener be constructed to leave a wide bottom with a slight indentation on each side of the furrow and a slight ridge of loose soil in the middle of the furrow bottom to accommodate wider plantings.

**Planting rate:** Based on research results and field observations, the planting rate recommendation is three to four stalks and a lap of at least two mature joints. Where sufficient seed cane is not available for optimum planting rates, growers may be able to obtain acceptable stands by planting two stalks and a lap of at least two mature joints. These

recommendations are based on using high-quality, disease-free seed cane. Additional seed cane should be used to compensate for poor-quality seed cane. Planted cane stalks should be spread to cover the entire width of the planting furrow.

**Date of planting:** Planting date trials from early August to mid-October have been conducted across numerous years. Results have shown the greatest advantage of August over mid-October planting. In some trials, August plantings even produced higher sugar yields than mid-September plantings.

### Amount of soil cover over seed cane

Research on depth of soil cover over seed cane indicates soil cover in excess of 4 inches can cause yield losses even if the excess is removed during the spring following planting. Although limited in acres planted, heat-treated cane should be covered with 2 inches of packed soil. After the heat-treated cane is up to a good stand and before freezing weather occurs, add an additional 2 inches of soil to protect from freeze damage. Do not cover heat-treated cane with more than 2 inches of packed soil at planting.

For August, September and October plantings, cover with 3 to 4 inches of packed soil at planting time. Farmers in the southern part of the belt normally can get by with 3 inches of packed soil covering. On farms in the northern part of the sugarcane belt, 4 inches of packed soil is recommended for additional freeze protection. Growers should use a fluke on the covering tool to keep from covering with more than 4 inches of packed soil. Growers who cover with much more than 4 inches of packed soil should be prepared to remove the additional soil early in the spring.

Varieties such as L 01-299 and HoCP 96-540 have poor vigor when germinating after planting. Soil cover for these varieties should be no more than 3 inches of packed soil.

Growers should use a covering tool that will cover the cane without pushing the cane closer than the width it was planted. Packing of rows should be done immediately after covering to minimize air pockets. Clean quarter drains before spraying herbicides. Where soil washing occurs in the fall before a hard freeze, it is suggested the middles be sunk and rows rebuilt for winter protection.

### Depth of planting with relation to water furrow

To avoid water damage, seed cane should be placed at least 3 to 4 inches above the final water furrow or row middle. In soils with poor internal drainage, the seed cane should be placed even higher above the final water furrow when possible.

Growers should be aware of the need to keep the seed cane above the area where water levels will hurt cane stands. Low row height at planting time could be a problem, especially with billet planting.

### Starter fertilizer application

Recent fertilization trials have shown sporadic yield responses to starter fertilizers applied in the planting furrow for cane planted after a fallow year. Other research has shown better response to starter fertilizer for succession planted cane. Where yield responses have been obtained, the rate was an application of 15-45-45 pounds per acre of N-P2O5-K2O.

Based on these recent findings and high fertilizer prices, it is suggested growers not apply starter fertilizer at planting. Where sugarcane is succession planted, a starter fertilizer should be applied at a rate of 15-45-45. Applying nitrogen at rates exceeding 15 pounds per acre is not recommended.

Rotational soybean crops are becoming more common in fallow fields. Although a nitrogen fertilizer credit has not yet been established, the organic nitrogen from soybeans should be sufficient to get the planted cane off to a good start during the fall. No starter fertilizer application is recommended for cane planted after a soybean crop.

### Succession planting sugarcane (cane planted without fallow)

Succession planting is an alternative planting system that has been investigated for several years and is used on a limited basis by some growers. It has the advantage of allowing growers to maintain more of their cane land in production and is beneficial in adjusting the cane rotation for growers who do not have a good balance of their acreage in each year of the crop cycle.

Because of its limitations, succession planting should be considered only on better drained soils that do not have serious infestations of johnsongrass or bermudagrass. Weather often becomes unsuitable for planting during the harvest season, and some

varieties are not tolerant of late planting. Observation indicates varieties that tolerate billet planting tend to perform better when planted in succession. Therefore, L 01-283 and L 01-299 may be good choices for succession planting.

Research has shown that fall fertilization at planting time has increased yields of succession

planted cane. In most cases, succession planted cane that received 15-45-45 of fall-applied N-P2O5-K2O fertilizer produced yields similar to cane planted conventionally after a fallow period.

Growers who plan to use succession planting should follow the procedures suggested below.

### **Suggested procedures for succession planting of sugarcane**

*(Please note: Growers should select succession planting areas that do not have heavy johnsongrass or bermudagrass infestations.)*

Suggested procedures for succession planting are:

1. Burn any remaining crop residues.
2. Lightly disk row top to break up the cane stubble into smaller, more manageable pieces.
3. Roto-till rows.
4. Do not subsoil because seed cane can sink and have too much soil cover.
5. Rebuild rows with disk chopper.
6. Culti-pack and then open planting furrow as recommended.
7. Apply fertilizer in planting furrow at 15-45-45 of N-P2O5-K2O before planting succession cane. (In addition, the normal recommended N-P2O5-K2O rates for plant and stubble cane should be applied during the spring of each crop year, depending on soil type and soil test results.)
8. Plant seed cane of a variety that tolerates late planting and cover as recommended.
9. Pack rows after planting.
10. Apply pre-emergence herbicides as recommended. Use the higher end of recommended rates.





## Section II. Sugarcane diseases

Several diseases can affect sugarcane grown in Louisiana. Knowing what symptoms to look for can lead to early diagnosis and help cut potential losses.

Among the common diseases that can affect Louisiana sugarcane are brown rust and smut. These

and other diseases Louisiana sugarcane growers should look for in their crops are listed in Table 4, which shows the disease names, symptoms, sources and control methods. For more information, visit [www.lsuagcenter.com](http://www.lsuagcenter.com).

Table 4. Sugarcane diseases

### Disease

#### Leaf Scald

**Symptoms:** Leaves of young plants may show bleaching or yellowing. The characteristic symptom of leaf scald is the presence of one or more narrow, white “pencil lines” running longitudinally down the full length of the leaf blade into the sheath. Bands of dead tissue may develop along pencil lines starting at the leaf margin and expanding until the entire leaf is dead. Young shoots may be killed. Mature stalks may show leaf symptoms and develop side shoots with symptoms. Under severe disease conditions, entire plants may die. Drought stress may induce severe symptom expression.

**Source of Inoculum:** The bacterium that causes leaf scald lives from year to year in infected plants. It is spread by the harvester and possibly by other cultivation practices that cause plant wounding. The disease can be spread aerially in windblown rain.

**Control:** Varietal resistance is the best means of control. Only two varieties going out of production, LCP 85-384 and Ho 95-988, are highly resistant. HoCP 96-540 exhibits moderate resistance. The other current varieties exhibit varying degrees of susceptibility, with HoCP 00-950 being the most susceptible. Avoid planting seed cane from fields with diseased plants. Regular planting of healthy seed cane produced through tissue culture has kept the incidence of leaf scald low. The heat treatment used to control ratoon stunting disease is not effective against leaf scald.

#### Mosaic

**Symptoms:** The mosaic pattern of irregular, interspersed, pale green, yellowish (sorghum mosaic virus) and green areas on leaves vary with cane variety, stage of growth, temperature (sugarcane mosaic virus) and the strain of the virus involved. The mosaic symptom is most evident in the youngest emerging leaves.

**Source of Inoculum:** The virus persists from year to year in infected plants. It is spread primarily by migrating aphids and also by planting infected seed cane.

**Control:** Mosaic is controlled primarily with host plant resistance. Historically, mosaic was a major disease adversely affecting sugarcane production in Louisiana. Basic breeding and development of sources of resistance have greatly reduced the effects of this disease, however. Currently grown varieties have adequate levels of resistance to mosaic. Planting seed cane produced through tissue culture can help keep disease incidence low in susceptible varieties.

#### Ratoon Stunting Disease

(*Leifsonia xyli subsp. xyli*)

**Symptoms:** Ratoon stunting disease has no obvious external symptoms. Infected plants may be shorter but with little or no decrease in diameter of the stalk. Stunting severity is associated with adverse environmental conditions, particularly drought stress, and it is more severe in ratoon crops. Affected plants, when split, may or may not show a pinkish color in the growing point of young shoots and orange to brownish discoloration of vascular bundles at the nodes in the lower portion of mature stalks.

**Source of Inoculum:** The bacterium lives from year to year in infected cane. It is spread by the cane harvester and by planting infected seed cane.

**Control:** A healthy seed cane program is the primary method for control. Seed cane produced from tissue culture free of the disease is commercially available. Heat treatment of seed cane in hot water at 50 degrees Celsius (122 degrees Fahrenheit) for two hours can provide control of most ratoon stunting disease bacteria. A regular annual heat treatment program can provide good control. Monitoring of infection levels and the success of a healthy seed cane program can be provided by collecting stalk samples and having them tested at the LSU AgCenter’s Sugarcane Disease Detection Lab. The level of resistance varies among varieties. High levels of resistance are uncommon, so a healthy seed cane program is essential for successful control.

**Red Rot**  
(*Glomerella tucumanensis*)

**Symptoms:** Red rot adversely affects stand establishment by rotting planted seed cane. Splitting stalks dug up from portions of a row without living plants reveals red discoloration of the internode tissue and rotted nodes. Within the red areas, white spots, usually elongated at right angles to the long axis of the stalk, are indicative of red rot infection. Red rot is more severe when planted stalks are exposed to drought stress or waterlogging.

**Source of Inoculum:** The fungal pathogen survives from season to season in infected cane tissue. Fungal inoculum is present on most planted stalks.

**Control:** Plant multiple whole stalks and avoid planting heavily bored or physically damaged seed cane. Provide good drainage for planted seed cane. High levels of varietal resistance are uncommon, so cultural practices that minimize stress on planted seed cane are needed to minimize red rot damage.

**Rust (Brown)**  
(*Puccinia melanocephala*)

**Symptoms:** Small chlorotic areas appear on the leaves at first as flecks. Later, the flecks elongate and become reddish-brown. The spots continue to enlarge, with a slight yellow halo surrounding the lesion on some varieties. The lesions take on a pustular appearance on the undersurface of the leaf, and pustules erupt, releasing a reddish-brown mass of spores. On susceptible varieties, heavily infected leaves dry out and die prematurely.

**Source of Inoculum:** Rust survives the winter in living green leaf tissue – usually in southern areas of the industry. Spores are then produced and aerially dispersed to spread the disease over short and long distances.

**Control:** Host plant resistance is the primary control method, but the rust pathogen has the capability to adapt and overcome varietal resistance. Once a variety becomes susceptible, rust can be controlled with the application of fungicides. Clipping or mowing to remove green leaf tissue of susceptible varieties containing rust early in the season may delay the onset of the spring epidemic by a few weeks. Detailed information on varietal resistance ratings, fungicide labels and use recommendations and clipping can be found on the LSU AgCenter website at [www.LSUAgCenter.com](http://www.LSUAgCenter.com) in “Best Management Practices for Minimizing the Impact of Brown Rust in Sugarcane.”

**Smut**  
(*Ustilago scitaminea*)

**Symptoms:** Smut is characterized by the production of a black, whiplike structure at the apex of stalks with smaller than normal diameter. The whip often elongates to a length of 2-3 feet and curls downward. The whip is covered by a layer of dark brown fungal spores. Prior to the emergence of whips, smut infected plants can have a grassy appearance with many small diameter shoots.

**Source of Inoculum:** Tremendous numbers of smut spores are released over time from whips and dispersed in air currents to spread the disease over short and long distances.

**Control:** To control smut, grow resistant varieties. Varieties with a high level of resistance to smut include LCP 85-384, HoCP 85-845, HoCP 96-540, HoCP 00-950, L 01-283, L 03-371 and HoCP 04-838. Varieties with moderate susceptibility include Ho 95-988, L 97-128, L 99-226, L 99-233 and L 01-299. High rates of disease increase do not occur under Louisiana climatic conditions, so it is possible to grow varieties with moderate smut susceptibility if a rigorous healthy seed cane program is followed. Tissue culture produced seed cane will have little or no smut infection. Roguing smut infected plants with glyphosate is only feasible in seed cane sources with low levels of infection. Avoid planting seed cane sources of smut susceptible varieties next to smut infected cane. Do not plant seed cane with more than 2 percent smut infection.

**White Stripe**  
(Physiological disorder)

**Symptoms:** White stripe is characterized by variable amounts of longitudinal white striping on leaves of some plants, which usually occur during spring. The white stripes extend the full length of the leaves. Striping is not considered infectious but rather is a growth response to environmental conditions.

**Control:** None. Plants usually will recover after fertilizer shows its effects in the presence of adequate rainfall.

**Yellow Leaf**  
(Sugarcane yellow leaf virus)

**Symptoms:** The underside of the midvein on younger leaves at the apex of mature plants turns bright yellow in infected plants. The yellowing can spread into the leaf blades, and midveins can turn pink in severely infected plants. Due to the short growing season in Louisiana, symptoms are not seen most years because of ripener applications and/or frosts. Despite the lack of visible symptoms, infected plants may exhibit reduced growth and juice quality.

**Source of Inoculum:** The sugarcane aphid acquires the virus during feeding on an infected plant. The aphid retains the virus for life and can transmit the disease during feeding on healthy plants within the same field or in other fields.

**Control:** Certified seed cane produced through tissue culture is tested for sugarcane yellow leaf virus. Continuous planting of seed cane with little or no virus infection will keep the incidence of yellow leaf low. Information is lacking on the disease resistance levels of commercial varieties.

### Section III. Controlling weeds in sugarcane

The Sugarcane Weed Management Guide is prepared as a joint effort between Dr. Jim Griffin, of the LSU AgCenter's School of Plant, Environmental and Soil Sciences in Baton Rouge, La., and Dr. Caleb Dalley, of the U.S. Department of Agriculture-Agricultural Research Service's Sugarcane Research Unit at Houma, La. The sections in the guide are in chronological order based on the sugarcane growing season from planting through harvest. Also included are sections on fallow and ditchbank weed control. For additional information concerning herbicides listed in this weed guide, consult the herbicide label. Expected weed control with sugarcane herbicides is provided in Table 12. Herbicides registered for use in sugarcane in Louisiana are included in Table 14. A listing of glyphosate products with surfactant recommendations is provided in Table 15.

#### At-planting weed control (August-September)

Herbicides may be applied on a band to the top of the row or broadcast. A broadcast application will help reduce weed encroachment from the row middles. Herbicides should be applied immediately after the row has been rolled or packed. Because residual weed control for herbicides applied at planting can be expected for about 60 days, a follow-up application of herbicide may be needed to prevent re-establishment of summer weeds and to control winter weeds. See "At-Planting Pre-emergence Split Application Programs" and "Post-emergence Weed Control (September-November)" sections. Herbicide application also will be needed on fields harvested for seed, especially where bermudagrass, johnsongrass and itchgrass are a problem.

Rates for herbicides are expressed on a broadcast basis.

To calculate band rate, for liquid and dry formulations, use this formula:

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

Information related to weed management programs for sugarcane and other crops can be found at:

[http://www.lsuagcenter.com/en/communications/publications/management\\_guides/Louisianas+Suggested+Chemical+Weed+Control+Guide.htm](http://www.lsuagcenter.com/en/communications/publications/management_guides/Louisianas+Suggested+Chemical+Weed+Control+Guide.htm)





**Table 5. At-planting pre-emergence (August-September) weed control**

Active Ingredient and Rate	Formulated Product and Rate	Weeds Controlled	Remarks and Precautions
atrazine @ 2-4 pounds per acre	Atrazine/others (See Table 14) 4 pounds per gallon formulation @ 2-4 quarts per acre 90 DF formulation @ 2.22-4.44 pounds per acre	Annual summer and winter broadleaf weeds	Use higher rate on heavy soils and when sugarcane is planted prior to early September.
sulfentrazone plus metribuzin @ 0.18-0.37 pounds per acre + 0.27-0.56 pounds per acre	Authority MTZ 45 DF @ 16-33 ounces per acre See Table 6 for equivalent rates of Spartan 4F and Metribuzin 75DF	Morningglory (tie vine) and other broadleaf weeds and nutsedge	Use higher rate on clay soils and soils with organic matter higher than 2 percent. At the highest rate of 33 ounces per acre the amount of metribuzin in Authority MTZ is not sufficient to provide grass control.
mesotrione @ 0.19-0.24 pounds per acre	Callisto 4L @ 6-7.7 ounces per acre	Annual summer and winter broadleaf weeds	Use higher rate on heavy soils or when sugarcane is planted prior to early September.
clomazone @ 1-1.25 pounds per acre	Command 3ME @ 2.66-3.33 pints per acre	Seedling johnsongrass, itchgrass, browntop panicum and other annual grasses	Use higher rate on heavy soils and when sugarcane is planted prior to early September. Addition of diuron or metribuzin can provide broadleaf weed control and bermudagrass suppression. Bleaching can occur where sugarcane has less than two inches of soil cover.
diuron @ 2.4-3 pounds per acre	Diuron/Direx/others (See Table 14) 4 pounds per gallon formulation @ 2.4-3 quarts per acre	Broadleaf weeds	Use higher rate on heavy soils and when sugarcane is planted prior to early September.
hexazinone plus diuron @ 0.5-0.53 pounds per acre + 1.75-1.87 pounds per acre	DuPont K-4 60DG @ 3.75-4 pounds per acre	Seedling johnsongrass, browntop panicum and other annual grass and broadleaf weeds	Can provide bermudagrass suppression. Can be applied with pendimethalin to improve itchgrass control. Velpar 2L at 1 quart per acre and Direx 4L at 1.8 quarts per acre can be combined to closely represent the DuPont K4 rate of 4 pounds per acre.
pendimethalin @ 2-3 pounds per acre	Prowl/Prowl H2O/others (See Table 14) 3.3EC formulation @ 2.4-3.6 quarts per acre.8CS @ 2.1-3.1 quarts per acre	Seedling johnsongrass, itchgrass, browntop panicum and other annual grasses	May be applied to the soil surface or incorporated. Use higher rate on heavy soils. Should be applied with other herbicides for broadleaf weed control.

**Table 5. At-planting pre-emergence (August-September) weed control (continued)**

Active Ingredient and Rate	Formulated Product and Rate	Weeds Controlled	Remarks and Precautions
metribuzin @ 1.5-3 pounds per acre	Metribuzin/Sencor/others (See Table 14) 75 DF formulation @ 2-4 pounds per acre	Seedling johnsongrass and other annual grass and broad-leaf weeds	Safe to sugarcane on all soil types. Use higher rate on heavy soils and when sugarcane is planted prior to early September. Can provide suppression of bermudagrass at higher rates. Addition of pendimethalin can improve control of browntop panicum and itchgrass.
terbacil @ 0.8-1.2 pounds per acre	Sinbar 80WP @ 1-1.5 (1 pound per acre on very sandy soils)	Seedling johnsongrass and other grass and broadleaf weeds.	Use higher rate on heavy soils and when sugarcane is planted prior to early September. Can provide suppression of bermudagrass at higher rates. Addition of pendimethalin can improve control of browntop panicum and itchgrass.
sulfentrazone @ 0.31-0.38 pounds per acre	Spartan 4F @ 10-12 ounces per acre See Table 6 for equivalent rates of Spartan 4F when using Authority MTZ	Broadleaf weeds and nutsedge	Use higher rate on heavy soils and when sugarcane is planted prior to early September.
trifluralin @ 2-4 pounds per acre	Treflan/Trifluralin/others (See Table 14) 4 pounds per gallon formulation @ 1-2 quarts per acre (banded)	Seedling johnsongrass, itchgrass, browntop panicum and other annual grasses	Roll or pack rows and incorporate herbicide within 24 hours after application. Avoid incorporation at a depth that will damage seed pieces. Can provide suppression of bermudagrass at higher rates. Other herbicides should be applied to the soil surface for broadleaf weed control.
flumioxazin @ 0.19-0.25 pounds per acre	Valor SX 51WG @ 6-8 ounces per acre	Annual broadleaf weeds	Use higher rate on heavy soils or when sugarcane is planted prior to early September. Do not apply after sugarcane emergence.

\*Equivalent rate in product per acre of Spartan 4F and Metribuzin 75DF based on Authority MTZ rate.

**Table 6. Sugarcane weed management - Authority MTZ 45 DF1 components**

Authority MTZ 45 DF1 Rate/Acre	Equivalent Rate/Acre of Spartan 4F Based on Authority MTZ Rate	Equivalent Rate/Acre of Metribuzin 75DF Based on Authority MTZ Rate
16 ounces	5.8 ounces	0.36 pounds (5.8 ounces)
18 ounces	6.5 ounces	0.41 pound (6.5 ounces)
20 ounces	7.2 ounces	0.45 pounds (7.2 ounces)
22 ounces	7.9 ounces	0.50 pounds (7.9 ounces)
24 ounces	8.6 ounces	0.54 pounds (8.6 ounces)
26 ounces	9.4 ounces	0.59 pounds (9.4 ounces)
28 ounces	10.1 ounces	0.63 pounds (10.1 ounces)
30 ounces	10.8 ounces	0.68 pounds (10.8 ounces)
32 ounces	11.5 ounces	0.72 pounds (11.5 ounces)
34 ounces	11.9 ounces	0.74 pounds (11.9 ounces)

Note: Authority MTZ contains 0.45 pounds active ingredient per pound: 0.18 pounds sulfentrazone (the active ingredient in Spartan 4F) and 0.27 pounds metribuzin (the active ingredient in Metribuzin/ Sencor/others).

### At-planting pre-emergence split application programs

A split application program, with herbicide applied at planting and around 60 days later, will provide extended residual control of bermudagrass, johnsongrass and itchgrass. In some cases, where split application programs are used, beds in the spring essentially are free of winter weeds. Programs that can be successful in suppressing bermudagrass include:

- **Command** at 3.3 pints per acre plus **Diuron/Direx** 4L/others at 2.5 pounds per acre at planting followed 60 days later by **Metribuzin/Sencor/others** at 1.5 pounds per acre **Command** at 3.3 pints per acre plus **Metribuzin/Sencor/others** at 1 pound per acre at planting followed 60 days later by **Metribuzin/Sencor/others** at 1.5 pounds per acre **DuPont K-4** at 4 pounds per acre at planting followed 60 days later by **Metribuzin/Sencor/others** at 1.5 pounds per acre.
- **Metribuzin/Sencor/others** at 2 to 3 pounds per acre at planting followed 60 days later by **Metribuzin/Sencor/others** at 1.5 pounds per acre
- **Treflan/Trifluralin/others** at 1.5 to 2 quarts per acre banded (3 to 4 quarts per acre broadcast) and incorporated at planting followed 60 days later by **Metribuzin/Sencor/others** at 1.5 pounds per acre

Another option for bermudagrass is to apply herbicide at planting on a band and sink the middles prior to the follow-up application. This program will reduce cost up front but will require an additional tillage operation and favorable weather conditions. If tillage cannot be performed, encroachment of bermudagrass from the row middles can result in a severe weed problem the following year.

### Weed control in sugarcane harvested for seed and in-succession planted sugarcane

Although shading from the crop canopy will suppress growth of weeds, once sugarcane is harvested for seed, bermudagrass will rapidly initiate new growth. Any of the herbicide programs listed for use at planting also can be used in fields where sugarcane was harvested for seed or where sugarcane was harvested early and delivered to the mill.

Herbicides listed for use at planting also may be used when sugarcane is succession planted. Rates may be reduced slightly (25 percent) due to the later planting date and to minimize the chance of sugarcane injury.



## Residual control of winter weeds (October-November)

For residual control of winter grass and broadleaf weeds apply Atrazine/others, Diuron/Direx/others, DuPont K-4, Metribuzin/Sencor/others or Sinbar in October-November to early harvested sugarcane, newly planted sugarcane or sugarcane harvested for seed. Herbicide rates specified in the “At-Planting Weed Control (August-September)” section can be reduced by 25 percent for November applications. Where a follow-up application is being made, selecting a herbicide other than the one previously applied should be considered to reduce risk of crop injury and development of herbicide-resistant weeds. If weeds are present, nonionic surfactant at 1 to 2 quarts per 100 gallons or crop oil concentrate at 2 to 4 quarts per 100 gallons should be added to the spray solution.

## Post-emergence weed control (September-November)

**Johnsongrass and itchgrass (September-October):** In early planted sugarcane or in sugarcane harvested for seed, johnsongrass may re-infest fields prior to winter. When applied in October to actively growing johnsongrass 12 to 18 inches tall, Asulox/Asulam at 3 quarts per acre or Envoke at 0.2 ounces per acre plus Asulox/Asulam (See Table 14 Glossary of Herbicides) at 2 quarts per acre plus nonionic surfactant at 1 to 2 quarts per 100 gallons of water or crop oil concentrate at 4 quarts per 100 gallons of water has controlled johnsongrass and reduced re-infestation the following spring. Asulox/Asulam alone and with Envoke also controls large itchgrass (more than 6 inches). For additional information on Asulox/Asulam and Envoke, see the “Post-emergence Weed Control – johnsongrass and Other Grasses (March-April)” section.

**Purple and yellow nutsedge (September-October):** To control nutsedge 4 to 12 inches in height in early planted sugarcane apply Permit/others (See Table 14 Glossary of Herbicides) at 1 to 1.33 ounces per acre with nonionic surfactant at 1 to 2 quarts per 100 gallons of water or crop oil concentrate at 4 quarts per 100 gallons of water. To control 2 to 6 inch yellow nutsedge or to suppress 2 to 4 inch purple nutsedge, apply Envoke at 0.2 ounces per acre with nonionic surfactant at 1 to 2 quarts per 100 gallons of water or crop oil concentrate at 4 quarts per

100 gallons of water. The higher rate of Permit/others 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 Permit/others and Envoke is slow and four weeks may be needed to maximize control. Sugarcane is very tolerant to over-top application of Permit/others. No more than three applications of Permit/others can be made per year and no more than 2.33 ounces should be applied per acre per year. Envoke can cause some yellowing and white banding on sugarcane leaves, as well as slight stunting, but sugarcane growth and emergence in spring has not been affected. Envoke also will provide some residual control of winter weeds. Other herbicides may be applied with Permit/others or Envoke for additional weed control. For additional information on Permit/others and Envoke, see the “Post-emergence Weed Control – Purple and Yellow Nutsedge (March-April)” section.

Yukon, a 67.5 percent WG premix of halosulfuron (the active ingredient in Permit/others) and dicamba (the active ingredient in Clarity/Vision) can provide control of both nutsedge and broadleaf weeds. For Yukon, a 4 ounces per acre rate is equivalent to 0.67 ounces per acre Permit and 4.5 ounces per acre Clarity/Vision; a 6 ounces per acre rate is equivalent to 1 ounce per acre Permit and 6.6 ounces per acre Clarity/Vision; and an 8 ounces per acre rate is equivalent to 1.3 ounces per acre Permit and 9 ounces per acre Clarity/Vision. Pre-emergence and post-emergence application of Spartan 4F at 8 to 12 ounces per acre or Authority MTZ at 22 to 33 ounces also will control purple and yellow nutsedge as well as many broadleaf weeds. Rates vary with soil type and with nutsedge population and size.

See “At-Planting Weed Control (August-September)” section for more information. Spartan and Authority MTZ have excellent crop safety when applied pre-emergence but will injure sugarcane when applied post-emergence. See table included in the “At-Planting Weed Control (August-September)” section for information on the equivalent rates of Spartan 4F when using Authority MTZ 45DF.

### **Bermudagrass (September-November):**

Shielded application of glyphosate to row sides and middles after planting or early harvest has provided good to excellent control of emerged bermudagrass (See Table 15 Glyphosate Products). Apply 2 to 3 quarts per acre of the 4 pounds active ingredient per gallon formulation or equivalent rate based on active ingredient in 5 to 20 gallons of water per acre as a shielded application. Information on glyphosate can be found in the “Fallow Weed Control” section. Severe injury will occur if glyphosate comes in contact with sugarcane foliage.

### **Broadleaf weeds (September-November):**

Apply Weedmaster/Brash/others at 0.5 to 1 quart per acre, 2,4-D (3.8L formulation) at 0.5 to 1.5 quarts per acre, Unison (1.74 L formulation) at 24 to 64 ounces per acre or Clarity/Vision/others at 0.5 to 1 pints per acre when air temperature is above 65 F (See Table 14 Glossary of Herbicides). Additional information related to these herbicides is provided in the “After Lay-by Weed Control (July-Harvest)” section.

**2,4-D Formulations:** Acid, amine salt and ester formulations of 2,4-D are available (See Table 14 Glossary of Herbicides). Since only the acid form of 2,4-D is active in controlling weeds, the herbicide concentration on the label is provided in pounds of acid equivalent (ae) per gallon instead of pounds of active ingredient (ai) per gal, as is the case with most other herbicides. Amine salt and ester formulations of 2,4-D range from 3.8 to 5.6 pounds acid equivalent per gallon. These numbers are important in determining the amount of formulated product to apply per acre. The lower the pounds acid equivalent per gallon the more formulated product required. For example, a 32 fluid ounces rate (1 quart per acre) of a 3.8L formulation would correspond to 21.7 ounces for a 5.6L formulation. Unison is an acid formulation of 2,4-D and contains 1.74 pounds acid equivalent per gallon. The rate range for Unison is 24 to 64 ounces per acre and rate, like other formulations, is dependent on weed spectrum, density and size. Unison is less volatile (susceptible to changing from a liquid to a gas where off-target movement can occur) than other 2,4-D formulations. Caution should be used anytime 2,4-D is applied near sensitive plants regardless of formulation.

### **Winter weed control (January-March)**

**Broadleaf weeds:** Apply Weedmaster/Brash/others at 0.5 to 1 quart per acre, 2,4-D (3.8L formulation) at 0.5 to 1.5 quarts per acre, Unison (1.74 L formulation) at 24 to 64 ounces per acre, or Clarity/Vision/others at 0.5 to 1 pints per acre after broadleaf weeds have emerged and when air temperature is above 65 F (See Table 14 Glossary of Herbicides). 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 “After Lay-by Weed Control (July-Harvest)” section. Atrazine/others, Diuron/Direx/others, DuPont K-4, Metribuzin/Sencor/others or Valor (prior to sugarcane emergence) may be added to improve post-emergence weed control and to provide soil residual activity.

**Grass and broadleaf weeds:** Gramoxone Inteon at 3 pints per acre or Paraquat/others 3L (See Table 14 Glossary of Herbicides) at 2 pints per acre plus nonionic surfactant at 1 to 2 quarts per 100 gallons or crop oil concentrate at 2 to 4 quarts per 100 gallons can be applied to sugarcane with no more than 4 leaves to control ryegrass, rescuegrass, timothygrass and winter annual bluegrass, as well as some broadleaf weeds. Atrazine/others, Diuron/Direx/others, DuPont K-4, Metribuzin/Sencor/others or Valor (prior to sugarcane emergence) may be added to improve burn down and provide soil residual activity. Gramoxone Inteon/Paraquat/others also can be applied with Weedmaster/Brash/others, 2,4-D or Clarity/Vision/others. Annual bluegrass can be controlled with Direx/others at 2.5 pounds per acre, DuPont K-4 at 3 pounds per acre, Metribuzin/Sencor/others at 1.33 pounds per acre or Sinbar at 1.25 pounds per acre plus a nonionic surfactant or crop oil concentrate. If herbicides with soil residual activity are applied prior to March 1, schedule lay-by cultivation and herbicide application earlier than normal to avoid weed reinfestation. Selection of a herbicide other than the one previously applied should be considered to reduce risk of crop injury and development of herbicide resistant weeds.

**Table 7. Spring weed control (February-March)**

Active Ingredient and Rate	Formulated Product and Rate	Weeds Controlled	Remarks and Precautions
<b>PRE-EMERGENCE (February-March)</b>			
atrazine @ 2-4 pounds per acre	Atrazine/others (See Table 14) 4 pounds per gallon formulation @ 2-4 quarts per acre 90 DF formulation @ 2.22-4.44 pounds per acre	Seedling broadleaf weeds	Use higher rate on heavy soils.
mesotrione @ 0.19-0.24 pounds per acre	Callisto 4L @ 6-7.7 ounces per acre	Seedling broadleaf weeds	Use higher rate on heavy soils.
clomazone @ 1-1.25 pounds per acre	Command 3ME @ 2.66-3.33 pints per acre	Seedling johnsongrass, itchgrass, browntop panicum and other annual grasses	Bleaching/whitening of sugarcane can occur if the crop is emerged at application. Can suppress bermudagrass at higher rates if applied with diuron or metribuzin.
diuron @ 2.4-3 pounds per acre	Diruon/Direx/others (See Table 14) 4 pounds per gallon formulation @ 2.4-3 quarts per acre 80 DF formulation @ 3-3.76 pounds per acre	Seedling broadleaf weeds	Use higher rate on heavy soils. Can be applied over top of sugarcane until daily maximum temperatures for the week preceding application average 80 F or greater.
hexazinone plus diuron @ 0.5-0.53 pounds per acre + 1.75-1.87 pounds per acre	DuPont K-4 60DG @ 3.75-4 pounds per acre	Seedling johnsongrass, browntop panicum and other annual grass and broadleaf weeds	For bermudagrass suppression apply at the higher rate. Can be applied with pendimethalin to improve itchgrass control. Velpar 2L at 1 quart per acre and Direx 4L at 1.8 quarts per acre can be combined to closely represent the DuPont K4 rate of 4 pounds per acre. See precaution above related to diuron application and temperature.
metribuzin @ 1.5-3 pounds per acre	Metribuzin/Sencor/others (See Table 14) 75 DF formulation @ 2-4 pounds per acre	Seedling johnsongrass and other annual grass and broadleaf weeds	Safe to sugarcane on all soil types. Use higher rate on heavy soils or when sugarcane is planted prior to early September. Can provide suppression of bermudagrass at higher rates. Addition of pendimethalin can improve control of browntop panicum and itchgrass.
trifluralin @ 4 pounds per acre	Treflan/Trifluralin/others (See Table 14) 4 pounds per gallon formulation @ 2 quarts per acre (banded)	Seedling johnsongrass, itchgrass, browntop panicum and other annual grasses	Incorporate within 24 hours after application. Can provide suppression of bermudagrass at higher rates. Other herbicides should be applied for broadleaf weed control.
flumioxazin @ 0.13-0.25 pounds per acre	Valor SX 51WG @ 4-8 ounces per acre	Annual broadleaf weeds	Can provide residual control when applied at 6 to 8 ounces per acre. Do not apply after sugarcane emergence.



## Post-emergence weed control (March-April)

### Johnsongrass and other grasses (March-April)

**Asulox/Asulam** can be applied broadcast, banded, or as a spot treatment. Nonionic surfactant at 1 to 2 quarts per 100 gallons of water or crop oil concentrate at 1 gallon per 100 gallons 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 degrees Fahrenheit. A 20-hour rain-free period following Asulox application may be needed to maximize control.

**First Application** – Apply 4 quarts per acre **Asulox/Asulam** broadcast (or the correct proportion if applying on a band) in 15 to 30 gallons of water per acre to actively growing johnsongrass that is 12 to 18 inches tall and to itchgrass less than 8 inches tall. If applying on a band, outside nozzles should be mounted on drops and band width should be wide enough to ensure thorough wetting of all foliage. Asulox applied at 3 to 4 quarts per acre also controls browntop panicum, foxtails, goosegrass and barnyardgrass/jungle rice when 6 to 8 inches tall. Vaseygrass that is less than 8 inches tall can be partially controlled with Asulox at 4 quarts per acre, but activity is very slow.

**Second Application** – A second application of **Asulox/Asulam** at 3 to 4 quarts per acre broadcast (or the correct proportion if applying on a band) can increase johnsongrass control but may not increase sugarcane yield over that obtained with a single Asulox 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 Asulox should be made to johnsongrass regrowth, usually about eight weeks after the first application. Sugarcane injury is more likely when Asulox is applied to sugarcane stressed from drought or excessive soil moisture and at high temperatures, especially after June 1.

**Spot Treatment** – 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” type nozzle is used for spot treatment, apply a 2 percent solution of **Asulox/Asulam** (2 gallons of herbicide plus 98 gallons of water). Spray to wet foliage but do not drench since sugarcane injury can be greater compared with spot treating using a calibrated sprayer.

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

**Envoke:** Envoke 75DF can be applied post-emergence over the top to plant or ratoon cane up to 24 inches tall at 0.3 ounces per acre broadcast (or the correct proportion if applying on a band) or as a directed application at 0.3 to 0.6 ounces per acre to sugarcane 18 inches tall at lay-by. Nonionic surfactant at 1 to 2 quarts per 100 gallons of water or crop oil concentrate at 4 quarts per 100 gallons of water should be added to the spray solution. **Envoke** applied over the top 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 effects on sugarcane yield have been observed. Envoke at 0.3 ounces per acre will suppress but will not control rhizome.

**Johnsongrass or large itchgrass:** Combinations of **Envoke** with **Asulox/Asulam** provide broadleaf and grassy weed control. Envoke at 0.3 ounces per acre applied with Asulox at 2 quarts per acre (half rate) plus nonionic surfactant or crop oil concentrate has improved control of large rhizome johnsongrass (more than 18 inches) when compared with Asulox applied alone at 4 quarts per acre (full rate). Envoke at 0.2 ounces per acre applied with Asulox at 2 quarts per acre controlled large itchgrass (more than 6 inches) better than Asulox applied alone at 4 quarts per acre. For ground application, use a minimum of 10 gallons of water per acre (broadcast basis). Higher spray volume of at least 20 gallons per acre should be used for heavy weed infestations to ensure adequate spray coverage. **Envoke cannot be applied aerially. For both Asulox/Asulam and Envoke, DO NOT cultivate, fertilize or otherwise disturb the johnsongrass root system for seven days before or after application.**

**Purple and yellow nutsedge (March-April):** Apply **Permit/others** at 1 to 1.33 ounces per acre, **Yukon** at 6 to 8 ounces per acre or **Envoke** at 0.2 ounces with nonionic surfactant at 1 to 2 quarts per 100 gallons of water or crop oil concentrate at 1 gallon per 100 gallons of water. **Spartan** and **Authority MTZ** will cause injury if applied over the top of sugarcane. See “Post-emergence weed control (September-November)” section for additional information.

### Lay-by weed control (May-June)

Herbicides at lay-by are applied broadcast and directed underneath the sugarcane canopy, usually following the last cultivation. It is necessary that the lower canopy be contacted by the spray to ensure weed control both in the sugarcane drill and in the row middles. If weeds are present, nonionic surfactant at 1 to 2 quarts per 100 gallons or crop oil

concentrate at 2 to 4 quarts per 100 gallons should be added to the spray solution for herbicides with post-emergence activity. Information related to post-emergence activity of herbicides can be found in the “After Lay-by Weed Control (July-Harvest)” section.

### After lay-by weed control (July-Harvest)

Morningglory or tie vines can cause significant problems at sugarcane harvest. To control morningglory and other broadleaf weeds, herbicides can be applied over the crop canopy by air or ground sprayer, or herbicides can be directed under the crop canopy. Coverage of the entire morningglory plant with spray solution will provide the most consistent control. Nonionic surfactant at 1 to 2 quarts per 100 gallons or crop oil concentrate at 2 to 4 quarts per 100 gallons should be added to the spray solution.



**Table 8. Lay-By Weed Control (May-June)**

Active Ingredient and Rate	Formulated Product and Rate	Weeds Controlled	Remarks and Precautions
<b>PRE-EMERGENCE Lay-By (May-June)</b>			
atrazine @ 2-4 pounds per acre	<b>Atrazine/others</b> (See Table 14) 4 pounds per gallon formulation @ 2-4 quarts per acre 90 DF formulation @ 2.22-4.44 pounds per acre	Morningglory (tie vine) and other broadleaf weeds	Use higher rate on heavy soils and where morningglory (tie vine) is a problem weed. Residual red morningglory control can be expected for about 35 days. Residual control of tie vine can be extended by applying atrazine a few weeks after the lay-by cultivation.
sulfentrazone plus metribuzin @ 0.18-0.37 pounds per acre + 0.27-0.56 pounds per acre	<b>Authority MTZ 45 DF</b> @ 16-33 ounces per acre <i>See Table 6 included in the "At-Planting Weed Control (August/September)" section for information on the equivalent rates of Spartan 4F when using Authority MTZ 45DF</i>	Morningglory (tie vine) and other broadleaf weeds and nutsedge	Use higher rate on clay soils and/or soils with organic matter content higher than 2 percent. At the highest rate of 33 ounces per acre, the amount of metribuzin in Authority MTZ is not sufficient to provide grass control. See information below for Spartan 4F concerning red morningglory control. <b>Injury will occur if herbicide contacts newly emerging sugarcane shoots and leaves.</b> Do not apply more than 33 ounces per acre in one growing season and do not apply within 120 days of harvest.
mesotrione @ 0.19-0.24 pounds per acre	<b>Callisto 4L</b> @ 6-7.7 ounces per acre	Morningglory (tie vine) and other broadleaf weeds	Use higher rate on heavy soils. Should be applied with other herbicides for grass control.
diuron @ 2.4-3 pounds	<b>Diuron/Direx/others</b> (See Table 14) 4 pounds per gallon formulation @ 2.4-3 quarts per acre 80 DF formulation @ 3-3.75 pounds per acre	Seedling broadleaf weeds	Apply when sugarcane is 30 inches or taller. Injury will occur if herbicide contacts newly emerging sugarcane shoots and leaves.
hexazinone plus diuron @ 0.27-0.4 pounds per acre + @ 0.94-1.4 pounds per acre	<b>DuPont K-4 60DG</b> @ 2-3 pounds per acre	Seedling johnsongrass, browntop panicum and other annual grass and broadleaf weeds	Apply when sugarcane is 30 inches or taller. <b>Injury will occur if herbicide contacts newly emerging sugarcane shoots and leaves.</b> Addition of pendimethalin can improve itchgrass control. Velpar 2L at 0.8 quarts per acre and Direx 4L at 1.4 quarts per acre can be combined to closely represent the equivalent rate of 3 pounds per acre of DuPont K4. <b>If DuPont K-4 was applied during the spring do not apply more than 2 pounds per acre at lay-by.</b>

**Table 9. After lay-by weed control (July-harvest)**

Active Ingredient and Rate	Formulated Product and Rate	Weeds Controlled	Remarks and Precautions
<b>POST-EMERGENCE After Lay-By (July-Harvest)</b>			
2,4-D @ 0.47-1.42 pounds per acre	<b>2,4-D</b> products 3.8L formulation @ 1-1.5 quarts per acre (See Table 14) See information below on 2,4-D formulations	Morningglory (tie vine) and other broadleaf weeds	Apply higher rate if vines are climbing sugarcane plants. Surfactant may be added. Note: Use of 2,4-D is restricted in some parishes. Check local restrictions before application. <b>To avoid potential stand and yield loss in the subsequent plant cane crop, do not apply to seed cane sources later than seven weeks prior to harvest and planting. See information below on 2,4-D formulations.</b>
atrazine @ 2-4 pounds per acre	<b>Atrazine/others</b> (See Table 14) 4 pounds per gallon formulation @ 2-4 quarts per acre 90 DF formulation @ 2.22-4.44 pounds per acre	Morningglory (tie vine) and other broadleaf weeds	Apply with surfactant over top or directed before row closure occurs. Use higher rate if vines are climbing sugarcane plants.
sulfentrazone plus metribuzin @ 0.18-0.37 pounds per acre + 0.27-0.56 pounds per acre	<b>Authority MTZ 45 DF</b> @ 16-33 ounces per acre See table included in the "At-Planting Weed Control (August/September)" section for information on the equivalent rates of Spartan 4F when using Authority MTZ 45DF	Morningglory (tie vine) and other broadleaf weeds and nutsedge	Apply with surfactant as a directed treatment. <b>Injury will occur if herbicide contacts newly emerging sugarcane shoots and leaves.</b> Do not apply more than 33 ounces per acre in one growing season or within 120 days of harvest.
mesotrione @ 0.09 pounds per acre	<b>Callisto 4L</b> @ 3 ounces per acre	Morningglory (tie vine) and other annual broadleaf weeds	Can be applied over the top or as a directed spray. Only one application can be made if Callisto was applied pre-emergence earlier in the season. Do not harvest sugarcane within 114 days following an over-the-top application or within 100 days following a directed spray.
dicamba @ 0.5-0.75 pounds per acre	<b>Clarity/Vision/others</b> (See Table 14) 4L formulation @ 16-24 ounces per acre 3.8L formulation @ 17 to 25 ounces per acre	Morningglory (tie vine) and other broadleaf weeds	Apply higher rate if vines are climbing sugarcane plants. Surfactant may be added. Can be used in areas where 2,4-D is restricted. <b>To avoid potential stand and yield loss in the subsequent plant cane crop, do not apply to seed cane sources later than seven weeks prior to harvest and planting.</b>
trifloxysulfuron-sodium @ 0.014-0.028 pounds per acre	<b>Envoke 75DF</b> @ 0.3-0.6 ounces per acre	Morningglory (tie vine) and other broadleaf weeds, itchgrass and other annual grasses and purple and yellow nutsedge.	Apply as a directed treatment with non-ionic surfactant at 1 quart per 100 gallons. Do not apply within 100 days of harvest. A maximum of three applications or 1.5 ounces per acre may be applied per growing season.



**Table 9. After lay-by weed control (July-harvest) continued**

Active Ingredient and Rate	Formulated Product and Rate	Weeds Controlled	Remarks and Precautions
<b>POST-EMERGENCE After Lay-By (July-Harvest)</b>			
paraquat @ 0.50-1 pound per acre	Gramoxone Inteon/Paraquat/ others (See Table 14) 2L formulation @ 2-4 pints per acre 3L formulation @ 1.33-2.67 pints per acre	Small grass and broadleaf weeds and bermudagrass (suppression)	Apply with surfactant as a directed treatment to row middles in late June to desiccate bermudagrass. <b>Herbicide contact with young sugarcane tillers and leaves can cause significant injury.</b>
halosulfuron @ 0.03-0.06 pounds per acre	<b>Permit/others</b> (See Table 14) 75DF formulation @ 0.67-1.33 ounces per acre	Purple and yellow nutsedge	Apply as a directed treatment at 1 to 1.33 ounces per acre with surfactant to nutsedge growing under the crop canopy.
sulfentrazone @ 0.19-0.25 pounds per acre	<b>Spartan 4F</b> @ 6-8 ounces per acre See Table 6 included in the "At-Planting Weed Control (August/September)" section for information on the equivalent rates of Spartan 4F when using Authority MTZ 45DF	Morningglory (tie vine) and other broadleaf weeds and nutsedge	Apply with surfactant as a directed treatment at the higher rate if morningglory is climbing sugarcane plants. <b>Injury will occur if herbicide contacts newly emerging sugarcane shoots and leaves.</b> Do not reapply if applied during the spring or at lay-by. Do not apply within 120 days of harvest.
flumioxazin @ 0.10-0.25 pounds per acre	<b>Valor SX</b> 51WG @ 3-8 ounces per acre	Morningglory (tie vine) and other broadleaf weeds and some annual grasses	<b>Apply as a directed treatment after sugarcane has begun to joint. Spray contact with more than the lower 6 inches of sugarcane plants will result in severe injury.</b> Residual red morningglory control can be expected for about 35 days. Valor can be applied at a maximum rate of 12 ounces per acre per crop year. Do not apply within 90 days of harvest.
2,4-D plus dicamba @ 0.36-0.72 pounds per acre + 0.12-0.24 pounds per acre	<b>Weedmaster/Brash/others</b> (See Table 14) 3.8L formulation @ 0.5-1 quarts per acre	Morningglory (tie vine) and other annual broadleaf weeds	Apply higher rate if vines are climbing sugarcane plants. Surfactant may be added. Note: Use of 2,4-D is restricted in some parishes. Check local restrictions before application. <b>To avoid potential stand and yield loss in the subsequent plant cane crop, do not apply to seed cane sources later than seven weeks prior to harvest and planting.</b>
halosulfuron plus dicamba @ 0.03-0.06 pounds per acre + 0.14-0.28 pounds per acre	<b>Yukon</b> 67.5 WG @ 4 to 8 ounces per acre	Purple and yellow nutsedge, small morningglory (tie vines) and other broadleaf weeds	Apply as a directed treatment at 1 to 1.33 ounces per acre with surfactant to nutsedge growing under the crop canopy. An 8-ounces-per-acre rate is equivalent to 1.3 ounces per acre of Permit and 9 ounces per acre of Clarity/Vision.

2,4-D Formulations: Acid, amine salt and ester formulations of 2,4-D are available (See Table 14 Glossary of Herbicides). Since only the acid form of 2,4-D is active in controlling weeds, the herbicide concentration on the label is provided in pounds of acid equivalent (ae) per gallon instead of pounds of active ingredient (ai) per gallon, as is the case with most other herbicides. Amine salt and ester formulations of 2,4-D range from 3.8 to 5.6 pounds acid equivalent per gallon. These numbers are important in determining the amount of formulated product to apply per acre. The lower the pounds of acid equivalent per gallon the more formulated product required. For example, a 32 fluid ounces rate (1 quart per acre) of a 3.8L formulation would correspond to 21.7 ounces for a 5.6L formulation. Unison is an acid formulation of 2,4-D and contains 1.74 pounds acid equivalent per gallon. The rate range for Unison is 24 to 64 ounces per acre and rate, like other formulations, is dependent on weed spectrum, density and size. Unison is less volatile (susceptible to changing from a liquid to a gas where off-target movement can occur) than other 2,4-D formulations. Caution should be used any time 2,4-D is applied near sensitive plants regardless of formulation.

## Fallow weed control

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. Apply pre-emergence herbicides to a weed-free and clod-free bed. Packing of the row top prior to application may improve weed control.

**Table 10. Pre-emergence fallow**

Active Ingredient and Rate	Formulated Product and Rate	Weeds Controlled	Remarks and Precautions
<b>PRE-EMERGENCE Fallow</b>			
atrazine @ 2-4 pounds per acre	<b>Atrazine/others</b> (See Table 14) 4 pounds per gallon formulation @ 2-4 quarts per acre 90 DF formulation @ 2.22-4.44 pounds per acre	Broadleaf weeds	Use higher rate on heavy soils and when control in excess of 45 days is needed.
diuron @ 2.4-3 pounds per acre	<b>Diuron/Direx/others</b> (See Table 14) 4 pounds per gallon formulation @ 2.4-3 quarts per acre 80 DF formulation @ 3-3.75 pounds per acre	Broadleaf weeds	Use higher rate on heavy soils and when control in excess of 45 days is needed.
hexazinone plus diuron @ 0.50-0.53 pounds per acre + 1.75-1.87 pounds per acre	<b>DuPont K-4 60DG</b> @ 3.75-4 pounds per acre	Seedling johnsongrass, browntop panicum, dove-weed and other annual grass and broadleaf weeds	Apply to a clean seedbed at least 60 days prior to planting. Can be reapplied at planting but no more than 11.25 pounds can be applied per acre per year. Velpar 2L at 1 quart per acre and Direx 4L at 1.8 quarts per acre can be combined to closely represent the DuPont K4 rate of 4 pounds per acre.
EPTC @ 3-6.1 pounds per acre	<b>Eptam 7-E</b> @ 3.5-7 pints per acre	Annual grass and broadleaf weeds	Apply to a clean seedbed at least 60 days prior to planting. Can be reapplied at planting but no more than 11.25 pounds can be applied per acre per year. Velpar 2L at 1 quart per acre and Direx 4L at 1.8 quarts per acre can be combined to closely represent the DuPont K4 rate of 4 pounds per acre.
halosulfuron @ 0.03-0.06 pounds per acre	<b>Permit/others</b> (See Table 14) 75 DF formulation @ 0.67-1.33 ounces per acre	Purple and yellow nutsedge	A rate of 1 to 1.33 ounces per acre with surfactant is recommended for control of nutsedge. Can be applied with other herbicides. Do not exceed 2.67 ounces per acre in one growing season.
pendimethalin @ 2.5 pounds per acre	<b>Prowl/Prowl H2O/others</b> 3.3EC formulation @ 3 quarts per acre 3.8CS @ 2.6 quarts per acre	Seedling johnsongrass, itchgrass, browntop panicum, other annual grasses	Apply to clean seedbed or incorporate 4 inches deep at least 60 days prior to planting.

## Post-emergence fallow

**Glyphosate and glyphosate mixtures:** Post-emergence herbicides should be applied to actively growing weeds. Several formulations of glyphosate are available, with the most common being 4L and 5.5L formulations (See Table 15: *Glyphosate Products*). A rate of 32 ounces per acre (1 quart per acre) of a 4L formulation would correspond to 26 ounces per acre of a 5L formulation and 23 ounces per acre of a 5.5L formulation. Most formulations of glyphosate contain some surfactant. The need for additional surfactant is based on how much surfactant is present in the formulation and the quality of the surfactant. The herbicide label may state that no additional surfactant is needed or recommended; that surfactant may be added; or that surfactant is required at a specified amount. See Table 15 for information concerning need for surfactant with the various glyphosate products. Always consult the label for specific information on the need for surfactants and other adjuvants.

**Johnsongrass in fallow:** For control of johnsongrass and other weeds, rates of 1 to 2 quarts per acre of the 4L glyphosate formulation is sufficient (See Table 15 *Glyphosate Products*). Do not cultivate for seven 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).

**Broadleaf weeds in fallow: Atrazine/others** at 1 to 2 quarts per acre, **Aim** 2EC at 1 to 2 ounces per acre and **Valor** at 3 to 4 ounces per acre can be applied to control broadleaf weeds and in particular morningglory (tie vine). The higher rates should be applied to control large vining weeds. **Atrazine/others** and **Aim** can be applied any time during the fallow period. **Valor** can be applied from two weeks prior to planting to before sugarcane emerges. Some residual weed control can be expected with **Atrazine/others** and **Valor**, but **Aim** has no soil residual activity. Nonionic surfactant at 1 to 2 quarts per 100 gallons or crop oil concentrate at 2 to 4 quarts per 100 gallons should be added to the spray solution. If applied with glyphosate, surfactant

present in the glyphosate formulation may be adequate. See Table 15 for information concerning need for surfactant with the various glyphosate products. Always consult the label for specific information on the need for surfactants and other adjuvants.

**Bermudagrass in fallow:** In fields where bermudagrass population is high, tillage in combination with glyphosate is most effective. Apply 2 to 3 quarts per acre of the 4L glyphosate formulation for control of bermudagrass with less than 8 inch runners. See Table 15 for information concerning need for surfactant with the various glyphosate products. Always consult the label for specific information on the need for surfactants and other adjuvants. Retreatment with 2 to 3 quarts per acre may be necessary to maintain control. Do not cultivate for seven 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 in fallow: Permit/others** at 1 to 1.33 ounces per acre, **Yukon** at 6 to 8 ounces per acre and **Envoke** at 0.15 to 0.2 ounces per acre applied with nonionic surfactant at 1 to 2 quarts per 100 gallons of water or crop oil concentrate at 4 quarts per 100 gallons 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. **Permit/others**, **Yukon** and **Envoke** can be applied with glyphosate products without negatively affecting grass control. If applied with glyphosate, surfactant present in the glyphosate formulation may be adequate. See Table 15 for information concerning need for surfactant with the various glyphosate products. Always consult the label for specific information on the need for surfactants and other adjuvants. If two applications of glyphosate are planned, **Permit/others**, **Yukon**, or **Envoke** should be applied with glyphosate in the first application. The follow-up application of glyphosate alone should be effective on nutsedge regrowth. **Yukon**, a premix of

halosulfuron (the active ingredient in Permit) and dicamba (the active ingredient in Clarity/Vision/others), and Envoke also will provide some control of broadleaf weeds. For **Yukon**, a rate of 6 ounces per acre is equivalent to 1 ounce per acre Permit and 6.6 ounces per acre Clarity/Vision and a 8 ounces per acre rate is equivalent to 1.3 ounces per acre **Permit** and 9 ounces per acre **Clarity/Vision**. As also noted for glyphosate, do not cultivate for seven days after application of **Permit/others**, **Yukon** or **Envoke** 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** at 3 pints per acre or **Paraquat/others** 3L at 2 pints per acre plus nonionic surfactant at 1 to 2 quarts per 100 gallons or crop oil concentrate at 2 to 4 quarts per 100 gallons can be applied one to two weeks before planting to desiccate weeds. Because herbicide does not move to underground nutsedge tubers, rapid reestablishment should be expected and use of **Permit/others**, **Yukon**, **Envoke**, **Authority MTZ** or **Spartan** in September or October should be considered. See “At-Planting Weed Control (August/September)” and “Post-emergence Weed Control (September-November)” sections.

**Doveweed in fallow:** 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 pounds per acre, **Metribuzin/Sencor/others** at 1.3 pounds per acre or **Valor SX** at 6 to 8 ounces per acre in June to control weeds on formed beds. This application should provide pre-emergence control of doveweed up to 60 days after application. For emerged doveweed, effective control may be obtained with **Gramoxone Inteon** at 3 pints per acre or **Paraquat/others** 3L at 2 pints per acre, **Atrazine/others** at 4 quarts per acre or **Metribuzin/Sencor/others** at 1.5 pounds per acre applied one to three weeks before planting. Nonionic surfactant at 1 to 2 quarts per 100 gallons or crop oil concentrate at 2 to 4 quarts per 100 gallons should be added to the spray solution for post-emergence applications. Application of **Gramoxone Inteon** at 2 pints per

acre or **Paraquat/others** 3L at 1.33 pints per acre with **Atrazine/others** at 2 quarts per acre or application of **Metribuzin/ Sencor/others** at 1 pound per acre with **Weedmaster/Brash/others** at 1.5 pints per acre were effective when planting was delayed beyond three weeks after application.

**No-tillage fallow program:** In a no-tillage program, sugarcane stubble must be destroyed with herbicide. To obtain about 90 percent control of sugarcane stubble, glyphosate rate based on a 4L formulation is 1 quart per acre (6 inch stubble), 1.5 quarts per acre (10 inch stubble), 2 quarts per acre (16 inch stubble) and 2.5 quarts per acre (18 inch stubble) (*See Table 15 : Glyphosate Products*). In a no-tillage program, a second glyphosate application typically 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-tillage program where glyphosate is used for weed control may 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 ditch banks. This will aid in field drainage and prevent weed movement into adjacent sugarcane fields. These recommendations are for nonirrigation, 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 gallons of water per acre spray volume.



**Table 11. Ditchbank weed control**

Active Ingredient and Rate	Formulated Product and Rate	Weeds Controlled	Remarks and Precautions
<b>DITCHBANK WEED CONTROL</b>			
2,4-D plus triclopyr @ 2 pounds per acre + 1 pound per acre	<b>Crossbow 3L</b> @ 4 quarts per acre	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 to 1.5 gallons per 100 gallons of water and add nonionic surfactant at 1 quart per 100 gallons of water. Apply in a spray volume of 40 to 60 gallons per acre to thoroughly soak all stems and plant crowns at the soil line. <b>This product contains 2,4-D and its use may be restricted in some areas of the state.</b>
diuron @ 2-15 pounds per acre	<b>Diuron/Direx/others</b> (See Table 14) 4L @ 2-15 quarts per acre 80DF @ 2.5-18.8 pounds per acre	Annual grasses and broadleaf weeds	Provides residual control of many annual weeds. Addition of nonionic surfactant at 1 to 2 quarts per 100 gallons of water or crop oil concentrate at 2 to 4 quarts per 100 gallons of water will increase contact activity on small, emerged weeds no more than 3 inches 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.
triclopyr @ 2-3 pounds per acre	<b>Garlon/others</b> (See Table 14) 4L @ 2-3 quarts per acre or 3L @ 2.7-4 quarts per acre	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 pints per acre of 4L formulation or 2 pints per acre of 3L formulation plus nonionic surfactant at 1 to 2 quarts per 100 gallons of water. Apply in a spray volume of 40 to 60 gallons per acre to thoroughly soak all stems and plant crowns at the soil line. Note: Garlon 4 at 1 gallon per 80 gallons water plus 1 percent Roundup has been effective on poppingweed when plants were thoroughly wetted.
MSMA @ 4 pounds per acre	<b>MSMA/others</b> (See Table 14) 6L @ 2.7 quarts per acre	Johnsongrass and itchgrass	Apply and repeat as necessary. Add nonionic surfactant at 1 quart per 100 gallons of water if not present in the formulation. Apply MSMA alone if the goal is to encourage bermudagrass growth for ditchbank stabilization. Mixing can be a problem when MSMA is applied with some broadleaf herbicides. Note: MSMA can no longer be purchased After Dec. 31, 2013, use of MSMA-containing products for all labeled uses, except cotton, is prohibited.
pendimethalin @ 2.5-3.3 pounds per acre	<b>Prowl/Prowl H2O/others</b> (See Table 14) 3.3EC @ 3-4 quarts per acre 3.8CS @ 2.6-3.5 quarts per acre	Seedling johnsongrass, itchgrass and other annual grasses	Apply in a minimum of 20 gallons per acre spray volume prior to weed emergence. It will NOT control emerged weeds. May apply with post-emergence herbicides to provide residual activity.

Table 11. Ditchbank weed control continued

Active Ingredient and Rate	Formulated Product and Rate	Weeds Controlled	Remarks and Precautions
<b>DITCHBANK WEED CONTROL</b>			
glyphosate @ 1-5 pounds per acre	<b>Roundup/others</b> (See Table 15) 4L @ 1 to 5 quarts per acre 5L @ 0.8 to 4 quarts per acre 5.5L @ 0.7 to 3.6 quarts per acre	Johnsongrass, itchgrass and other weeds	Johnsongrass, itchgrass and most other weeds are controlled at 1 to 2 quarts per acre of the 4L glyphosate formulation. Apply 2 to 3 quarts per acre for control of bermudagrass with less than 8-inch runners. Retreatment with 2 to 3 quarts per acre may be necessary to maintain bermudagrass control. Application with diuron at 5 pounds active ingredient per acre (see information on diuron) or Velpar 2L at 1 quart per acre and Diuron/Direx/others 4L at 1.8 quarts per acre can increase initial control and provide extended control of many annual weeds. Do not allow herbicide to contact foliage of desirable plants.
hexazinone plus diuron @ 0.5 + 1.8 pounds per acre	<b>Velpar</b> 2L at 1 quart per acre and <b>Diuron/Direx/others</b> 4L at 1.8 quarts per acre	Most ditchbank weeds, including some control of poppingweed	Will not control rhizome johnsongrass or curly dock. Do not use on outflow ditches or ditches not directly between two cane fields. Very slow activity on poppingweed. Inclusion of 2 quarts per acre of a 4L glyphosate formulation or 2.67 quarts per acre of a 6L MSMA formulation has increased rhizome johnsongrass and curly dock control. Apply in a spray volume of at least 40 gallons per acre to thoroughly cover the soil and foliage and soak all stems and plant crowns at the soil line. Nonionic surfactant at 1 quart per 100 gallons of water or crop oil concentrate at 1 gallon per 100 gallons of water should be added.
2,4-D plus dicamba @ 0.36-2.15 pounds per acre + 0.12-0.75 pounds per acre	<b>Weedmaster/Brash/others</b> (See Table 14) 3.8L @ 0.5-3 quarts per acre	Broadleaf weeds	Use 1 quart per acre to control annual broadleaf weeds and 1 to 3 quarts per acre for suppression of perennial weeds. <b>This product contains 2,4-D and its use may be restricted in some areas of the state.</b>

**Table 12. Effectiveness of selected sugarcane herbicides applied pre-emergence in-crop and in-fallow**

Weed control estimates represent 28 to 35 days after application of pre-emergence herbicides and 14 to 21 days after application of post-emergence herbicides at the high end of the rate range. A value of 0 equals no control and a value of 10 equals 100 percent control.

	Seedling Johnson grass	Rhizome Johnson grass	Itchgrass (Raoul grass)	Bermuda grass <sup>1</sup>	Browntop panicum	Annual grasses	Morningglory (Tie vines)	Other broadleaf weeds	Nutsedges	Doveweed	Winter grasses <sup>2</sup>	Winter broadleaf weeds <sup>3</sup>
<b>Pre-emergence application:</b>												
Atrazine/others	2	0	2	0	4	5	8	9	2	5	8	9
Authority MTZ	5	0	2	1	5	5	9	8	7	-	5	8
Callisto	2	0	0	0	5	5	7 <sup>6</sup>	8	2	8	3	7
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
Diuron/Direx/others	7	0	5	1	6	6	6	8	2	3	7	8
DuPont K-4	8	2	7	7	8	9	7	8	5	9	8	8
Eptam <sup>4</sup>	8	6	-	6	-	-	7	6	5	-	2	2
Prowl/others	8	2	8	2	8	9	2	2	3	0	6	2
Prowl plus DuPont K-4	8	2	8	5	9	9	7	8	3	-	7	8
Prowl plus, Metribuzin/Sencor/others	9	2	8	5	9	9	8	9	4	-	8	8
Metribuzin/Sencor/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/Trifluralin/others <sup>4</sup>	9	6	9	7	9	9	2	2	5	-	8	2
Valor	3	0	2	0	3	4	8	9	2	-	8	9

<sup>1</sup> Expected control level with application 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.

<sup>2</sup> Winter grasses include ryegrass, rescuegrass and timothygrass.<sup>3</sup> Winter broadleaf weeds include sowthistle, wild geranium and clovers.

<sup>4</sup> Herbicide must be incorporated.

<sup>5</sup> Requires 28 to 35 days to reach maximum control.

<sup>6</sup> Addition of atrazine improves control.

<sup>7</sup> For best results, apply before morningglory exceeds 5 inches in height.

**Table 13. Effectiveness of selected sugarcane herbicides applied post-emergence in-crop and in-fallow**

Weed control estimates represent 28 to 35 days after application of pre-emergence herbicides and 14 to 21 days after application of post-emergence herbicides at the high end of the rate range. A value of 0 equals no control and a value of 10 equals 100 percent control.

	Seedling Johnson grass	Rhizome Johnson grass	Itchgrass (Raoul grass)	Bermuda grass <sup>1</sup>	Browntop panicum	Annual grasses	Morningglory (Tie vines)	Other broadleaf weeds	Nutsedges	Doveweed	Winter grasses <sup>2</sup>	Winter broadleaf weeds <sup>3</sup>
<b>Post-emergence application:</b>												
Aim	0	0	0	0	0	0	9	8	0	0	-	-
Asulox/Asulam <sup>5</sup>	8	7	7	2	8	9	0	0	0	-	-	-
Atrazine/others	2	0	2	0	2	6	9	9	2	7	4	7
Callisto	0	0	1	0	4	4	7 <sup>6,7</sup>	8	2	6	0	8
Clarity/Vision/others	0	0	0	0	0	0	9	9	3	6	0	9
Diuron/Direx/others	6	2	5	0	5	8	7	8	2	-	6	6
Envoke <sup>5</sup>	7	4	8	1	7	9	6	8	7	2	-	-
Envoke + Asulox/Asulam <sup>5</sup>	8	7	9	2	8	9	6	8	7	2	7	7
Glyphosate herbicides	9	9	9	8	9	9	6	7	6	4	8	8
Gramoxone SL/Paraquat/other	8	2	8	4	8	9	8	8	2	8 <sup>6</sup>	8	8
Permit/others	1	0	0	0	0	1	4	4	8	0	0	0
Spartan	2	0	2	0	2	4	9	8	7	-	3	8
Valor	2	0	2	0	3	4	9	8	2	5	2	8
Weedmaster/Brash/others	0	0	0	0	0	0	9	9	3	6	0	9
Yukon	0	0	0	0	0	0	8	8	8	6	0	8
2,4-D/others	0	0	0	0	0	0	9	9	3	6	0	9

<sup>1</sup> Expected control level with application 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.

<sup>2</sup> Winter grasses include ryegrass, rescuegrass and timothygrass.<sup>3</sup> Winter broadleaf weeds include sowthistle, wild geranium and clovers.

<sup>4</sup> Herbicide must be incorporated.

<sup>5</sup> Requires 28 to 35 days to reach maximum control.

<sup>6</sup> Addition of atrazine improves control.

<sup>7</sup> For best results, apply before morningglory exceeds 5 inches in height.



**Table 14. Glossary of herbicides registered for use in sugarcane in Louisiana<sup>1</sup>**

<b>Common chemical name</b>	<b>Company</b>	<b>Trade name and formulation</b>
asulam	Bayer CropScience	Asulox XP-3.12 pounds per gallon; Asulox-3.34 pounds per gallon
	Helena Chemical	Asulam-3.34 pounds per gallon
	United Phosphorus	Asulox-3.34 pounds per gallon; Asulox XP-3.12 pounds per gallon
	AgriSolutions (Agrilience)	Asulam 3.3-3.3 pounds per gallons liquid
atrazine	Drexel Chemical	Atra-5-5 pounds per gallon; Atrazine 4L-4 pounds per gallon; Atrazine 90DF — 90 percent DF
	Helena Chemical	Atrazine 4L-4 pounds per gallon; Atrazine 4F-4 pounds per gallon; Atrazine 90-DG
	Loveland Products	Atrazine 4L-4 pounds per gallon; Atrazine 90 WDG-90 percent WDG
	Makhteshim Agan of N.A.	Atrazine 4L-4 pounds per gallon; Atrazine 90DF 90 percent dry flowable
	Sipcam	Atrazine 4L-4 pounds per gallons liquid; Atrazine 90DF-90 percent dry flowable
	Southern States Cooperative	Atrazine 4L-4 pounds per gallon
	Syngenta Crop Protection	AAtrex 4L-4 pounds per gallon; AAtrex Nine-85.5 percent WDG
	Tenkoz	Atrazine 4L-4 pounds per gallon; Atrazine 4F-4 pounds per gallon; Atrazine 90DF-90 percent dry flowable
	Universal Crop Protection Alliance	Atrazine 4L-4 pounds per gallons liquid; Atrazine 90-90 percent dry flowable
	AgriSolutions (Agrilience)	Atrazine 4L-4 pounds per gallons liquid; Atrazine 90DF-90 percent dry flowable
carfentrazone-ethyl	FMC	Aim EW-1.9 pounds per gallon; Rage D-Tech-0.13 pounds per gallons carfentrazone and 2,4-D ester
	Helena	Shutout-0.05 pounds per gallons carfentrazone + mecoprop-p acid + 2,4-D ester
clomazone	FMC	Command 3ME-3 pounds per gallon
	Helena Chemical	Command 3 ME-3 pounds per gallon
2,4-D amine	Alligare	2,4-D Amine-3.8 pounds per gallon
	Albaugh/AgriStar	2,4-D Amine 4-3.8 pounds per gallon
	Dow Agro Sciences	Crossbow-3 pounds per gallons (2,4-D 2 pounds per gallons and triclopyr 1 pound per gallon)
	Helena Chemical	2,4-D Amine 4-3.8 pounds per gallons liquid; Sinker Ball-1.74 pounds per gallon; Opti-Amine; 2,4-D Amine-3.8 pounds per gallons liquid; Unison-1.74 pounds per gallon; Crossbow-3 pounds per gallons (2,4-D 2 pounds per gallons and triclopyr 1 pound per gallon)
	Loveland Products	Amine 4-3.74 pounds per gallon; Saber-3.8 pounds per gallon; Crossbow-3 pounds per gallons (2,4-D 2 pounds per gallons and triclopyr 1 pound per gallon)
	Nufarm	UAP Timberland Platoon-3.8 pounds per gallon; Weedard 64-3.8 pounds per gallon
	Tenkoz	Amine 4-3.8 pounds per gallon

**Table 14. Glossary of herbicides registered for use in sugarcane in Louisiana<sup>1</sup> continued**

Common chemical name	Company	Trade name and formulation
2,4-D (ester)	AgriSolutions (Winfield Solutions)	2,4-D LV6-5.6 pounds per gallon
	Albaugh/AgriStar	2,4-D LV4-3.8 pounds per gallon; 2,4-D LV6-5.5 pounds per gallon
	Helena Chemical	2,4-D LV4-3.8 pounds per gallon; Barrage HF-4.7 pounds per gallon
	Loveland Products	Low Vol 4-3.8 pounds per gallon; Low Vol 6-5.6 pounds per gallon; Salvo-5 pounds per gallon; Whiteout-3.7 pounds per gallon
	Nufarm	Weedone LV4 EC-3.8 pounds per gallon
	Tenkoz	Lo-Vol 4 2,4-D Low Volatile-3.8 pounds per gallon; Lo-Vol 6 2,4-D Low Volatile-5.5 pounds per gallon
	Universal Crop Protection Alliance	2,4-D Lo-V Ester Weed Killer-3.76 pounds per gallons liquid
dicamba	AgriSolutions (Agrilience)	Sterling-4 pounds per gallon
	Albaugh/AgriStar	Vision-3.8 pounds per gallon
	Alligare	Cruise Control-4 pounds per gallon
	Arysta LifeScience	Banvel-4 pounds per gallon
	AXSS USA	Dicamba 4 DMA-4 pounds per gallon
	BASF	Clarity-4 pounds per gallon
	Gharda USA	Oracle Dicamba Ag.-4 pounds per gallons liquid
	Loveland	Rifle-4 pounds per gallon
	Nufarm	Diablo-4 pounds per gallon
	Trace Mountain	Dicamba 4-4 pounds per gallon
	Universal Crop Protection Alliance	Dicamba-4 pounds per gallon
dicamba + 2,4-D	AgriSolutions (Winfield Solutions)	Brash-4 pounds per gallon
	Albaugh/AgriStar	Range Star-4 pounds per gallon
	Arysta LifeScience North America	Banvel + 2,4-D-3.8 pounds per gallon
	BASF	Weedmaster-3.8 pounds per gallon
	Loveland	Rifle-D-3.8 pounds per gallon
	Nufarm	Weedmaster-3.8 pounds per gallon; Kambamaster-3.8 pounds per gallon
diuron	AgriSolutions (Agrilience)	Diuron 4L-4 pounds per gallon
	AgriSolutions (Winfield)	Diuron 80DF-80 percent DF
	Alligare	Diuron 80DF-80 percent DF
	Drexel Chemical	Diuron 4L-4 pounds per gallon; Diuron 80W-80 WP
	DuPont	Direx 4L-4 pounds per gallon; Karmex XP-80 percent DF
	Griffin	Direx 4L; Direx 80DF-80 percent DF; Karmex DF-80 percent; Karmex XP-80 percent DF
	Loveland	Diuron 4L Herbicide-4 pounds per gallon; Diuron 80WDG Weed Killer-80 percent DG
	Makhteshim Agan of N.A.	Diuron 80DF-80 percent DF; Diuron 4L-4 pounds per gallon
EPTC	Gowan	Eptam 7E-7 pounds per gallon

**Table 14. Glossary of herbicides registered for use in sugarcane in Louisiana<sup>1</sup> continued**

Common chemical name	Company	Trade name and formulation
flumioxazin	Valent USA	Valor SX-51.0 percent WDG
glyphosate	See Table 15	See Table 15
halosulfuron	Aceto Agricultural Chemicals Corp.	Halomax-75 DF
	Gowan	Permit-75 percent WDG; Yukon-67.5 percent WDG (12.5 percent halo-sulfuron and 55.0 percent
hexazinone	DuPont	Velpar L-2 pounds per gallon; Velpar DF-75 percent DG; Velpar K-4 Max-78.8 DG (17.3 percent
mesotrione	Syngenta Crop Protection	Callisto-4 pounds per gallon; Callisto Xtra-3.7 pounds per gallons (0.5 pounds per gallons mesotrione and 3.2 pounds per gallon
metribuzin	Bayer CropScience	Metribuzin DF-75 percent dry flowable; Sencor DF-75 percent dry flowable
	Loveland Products	Metribuzin 75-75DF
	Makhteshim Agan of N.A.	Metribuzin 75DF-75DF
	United Phosphorus, Inc.	Tricor 75DF-75DF
	AgriSolutions (Winfield Solutions)	Dimetric DF-75DF
paraquat dichloride	Makhteshim Agan of N.A.	Parazone 3SL-3 pounds per gallon
	Source Dynamics	Paraquat Conc.-3 pounds per gallon
	Syngenta Crop Protection	Gramoxone Inteon-2 pounds per gallons liquid
pendimethalin	BASF	Prowl 3.3EC-3.3 pounds per gallon; Prowl H20-3.8 pounds per gallon
	Dow AgroSciences	Pendimax 3.3-3.33/gallons liquid
	Helena Chemical	Pendimethalin-3.3 pounds per gallon
	Lesco	Pre-M 3.3EC-3.3 pounds per gallon
	Loveland Products	Stealth-3.3 pounds per gallon
	Tenkoz	Acumen-3.3 pounds per gallon
	Winfield Solutions	Framework 3.3 EC-3.3 pounds per gallon
sulfentrazone	FMC	Spartan 4F-4 pounds per gallon; Spartan Advance-4.6 pounds per gallons (0.56 sulfentrazone + 4.04 pounds per gallons glyphosate); Spartan Charge-3.5 pounds per gallons (3.15 sulfentrazone + 0.35 carfentrazone); Authority MTZ-45 percent DF (0.18 pounds sulfentrazone + 0.27 pounds metribuzin)
terbacil	DuPont	Sinbar-80 percent WP
	Tessenderlo Kerley	Sinbar-80 percent WP
triclopyr	Albaugh/AgriStar	AgriStar Triclopyr 3A-3 pounds per gallon; Triclopyr R&P-4 pounds per gallon
	Alligare	Triclopyr 3-3 pounds per gallon; Triclopyr 4-4 pounds per gallon
	Dow AgroSciences	Garlon 3A, Element 3A-3 pounds per gallon; Garlon 4, Garlon 4 Ultra, Element 4-4 pounds per gallon;
	Helena	Trycera-2.87 pounds per gallon
	Nufarm	Platform-3 pounds per gallon; Relegate RTU-0.75 pounds per gallon; Relegate-4 pounds per gallon; Tahoe 3A-3
	Makhteshim Agan of N.A.	Triquad-4 pounds per gallon; Triclopyr 3SL-3 pounds per gallon
	Vegetation Management	Triclopyr 3SL-3 pounds per gallon; Triclopyr 4EC-4 pounds per gallon

**Table 14. Glossary of herbicides registered for use in sugarcane in Louisiana<sup>1</sup> continued**

Common chemical name	Company	Trade name and formulation
triclopyr + 2,4-D	Dow AgroSciences	Crossbow-1 pound per gallons triclopyr + 2 pounds per gallons 2,4-D
	Helena	Crossbow-1 pound per gallons triclopyr + 2 pounds per gallons 2,4-D
	Loveland Products	Crossbow-1 pound per gallons triclopyr + 2 pounds per gallons 2,4-D
	Tenkoz	Crossbow-1 pound per gallons triclopyr + 2 pounds per gallons 2,4-D
trifloxysulfuron-sodium	Syngenta Crop Protection	Envoke 75WG
trifluralin	AgriSolutions (Winfield Solutions)	Trust-4 pounds per gallon
	Albaugh/AgriStar	Trifluralin 4EC-4 pounds per gallon
	Dow AgroSciences	Treflan HFP-4 pounds per gallon
	Helena Chemical	Treflan 4EC-4 pounds per gallon
	Loveland Products	Treflan 4L-4 pounds per gallon; Trifluralin 4HF-4 pounds per gallon
	Makhteshim Agan of N.A.	Triflurex HFP-4 pounds per gallon
	Tenkoz	Trifluralin 4 EC-4 pounds per gallon
	TriCorp	Trilin-4 pounds per gallon
	Universal Crop Protection Alliance	Trifluralin 4EC-4 pounds per gallon

<sup>1</sup>Information provided by the Louisiana Department of Agriculture and Forestry through its pesticide registration website. This list is not inclusive of all products available. See herbicide labels for specific crops and uses. The LSU AgCenter does not recommend or endorse specific herbicide brands.





**Table 15. Glyphosate products registered for use in Louisiana with surfactant recommendations**

		Glyphosate concentration <sup>2</sup>		Rate equivalent based on 4 pounds active ingredient per gallon of product			
Product	Manufacturer or distributor	Acid equivalent (a.e)	Active ingredient (a.i.)	Need for non-ionic surfactant <sup>3</sup>	1 quart	1.5 quarts	2 quarts
Abundit Extra	Nufarm	3	4	No	1.0	1.5	2.0
Atila	Nufarm	3	4	May be added*	1.0	1.5	2.0
Atila Extra	Nufarm	3	4	No	1.0	1.5	2.0
Atila Plus	Nufarm	3	4	No	1.0	1.5	2.0
Buchaneer	Tenkoz	3	4	May be added**	1.0	1.5	2.0
Buchaneer Plus	Tenkoz	3	4	May be added***	1.0	1.5	2.0
Buchaneer 5	Tenkoz	-	5	May be added*	0.8	1.2	1.6
Cornerstone	AgriSolutions (Winfield)	3	4	May be added**	1.0	1.5	2.0
Cornerstone Plus	AgriSolutions (Winfield)	3	4	May be added***	1.0	1.5	2.0
Cornerstone 5 Plus	AgriSolutions (Winfield)	4	5.5	Can be added****	0.75	1.1	1.5
Credit 41	Nufarm	3	4	No	1.0	1.5	2.0
Credit 41 Extra	Nufarm	3	4	No	1.0	1.5	2.0
Credit Mixed Salt	Nufarm	3	3.4	May be added*	1.15	1.7	2.3
Credit Extra Mixed Salt	Nufarm	3	3.4	May be added*	1.15	1.7	2.3
Credit Duo	Nufarm	3	4	May be added*	1.0	1.5	2.0
Credit Duo Extra	Nufarm	3	4	No	1.0	1.5	2.0
Credit Systemic	Nufarm	3	4	May be added*	1.0	1.5	2.0
Credit Systemic Extra	Nufarm	3	4	No	1.0	1.5	2.0
Credit Xtreme	Nufarm	-	4.5	No	0.9	1.3	1.8
Crop-Sure Glyphosate Plus	Universal Crop Protection	3	4	May be added***	1.0	1.5	2.0
Czar	Fusion Technologies	3	4	No	1.0	1.5	2.0
Deal	Tenkoz	3	4	May be added**	1.0	1.5	2.0
Deal Plus	Tenkoz	3	4	May be added***	1.0	1.5	2.0
Debit TMF	Nufarm	4	5.4	Yes*	0.75	1.1	1.5
Durango	Dow AgroSciences	4	5.4	No	0.75	1.1	1.5
Durango DMA	Dow AgroSciences	4	5.4	No	0.75	1.1	1.5

**Table 15. Glyphosate products registered for use in Louisiana with surfactant recommendations continued**

		Glyphosate concentration <sup>2</sup>		Rate equivalent based on 4 pounds active ingredient per gallon of product			
Product	Manufacturer or distributor	Acid equivalent (a.e)	Active ingredient (a.i.)	Need for non-ionic surfactant <sup>3</sup>	1 quart	1.5 quarts	2 quarts
Four Power Plus	Loveland	3	4	No	1.0	1.5	2.0
Genesis Extra	Farm Advantage	3	4	May be added**	1.0	1.5	2.0
Genesis Extra II	Farm Advantage	3	4	May be added**	1.0	1.5	2.0
Gly-4	Universal Crop Protection	3	4	May be added**	1.0	1.5	2.0
Gly-4 Plus	Universal Crop Protection	3	4	May be added***	1.0	1.5	2.0
Glycana Plus 41	Arcana	3	4	No	1.0	1.5	2.0
Glyfine Plus	Aceto	3	4	May be added***	1.0	1.5	2.0
Glyfos	Cheminova	3	4	May be added**	1.0	1.5	2.0
Glyfos X-tra	Cheminova	3	4	No	1.0	1.5	2.0
Glypho 41	UPI	3	4	May be added***	1.0	1.5	2.0
Glyphogan	Makhteshim Agan of N.A.	3	4	May be added**	1.0	1.5	2.0
Glyphomax XRT	Dow AgroSciences	4	5.4	No	0.75	1.1	1.5
Glyphosate 4	Alligare	3	4	May be added**	1.0	1.5	2.0
Glyphosate 41 Plus	CropSmart	3	4	May be added**	1.0	1.5	2.0
Glyphosate Plus	Crop-Sure	3	4	May be added***	1.0	1.5	2.0
Glyphosate 5.4	Alligare	4	5.4	Yes**	0.75	1.1	1.5
Gly Pho-Sel Pro 41 percent	Agrisel	3	4	No	1.0	1.5	2.0
Glysort	Glysortia	3	4	May be added**	1.0	1.5	2.0
Glysort Plus	Glysortia	3	4	No	1.0	1.5	2.0
Gly Star Gold	Albaugh	3	4	No	1.0	1.5	2.0
Gly Star Original	Albaugh	3	4	May be added**	1.0	1.5	2.0
Gly Star Plus	Albaugh	3	4	No	1.0	1.5	2.0
Gly Star Pro	Albaugh	3	4	No	1.0	1.5	2.0
GlySupreme Plus	MEY Corp.	3	4	No	1.0	1.5	2.0
Grandslam 4XS	AGRI Pckg & Logistics	3	4	May be added***	1.0	1.5	2.0

**Table 15. Glyphosate products registered for use in Louisiana with surfactant recommendations continued**

		Glyphosate concentration <sup>2</sup>		Rate equivalent based on 4 pounds active ingredient per gallon of product			
Product	Manufacturer or distributor	Acid equivalent (a.e)	Active ingredient (a.i.)	Need for non-ionic surfactant <sup>3</sup>	1 quart	1.5 quarts	2 quarts
Helosate 70	Helm Agro US	4.72	6.3	May be added**	0.64	1.0	1.3
Helosate Plus	Helm Agro US	3	4	May be added**	1.0	1.5	2.0
Helosate Pro	Helm Agro US	3	4	May be added**	1.0	1.5	2.0
Honcho	Monsanto	3	4	May be added***	1.0	1.5	2.0
Honcho Plus	Monsanto	3	4	May be added***	1.0	1.5	2.0
Hoss Ultra	Helena	3	4	No	1.0	1.5	2.0
Lajj Plus	Northmoose Chemicals	3	4	No	1.0	1.5	2.0
Mad Dog	Loveland	3	4	May be added**	1.0	1.5	2.0
Mad Dog Plus	Loveland	3	4	No	1.0	1.5	2.0
Makaze	Loveland	3	4	No	1.0	1.5	2.0
Meychem 41 percent Glyphosate	MEY Corporation	3	4	Can be added****	1.0	1.5	2.0
Mirage	Loveland	3	4	May be added**	1.0	1.5	2.0
Mirage Plus	Loveland	3	4	No	1.0	1.5	2.0
Rascal	Winfield Solutions	3	4	May be added***	1.0	1.5	2.0
Rascal Plus	Winfield Solutions	3	4	May be added***	1.0	1.5	2.0
Rascal Plus Glyphosate 41 percent	Agrilience	3	4	May be added***	1.0	1.5	2.0
Reserve 41 Plus	Ntl Ag Chem Assoc.	3	4	No	1.0	1.5	2.0
Roughneck	Nufarm	3	4	No	1.0	1.5	2.0
Roundup Original	Monsanto	3	4	May be added***	1.0	1.5	2.0
Roundup OriginalMax	Monsanto	4.5	5.5	May be added*****	0.75	1.1	1.5
Roundup PowerMax	Monsanto	4.5	5.5	May be added*****	0.75	1.1	1.5
Roundup WeatherMax	Monsanto	4.5	5.5	No	0.75	1.1	1.5
StrikeOut Loaded	Libertas Now	3	4	May be added**	1.0	1.5	2.0
Tomahawk	United Suppliers	3	4	May be added****	1.0	1.5	2.0
Tomahawk 5	United Suppliers	4	5.4	Yes***	0.75	1.1	1.5

**Table 15. Glyphosate products registered for use in Louisiana with surfactant recommendations continued**

Product	Manufacturer or distributor	Glyphosate concentration <sup>2</sup>		Rate equivalent based on 4 pounds active ingredient per gallon of product			
		Acid equivalent (a.e)	Active ingredient (a.i.)	Need for non-ionic surfactant <sup>3</sup>	1 quart	1.5 quarts	2 quarts
Touchdown HiTech	Syngenta	5	--	Yes****	0.6	0.9	1.2
Touchdown Total	Syngenta	4.17	--	No	0.72	1.1	1.44
Traxion	Syngenta	4.17	--	No	0.72	1.1	1.44
Willowood Glyphosate 41 percent	Willowood LLC	3	4	No	1.0	1.5	2.0
Wise Up Plus	MEY Corporation	3	4	No	1.0	1.5	2.0
Z-Glyphosate 41 Max	Fusion Technologies	3	4	No	1.0	1.5	2.0

<sup>1</sup>Information provided by the Louisiana Department of Agriculture and Forestry through its pesticide registration website.. This list does not include all available glyphosate products. See herbicide labels for specific crops and uses. The LSU AgCenter does not recommend or endorse specific herbicide brands.

<sup>2</sup>Glyphosate concentration can be expressed based on “acid equivalent” (a.e.) or on “active ingredient” (a.i.). Both concentrations usually are provided on the herbicide label. For glyphosate products, the active portion of the herbicide molecule (the part that provides weed control) is the acid. To formulate a usable and stable product, the glyphosate parent acid is attached to a salt (e.g., isopropyl amine, potassium, etc.), increasing the molecular weight of the molecule but not affecting the herbicidal activity. Therefore, the active ingredient designation always is a larger number.

<sup>3</sup>Most formulations of glyphosate contain some surfactant. The need for additional surfactant is based on how much surfactant is present in the formulation and the quality of the surfactant. The herbicide label may state that no additional surfactant is needed or recommended; that surfactant may be added or that surfactant is required at a specific amount. It is critical that surfactant be added if required. Always consult the label for specific information on the need for surfactants and other adjuvants. For the products listed in the Table 15, with regard to the need for surfactant, No= Label specifies that surfactant is not needed or nothing is included in reference to surfactant; Yes= \* For surfactant at least 80 percent active, add 2 or more quarts unless otherwise indicated in specific crop or noncrop directions for using the product, \*\* For surfactant at least 50 percent active, add 2 or more quarts per 100 gallons water, \*\*\* For surfactant at least 70 percent active, add 2 to 4 quarts per 100 gallons water, \*\*\*\* For surfactant at least 75 percent active, add at 0.25 percent to 0.5 percent; May be or can be applied= \* For surfactant at least 80 percent active, add at 0.375 percent volume \*\* For surfactant at least 70 percent active, add at 0.5 percent volume; less than 70 percent active ingredient add at 1 percent volume, \*\*\* Use surfactant at least 70 percent active, \*\*\*\* Surfactant active ingredient and rate not specified, \*\*\*\*\* Recommended when carrier volume is above 30 gallons per acre or when product application rate is less than 16 ounces per acre; use surfactant at least 70 percent active and add at 0.25 percent to 0.5 percent volume; less than 70 percent active ingredient add at 1 percent volume. Note: 0.25 percent volume = 1 quart per 100 gallons; 0.375 percent volume = 1.5 quarts per 100 gallons; 0.5 percent volume = 2 quarts per 100 gallons; 1 percent volume = 4 quarts (1 gallon) per 100 gallons.

Note: For AMS (ammonium sulfate), labels for all glyphosate products state that addition of AMS may increase performance.



## Section IV. Sugarcane fertilization

Sugarcane production is important to the Louisiana rural economy. Fertilizer and lime costs are two of the biggest direct costs incurred in producing sugarcane. To maximize the return on fertilizer investment and ensure minimal environmental damage, it is necessary to follow sound, research-based guidelines. For best results, apply fertilizer according to soil test recommendations.

To maximize returns from your fertilizer dollars, consider these four points: (1) What nutrients are needed? (2) How much of each nutrient is needed? (3) What source of fertilizer should be used? (4) How and when should it be applied?

### Soil testing

The best way to determine lime, phosphorus and potassium requirements is with a reliable soil test. The soil sample must be collected properly for the test to be valid. Large fields should be broken up into smaller units for sampling purposes and the smaller fields intensively sampled, because nutrient and pH levels often vary greatly within fields. Thorough sampling is the only way to detect these variations and adjust fertilizer and lime rates accordingly.

Soil samples may be collected at any time before fertilizing or liming, but soon after harvest is recommended, if possible. That way you will get your test results in time to plan a fertilizer program tailored to each individual field. Also, if lime is recommended, it is best applied in the fall or early winter since it takes several months for lime to react fully with the soil to neutralize excess acidity.

An investment in a good soil testing program is one of the most effective programs you can use to increase profits. More information on soil sampling, soil sample collection boxes and information forms can be obtained from your local LSU AgCenter agent.

### Lime

Correcting soil pH is the single most important aspect of a soil fertility program. Availability of most plant nutrients usually is best in a soil with a pH of 5.8-7.0. Yield decreases can occur when the pH falls below 5.5 on silt loam and sandy loam soils and below 5.2 on clay loams and clays. Soil solution levels of aluminum and manganese increase sharply when the soil pH falls below 5. Root growth slows rapidly when soil solution levels of aluminum or manganese

become toxic. Other benefits of liming include enhancing the activity of soil microorganisms and improving the activity of soil applied herbicides.

When the soil pH drops below 5.5 on sandy loam or silt loam soils, or below 5.2 on clay loam or clay soils, lime is recommended to reduce soil acidity. Lime rates always should be based on soil test results. Different soils have different buffering capacities. For example, an equal amount of lime may raise the soil pH one full unit on a sandy soil and possibly only two-tenths of a unit on a clay loam soil. A soil test is necessary to determine the correct amount of lime to apply, since excessive rates of lime may cause problems, including deficiencies of some nutrient elements. For best results, apply lime in the fallow year and incorporate – or apply it in the fall or winter. Lime takes several months to reach its maximum effectiveness.

There are two basic types of lime, calcitic and dolomitic. Calcitic lime contains primarily calcium carbonate. Dolomitic lime contains both calcium carbonate and magnesium carbonate. If soil test levels of magnesium are very low, low or medium, use dolomitic lime if lime is needed. If soil test magnesium levels are high or very high, either source may be used. In this case, base your choice of lime on price and availability.

### Nitrogen

**Nitrogen rates:** Nitrogen is an important plant nutrient and is used in fairly large amounts by sugarcane. Nitrogen is supplied to the plant by fertilizers, residual nitrogen in the soil, decomposition of organic matter and atmospheric sources of nitrogen. Nitrogen rates in sugarcane are based on soil type (whether the soil is light or heavy) and crop (plant cane versus stubble cane). Table 16 shows the recommendations for nitrogen rates on sugarcane in Louisiana.

**Table 16. Recommended nitrogen rates for sugarcane in Louisiana**

Crop	Soil Type	Nitrogen Rate (Pounds of Nitrogen per Acre)
Plant cane	Light	60-80
Plant cane	Heavy	80-100
Stubble	Light	80-100
Stubble	Heavy	100-120

**Nitrogen placement:** Nitrogen fertilizer is applied best as a banded application to row side, either off bar or knifed in.

**Nitrogen timing:** The recommended time for nitrogen application is April 1-April 30 – earlier if the crop is more advanced and later if the crop is less advanced. Early applications of nitrogen have the potential to be lost to leaching and denitrification and can stimulate early weed growth.

**Split applications of nitrogen:** Split applications of nitrogen may be beneficial under certain rare situations. These include high tonnage cane free of weeds and with weather conditions that lead to nitrogen loss, such as excessive rainfall. If nitrogen is to be split, apply two-thirds of the recommended rate in early April and the remainder at lay-by. Nitrogen is important for good tillering (suckering) and should not be limited during this important growth stage of sugarcane.

**Sources of nitrogen:** If correctly applied, all sources of nitrogen are equal in their ability to increase the yield of cane and sugar per acre. Base your decisions about nitrogen sources on price, service, convenience and personal preference.

## Phosphorus, potassium and sulfur

Phosphorus (P) and potassium (K) are important plant nutrients for sugarcane and are used in fairly large quantities. Phosphorus is expressed in fertilizer analyses in phosphate ( $P_2O_5$ ) equivalent. Potassium is expressed as the potash ( $K_2O$ ) equivalent.

**Phosphorus (P):** Phosphorus is critical during the early stages of sugarcane growth. It stimulates root growth. It is essential in the storage and transfer of energy and is an important component of several biochemicals that control plant growth and development. If all other factors are equal, sugarcane grown on clay soils generally responds to phosphorus fertilizer applications better than does cane grown on sandy soils due to poor root penetration and a small root feeding volume in clay soils.

Phosphate ( $P_2O_5$ ) is used by sugarcane at a rate of approximately 1.7 pounds per ton of cane. Of this, about half is in the millable stalk and is removed from the field. The other half is in the tops, trash, stubble and roots and is returned to the soil during decomposition.

Phosphate fertilizer rates should be derived from soil test results. Phosphate is recommended according to soil test levels of phosphate and age of cane

**Table 17. Recommended phosphate rates for sugarcane in Louisiana**

Soil Test	Plant Cane	Stubble Cane
Pounds of $P_2O_5$ per Acre		
Very Low	50	60
Low	45	50
Medium	40	40
High	0	0
Very High	0	0

stand. Table 17 shows the phosphate fertilizer recommendations for sugarcane.

Phosphorus availability in the soil is largely controlled by soil pH. When the soil pH is highly acidic (pH less than 5.5), phosphorus becomes tied up in insoluble compounds with iron and aluminum. When the soil pH is alkaline (pH greater than 7.0), phosphorus becomes tied up in insoluble compounds with calcium. Phosphorus is most available to plants when the soil pH is 6-7.

Phosphorus fertilizers attach strongly to the soil particles. In Louisiana soils, phosphorus losses to leaching are almost nonexistent. The major means of phosphorus losses from the soil are crop removal and soil erosion.

Application methods for phosphate fertilizers depend on the soil pH and soil test phosphorus (P) level. Do not broadcast phosphate if the soil pH is below 5 or above 7.5. If soil test levels of phosphorus are low or very low, band applications should be made to increase the efficiency of the phosphate fertilizer. On soils with a pH of 6-7 and testing medium in phosphorus, broadcast application of phosphorus can be as effective as band applications. When using broadcast applications of phosphate, the fertilizer can be applied after the cane has been off-barred and before rebuilding the row. This will result in a semi-banding of the fertilizer.

**Potassium (K):** Potassium is indirectly related to many plant cell functions in sugarcane. Some 60 enzymes require the presence of potassium (K). Potassium deficiency inhibits the ability of the plants to use available water and makes them more susceptible to drought stress. Potassium-deficient plants are more prone to certain diseases and more likely to lodge than plants containing adequate potassium.

Sugarcane is a heavy feeder of potassium. The plants require about 6.7 pounds of potash ( $K_2O$ )

per ton of cane produced. Of this amount, about 2.9 pounds are contained in the millable stalk and removed from the field. The remaining 3.8 pounds of potash are contained in the tops, trash, stubble and roots and are returned to the soil during decomposition.

Potash fertilizer rates should be based on soil test results. Potash is recommended according to soil test levels of potassium and age of the cane stand. These recommendations are based on research conducted by LSU AgCenter scientists. Table 18 shows the potash fertilizer recommendations for sugarcane from the LSU AgCenter’s Louisiana Cooperative Extension Service. Although a suggested rate is shown for situations when soil tests are not available, soil testing is strongly encouraged. Using a general recommendation instead of one based on soil tests can waste money or reduce yields.

**Table 18. Recommended potash rates for sugarcane in Louisiana**

Soil Test	Plant Cane	Stubble Cane
	<b>Pounds of Potash (K<sub>2</sub>O) per Acre</b>	
Very Low	120	140
Low	110	120
Medium	80	80
High	0	0
Very High	0	0

The higher rates at the low and very low soil test levels are to replace what the cane crop removes and perhaps give a small buildup amount. This can prevent mining of potassium from the soil at these low soil test levels.

In most instances, broadcast potash fertilizers are equal to banded applications. The fertilizer can be applied after the cane has been off-barred and before rebuilding the row. This will result in a semibanding effect. Since potash fertilizers do not tie up chemically with the soil, they can be applied anytime between harvest and the time the cane begins spring growth, except in extremely sandy soils. In extremely sandy soils, potash can leach and should be applied near the time of spring growth.

**Sulfur (S):** Sulfur is essential in several key plant functions including synthesis of chlorophyll and photosynthesis. It is a constituent of several enzymes, amino acids and biochemicals that regulate plant growth.

Yield increases associated with applied sulfur fertilizers on sugarcane have been observed in Louisiana under certain situations. Yield increases resulting from sulfur fertilizer may be expected in such situations as: (1) Stubble cane is more likely to respond to sulfur fertilization than plant cane. (2) Sugarcane grown on fine-textured soils (clays) is more likely to respond to sulfur fertilization than sugarcane grown on coarse-textured soils (sandy loams and silt loams). Table 19 provides soil test recommendations for sulfur in sugarcane.

**Table 19. Recommended sulfur rates for sugarcane in Louisiana.**

Soil Test Category	Plant Cane	Stubble-Cane
	<b>Pounds per Acre</b>	
Low	24	24
High	0	0

If an economical source can be obtained, gypsum (calcium sulfate) can be substituted for sulfur fertilizer in areas where sulfur responses are expected. Applying 1 ton of gypsum in the fallow year can provide adequate sulfur for the crop cycle. Base your choice of sulfur or gypsum on price, availability and convenience.

### Micronutrients

Generally speaking, micronutrient deficiencies are not common with sugarcane in Louisiana. Research by sugarcane soil scientists has failed to establish yield increases caused by general applications of zinc, copper, boron or other micronutrients. In specific situations, where a micronutrient deficiency is known to exist, specific micronutrient applications may increase yields. We do not recommend applications of micronutrients, however, unless a deficiency of a particular micronutrient has been confirmed by soil or tissue analysis (Table 20).

**Table 20. Recommendations for the application of zinc in Louisiana sugarcane.**

Soil Test Category	Application Rate
	<b>Pounds per Acre</b>
Very low (Less Than 1 ppm)	6
Low (Less Than 2.25 ppm)	3



## Fertilization at planting

**Succession planted cane:** Fall fertilization at planting time has been shown to increase yield of succession planted cane. In most tests, succession planted cane with fall-applied NPK fertilizer produced yields similar to conventionally planted cane after a fallow year.

Research results indicate that 15-45-45 pounds per acre of N-P<sub>2</sub>O<sub>5</sub>-K<sub>2</sub>O should be applied in the planting furrow before planting succession cane. In addition, the normal recommended N, P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O rates for stubble cane should be applied in the spring of each crop year, depending on soil type and soil test results.

**Conventionally planted cane:** Only a few positive yield responses have been noted in both plant and stubble cane crops from a one-time in-furrow fertilizer application at planting. With increasing costs of fertilizer, it is not recommended to make an at-planting fertilizer application following a conventional fallow program or following a soybean crop.

**Filter press mud:** Soil application of filter press mud, a byproduct of raw sugar factories, generally has resulted in yield increases in sugarcane and improvement of soil fertility. The total nitrogen, phosphorous, potassium, calcium (Ca) and magnesium (Mg) found in filter press mud were high compared to soil contents of these elements. Although extractable calcium and magnesium were relatively high in filter press mud, addition of filter press mud to soils resulted in only small changes to soil pH.

**Caution:** Direct treatment with filter press mud fresh from the factory at harvest occasionally has caused “burning” of cane when very low rainfall occurred the following spring.

## Summary

A complete soil fertility program is essential for maximum sugarcane yields and profits. Use soil tests properly. Know the lime and fertilizer requirements for each field on which you grow sugarcane and apply the plant nutrients according to the recommendations and soil test results. Avoid unproven and untested products. You will harvest better yields and make more profit if you do!





## Section V. Sugarcane ripener recommendations

### Glyphosate program

In 2014, the following glyphosate formulations were available as chemical ripeners: Touchdown Total®, Roundup WeatherMAX® and Roundup PowerMAX®. **Note: These products were labeled for use in stubble sugarcane crops only and not in plant cane.** When used according to the label and the following recommendations, these products should increase recoverable sugar per ton of cane while minimizing decreases in tons of cane per acre. Sugarcane's response to ripener application may be lessened when conditions favor good natural ripening or when conditions are not conducive to glyphosate absorption. Ripener application will reduce vegetative growth and may reduce cane yields. But cane yield losses generally are offset by increases in recoverable sugar per ton of cane, resulting in equal or greater yields of sugar per acre when harvested during the recommended treatment-to-harvest interval.

**Table 21. Glyphosate ripener rates for available formulations**

Glyphosate Formulation	Recommended	Label Rate Range
Ounces per Acre		
Touchdown Total®	5.7 <sup>1</sup>	4.3-13.4
Roundup WeatherMAX®	5.3	4-12
Roundup PowerMAX®	5.3	4-12

<sup>1</sup> DO NOT round off rates as shown in the table.

**Rates, drift and surfactants:** Application rates for glyphosate products vary depending on the concentration of the active ingredient (Table 21). Higher rates than those recommended should only be used on the final stubble crop since the risk of injury increases with higher rates.

Glyphosate can cause serious damage when it drifts onto nontarget sites (newly planted cane, other crops or residential landscapes). Drift-control agents may be added to reduce drifting potential. Ripener should only be applied when wind speeds are between 3 and 10 mph, however, and should not be applied when there is a surface temperature inversion. A surface inversion occurs when the temperature at the surface is cooler than the air above the surface

– usually in the evening or early morning. Surface inversions restrict vertical air mixing and cause spray droplets to remain suspended, where they can move laterally and thus reduce effectiveness of application and potentially cause damage to nontarget sites. Also, wind direction should be taken into account when applying glyphosate ripener to avoid drifting onto sensitive nontarget sites.

All recommended glyphosate formulations contain surfactants, so under normal conditions, no additional surfactant is needed. Research has shown that rainfall less than six hours after application may reduce sugarcane's response to glyphosate. The low use rate of glyphosate, when applied as a sugarcane ripener, results in a lower than ideal concentration of surfactant in the spray solution. This lower amount of surfactant may not provide the rain-fastening properties obtained when these formulations are applied at much higher herbicidal rates. Therefore, do not apply glyphosate ripener if rainfall is likely within six hours of application.

**Variety response:** Some sugarcane varieties are less responsive to glyphosate than others. Higher rates of glyphosate may be needed to obtain the desired increase in the recoverable sugar per ton of cane (TRS) in varieties that are less responsive (Table 22). Caution should be used when applying higher rates to increase response in poorly responding varieties since that might also increase injury to the following year's stubble crop.

**Table 22. Response of Louisiana sugarcane varieties to glyphosate ripener application**

Highly Responsive	Moderately Responsive
LCP 85-384	HoCP 85-845
HoCP 96-540	L 97-128
L 99-226	L 99-233
L 01-299	HoCP 00-950
L 03-371	L 01-283
HoCP 04-838	

**Treatment to harvest intervals:** A 28 to 49 day treatment to harvest interval is recommended following glyphosate ripener application. Tables 24-26 are provided to help calculate ripener treatment to harvest intervals. Research has shown the percentage increase in the recoverable sugar per ton of cane is similar during this time frame. Harvesting prior to 28 days is not recommended because this will not maximize the recoverable sugar per ton of cane for ripener applications. Delaying harvest beyond 49 days not only reduces yield potential in the current crop but increases risk of injury and further yield loss in next year's crop.

**Application schedule:** When glyphosate ripener is applied in late August and early September for harvest in late September or early October, sugarcane still will be actively growing. Therefore, it is recommended that the first applications be scheduled no earlier than four weeks before mill opening to minimize reductions in cane tonnage. This also will allow for delays in factory openings without greatly affecting the current and future stubble crops.

The following schedule is recommended to maximize the response to application of these ripeners. **For harvest dates of Sept. 15 to Oct. 15, consider a treatment-to-harvest interval of 28 to 35 days; from Oct. 15 to Nov. 15, 28 to 42 days; and from Nov. 15 to Dec. 1, 35 to 49 days.** Treatment-to-harvest intervals beyond 49 days are not recommended, especially if additional stubble crops are planned. Sugarcane scheduled for harvest after Dec. 1 should not be treated with a ripener since sugarcane will have matured naturally and little to no increase in recoverable sugar could be expected.

Response to glyphosate is based on sugar levels at the time of ripener application. Therefore, it is recommended that a hand refractometer be used to test for Brix as an indicator of the cane's sucrose content prior to application. Fields with the highest Brix should be treated first, and fields with the highest Brix at the recommended treatment-to-harvest interval should be harvested first. Please refer to *Brixing*

*to Improve Sugarcane Quality*, LSU AgCenter online Publication No. 2888.

**Regrowth:** Research has shown that glyphosate ripener applications may delay spring shoot emergence and, in some cases, harvestable stalk populations in subsequent stubble crops. In some years and in some varieties, spring shoots will appear bleached and stunted. Sugarcane will typically outgrow this injury with warmer weather. Yield reductions are infrequent, occurring primarily when higher than recommended rates of glyphosate are applied and/or recommended treatment-to-harvest intervals are exceeded and/or harvest residue is not removed on a timely basis following harvest. Leaving mulch on ripener-treated sugarcane can reduce sugar yields by as much as 30 percent the following year. In fields where mulch cannot be removed, a ripener should only be applied to the last stubble crop.

**Points to consider when applying a glyphosate-based ripener:**

1. Follow product labels and rate recommendations.
2. Do not apply to seed cane or plant cane.
3. Apply the higher recommended rates only to the last stubble crop.
4. Do not exceed the maximum recommended treatment-to-harvest interval (49 days).
5. Do not apply glyphosate ripeners to sugarcane after the third full week of October.
6. For best results, apply glyphosate to erect cane. If recently lodged, allow sufficient time (seven to 10 days) for the cane to stand back up or "right" itself.
7. Do not apply ripeners when rainfall is imminent.
8. Use a drift control agent to reduce chances of injuring crops in nearby fields.
9. Use a hand refractometer to measure Brix to optimize ripener scheduling.

## Moddus program

The plant growth regulator Moddus recently was labeled for use as a ripener for sugarcane in Louisiana. Moddus can be applied to all crops in the sugarcane crop cycle. The recommended rate of Moddus for ripening sugarcane in Louisiana is 16-19 ounces per acre. The label states Moddus can be applied 28-60 days prior to sugarcane harvest. Higher theoretical sugar per ton of cane response was achieved in the 50-60 day range.

**Table 23. Moddus ripener rates for sugarcane grown in Louisiana**

Trinexapac-ethyl Formulation	Recommended	Label Rate Range
	Ounces per Acre	
Moddus	16-19	11-19

### Research experience

- Moddus did not increase theoretical recoverable sugar as effectively as glyphosate. The average theoretical recoverable sugar increase was 5 percent above nontreated sugarcane. The increase for glyphosate was 10-20 percent.
- Moddus response among Louisiana varieties was variable. Varieties such as L 99-226, L 99-233 and HoCP 00-950 exhibited negligible to low theoretical recoverable sugar increases due to Moddus application. Varieties such as HoCP 96-540 and HoCP 04-838 exhibited greater theoretical recoverable sugar increases.
- Moddus reduces sugarcane growth, which can reduce cane yields when compared to nontreated sugarcane, but reductions in yield generally were less than when compared with glyphosate applications. Reductions in cane yield as a result of ripener application, glyphosate or Moddus, depend on rate of growth at time of application, treatment to harvest interval and sugarcane variety.



**Table 24. Days to harvest for glyphosate application (September harvest)**

Date of Harvest: September																	
Date of Application		15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Aug.	4	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
	5	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56
	6	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
	7	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
	8	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
	9	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
	10	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
	11	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
	12	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
	13	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
	14	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
	15	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
	16	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
	17	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
	18	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
	19	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
	20	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
	21	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
	22	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
	23	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
	24	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
	25	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	26	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	27	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
	28	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
	29	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
	30	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	31	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30



**Table 24. Days to harvest for glyphosate application (September harvest) continued**

Date of Harvest: September																	
Date of Application		15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Sept.	1	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
	2	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
	3	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
	4	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
	5	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	6	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	8	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	9	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	10	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	11	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	12	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	13	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	14	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	15		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	16			1	2	3	4	5	6	7	8	9	10	11	12	13	14
	17				1	2	3	4	5	6	7	8	9	10	11	12	13
	18					1	2	3	4	5	6	7	8	9	10	11	12
	19						1	2	3	4	5	6	7	8	9	10	11
	20							1	2	3	4	5	6	7	8	9	10
	21								1	2	3	4	5	6	7	8	9
	22									1	2	3	4	5	6	7	8
	23										1	2	3	4	5	6	7
	24											1	2	3	4	5	6
	25												1	2	3	4	5

**Table 25. Days to harvest for glyphosate application (October harvest)**

Days to Harvest: October																																
Date Applied	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Aug 14	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	
	15	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77
	16	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
	17	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
	18	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74
	19	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
	20	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
	21	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
	22	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70
	23	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
	24	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68
	25	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
	26	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
	27	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
	28	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
	29	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
	30	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62
	31	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61

Table 25. Days to harvest for glyphosate application (October harvest) continued

Days to Harvest: October																															
Date Applied	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Sep 1	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
2	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59
3	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58
4	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57
5	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56
6	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
7	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
8	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53
9	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52
10	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
11	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
12	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49
13	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
14	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46

Table 25. Days to harvest for glyphosate application (October harvest) continued

Days to Harvest: October																																
Date Applied	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Sep 16	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	
	17	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
	18	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
	19	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
	20	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41
	21	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
	22	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
	23	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
	24	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
	25	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	26	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	27	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
	28	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
	29	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31



Table 25. Days to harvest for glyphosate application (October harvest) continued

Days to Harvest: October																																	
Date Applied	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
Oct 1		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
2			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
3				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
4					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
5						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
6							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
7								1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
8									1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
9										1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
10											1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
11												1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
12														1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Table 26. Days to harvest for glyphosate application (November harvest)

Days to Harvest: November																															
Date Applied	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Sep 20	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	
	21	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70
	22	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
	23	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68
	24	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
	25	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
	26	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
	27	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64
	28	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
	29	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62
	30	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61

Table 26. Days to harvest for glyphosate application (November harvest) continued

Days to Harvest: November																																	
Date Applied	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30			
Oct 1	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60			
2	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59			
3	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58			
4	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57			
5	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56			
6	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55			
7	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54			
8	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53			
9	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52			
10	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51			
11	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50			
12	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49			
13	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48			
14	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47			
15	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46			
16	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45			
17	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44			
18	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43			
19	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42			
20	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41			
21	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40			
22	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39			
23	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38			
24	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37			
25	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36			
26	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35			
27	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34			
28	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33			
29	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32			
30	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30			

Table 26. Days to harvest for glyphosate application (November harvest) continued

Days to Harvest: November																															
Date Applied	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Nov 1		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
2			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
3				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
4					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
5						1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
6							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
7								1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
8									1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
9										1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
10											1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
11												1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
12													1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
13														1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
14															1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17



## Section VI - Sugarcane harvesting recommendations

To maximize the yield of sugar per acre, always strive to deliver clean, fresh cane to the mill for processing. The use of glyphosate is recommended at the proper rate range to increase the yield of recoverable sugar per ton. Furthermore, it is recommended that all stubble cane be harvested prior to harvesting plant cane because stubble cane generally matures earlier than plant cane. Also, the growth rate in the stubble crop during the harvest generally is less than the growth rate in the plant cane crop. Delaying the harvest of the plant cane crop generally will mean an increase in cane yield during the harvest season.

### Maturity classification

Maturity studies designed to measure relative changes in juice quality of commercial varieties are conducted at the U.S. Department of Agriculture's Agricultural Research Service Sugarcane Research Unit on a continuing basis in the first-stubble and plant-cane crops. Within each stubble group, varieties should be harvested according to the following maturity classes:

- Very early – varieties with an acceptable yield of commercially recoverable sugar per ton of cane on or before Oct. 1 (HoCP 00-950, L 01-283, Ho 07-613).
- Early – varieties with acceptable yield of commercially recoverable sugar per ton of cane on or about Oct. 15 (HoCP 96-540, L 99-226, L 01-299, L 03-371, HoCP 04-838).
- Midseason – varieties with acceptable commercially recoverable sugar on or about Nov. 1 (L 99-233).

Glyphosate is an effective management tool to advance the maturity curve of all varieties listed above

in the stubble crop, but the rate of increase depends on the variety selected as well as the condition of the cane and the weather at the time of application. The increase in commercially recoverable sugar per ton of cane, as an average of all varieties when using glyphosate at the recommended rate and proper treatment/harvest interval, is 21 percent. Suggestions and recommendations for growers regarding the use of glyphosate can be found in the "Sugarcane Ripener Recommendations" section. (See Section IV of this handbook).

### Post-freeze classification of varieties

Varieties harvested after Dec. 1 generally are vulnerable to a damaging freeze (25 degrees Fahrenheit) in which the freezing temperatures lasting for six to 10 hours or more. Regardless of the crop year, all varieties should be harvested after a freeze of such a magnitude according to stalk cold tolerance (resistance to deterioration). Varieties are classified according to the following post-freeze resistance groups:

- Resistant – varieties with generally acceptable levels of sucrose, purity, TRS, pH, titratable acidity and dextran for four weeks following a freeze of the above magnitude (HoCP 96-540, L 01-283, L 01-299, HoCP 04-838).
- Intermediate – varieties with generally acceptable levels of sucrose, purity, TRS, pH, titratable acidity and dextran for two to four weeks following a freeze of the above magnitude (Ho 95-988, L 97-128, HoCP 00-950).
- Susceptible – varieties with generally unacceptable levels of sucrose, purity, TRS, pH, titratable acidity and dextran within two weeks following a freeze of the above magnitude (L 99-226, L 99-233, L 03-371, Ho 07-613).

## Section VII - Insect guide: commercial sugarcane

### Sugarcane borer and Mexican rice borer

The sugarcane borer is the most destructive insect attacking the Louisiana sugarcane crop. Wireworms, the sugarcane aphid, sugarcane beetle, sugarcane mealybug, root stock weevils, West Indian cane fly and springtails are minor pests for which no controls or spot controls are recommended consistently. The Mexican rice borer, which was first discovered in Calcasieu Parish in 2008, also is a pest of potential concern. Populations of the Mexican rice borer are present in low numbers across the western sugarcane region of Louisiana, including Calcasieu, Cameron and Jefferson Davis parishes.

### Sugarcane borer Management

Cultural Practices	<p>The following farming practices can reduce sugarcane borer infestations and damage:</p> <ol style="list-style-type: none"> <li>1. Plant uninfested seed cane to improve crop stands. Sugarcane borer larvae in seed cane can destroy 20 percent or more of the vegetative buds (eyes) and contribute substantially to overwintering populations.</li> <li>2. Plant corn as far as possible from sugarcane to reduce midsummer moth migration from cornfields to sugarcane.</li> <li>3. Plow stubble soon after final harvest to reduce the number of overwintering larvae.</li> <li>4. Leave crop residues such as cane tops, pieces of broken stalks or old stubs exposed on the soil surface throughout winter to obtain maximum kill of larvae by low temperatures.</li> </ol>								
Varietal Resistance	<p>Some varieties withstand sugarcane borer attacks better than others. The following commercial sugarcane varieties are ranked in order of their response to attack. Within resistance groups, those varieties that grow more quickly early in the season are more likely to have heavy infestations early. In addition, because of fewer fire ants and other arthropod predators, plant cane fields often have earlier treatable infestations. With the development of combine harvester operations and increased use of reduced risk insecticides enhancing beneficial organisms, substantial reductions in sugarcane borer populations are occurring.</p>								
Relative Susceptibility to Borer Injury*	<table> <tr> <th>Rating</th><th>Available Varieties</th></tr> <tr> <td>Resistant .....</td><td>**HoCP 85-845, **HoCP 04-838</td></tr> <tr> <td>Moderate .....</td><td>L 99-226, L 01-283, L 01-299</td></tr> <tr> <td>Susceptible .....</td><td>HoCP 96-540, Ho 95-988, L 97-128, L 99-233, HoCP 00-950, L 03-371, Ho 07-613</td></tr> </table>	Rating	Available Varieties	Resistant .....	**HoCP 85-845, **HoCP 04-838	Moderate .....	L 99-226, L 01-283, L 01-299	Susceptible .....	HoCP 96-540, Ho 95-988, L 97-128, L 99-233, HoCP 00-950, L 03-371, Ho 07-613
Rating	Available Varieties								
Resistant .....	**HoCP 85-845, **HoCP 04-838								
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Susceptible .....	HoCP 96-540, Ho 95-988, L 97-128, L 99-233, HoCP 00-950, L 03-371, Ho 07-613								

\* Based on injury in replicated on-farm varietal trials.

\*\* Standards for Mexican rice borer varietal evaluations are HoCP 85-845 (resistant) and HoCP 04-838 (susceptible).

Plant each variety in as large an area as possible. This practice facilitates the scouting program and reduces the treatment of resistant varieties when mixed with susceptible varieties. Plant resistant varieties wherever appropriate since this will greatly reduce the number of insecticide applications needed for control of damaging infestations. Use of resistant varieties supplies about 25 percent of the suppressive effect annually to control the sugarcane borer.

**Table 27. Insecticides to use against sugarcane borers and Mexican rice borers**

Insecticide	IRAC Mode of Action	Dosage (Pounds of Active Ingredient per Acre)	Dosage (Fluid Ounces per Acre)	Last Application to Harvest**
<b>Sugarcane borer</b>				
Karate Z	Pyrethroid (3A)	0.033	2	21 days
Asana XL	Pyrethroid (3A)	0.033-0.05	5.5-9.8	21 days
Baythroid XL	Pyrethroid (3A)	0.033	2.1	15 days
Mustang Max	Pyrethroid (3A)	0.01875-0.025	3-4	21 days
Proaxis	Pyrethroid (3A)	0.0125-0.02	3.2-5.12	21 days
Voliam Xpress, Besiege	Diamide (28) + Pyrethroid (3A)	0.078-0.098	8-10	14 days
<i>Reduced Risk Chemistry</i>				
Confirm 2F	Diacylhydrazine [IGR] (18)	0.09-0.12	6-8	14 days
Diamond 0.83EC	Benzoylurea [IGR] (15)	0.052-0.078	8-12	14 days
Coragen	Diamide (28)	0.045-0.065	3.5-5	14 days
Prevathon	Diamide (28)	0.047-0.067	14-20	14 days
Belt SC	Diamide (28)	0.094-0.125	3-4	14 days
<b>Mexican Rice Borer</b>				
Diamond 0.83 EC	Benzoylurea [IGR] (18)	0.052-0.078	12	14 days
Confirm 2F	Diacylhydrazine [IGR] (15)	0.25	16	14 days
Baythroid XL	Pyrethroid (3A)	0.022	2.8	15 days

\*Insecticide Resistance Action Committee mode of action classification

\*\* Minimum number of days from last application until harvest

**Note:** During those instances that treatable sugarcane borer and morningglory (tie vine) infestations occur in the same fields during late summer, a co-application of insecticide and 2-4, D can be used (minimum 5 gallons water per acre) unless otherwise stated on the label. For most labeled products, effectiveness is not reduced when insecticides and 2-4, D are co-applied, and there are no additional drift hazards associated with the combination than with each chemical applied independently. This saves the cost of an additional application.

**Warning:** Re-entry times for workers entering treated fields should be strictly observed. Be sure to check the label for this information.

**Timing application:** It is important that fields be checked at weekly intervals from mid-June through Sept. 15 and that insecticides are applied only when economically injurious borer infestations exist at an action threshold of 5 percent stalks infested with live larvae in leaf sheaths.

**No application should be made during rain.** Applications may be made after Sept. 15 when borer populations could damage late harvested sugarcane

as long as the pre-harvest interval is considered. Insecticide applications should be made only after joints have begun to form and when economic infestations are detected. The need for thorough and competent checking of fields to determine where and when to use insecticides is most acute.

Field checking permits the use of insecticides in ways that will:

1. Prevent the unnecessary destruction of natural enemies of the sugarcane borer.
2. Eliminate the unnecessary expense of applying insecticides where they are not needed.
3. Reduce fish kills and adverse effects of insecticides on other wildlife.
4. Prolong the useful life of new insecticides by delaying the development of resistance.
5. Reduce hazards of insecticide contamination of drinking water.
6. Reduce amounts of insecticides accumulating in the soil that could cause excess residues in future crops.

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## Wireworms

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Soil treatment is recommended to control wireworms where sod land is planted to cane or where wireworms are a problem. Wireworm damage generally occurs in spots and usually is confined to sandy loam soils. Apply granular insecticide over seed pieces in the open furrow in a band 12-16 inches wide so that all the seed pieces have contact. The application should be made just before the seed pieces are covered with soil.

Formulation	Dosage	Application
Thimet 20G	1-1.5 pounds of active ingredient per acre 5-7.5 pounds per acre	Apply in furrow directly around planted cane in a 12-inch band and cover with soil.
Mocap 20G	1-1.5 pounds of active ingredient per acre 5-7.5 pounds per acre	Apply in furrow directly around planted cane in a 12-inch band and cover with soil.

**Sampling:** No treatments should be made without sampling to determine if an infestation of wireworms exists. Wireworms can be sampled by setting up one to two bait stations per acre about one to four weeks before planting. For each bait station, bury a handful of fermented corn seeds 2-4 inches deep. (Corn seeds must not be coated with a seed treatment.) Cover with a small mound of soil and mark location with a flag. Remove the soil and count the number

of wireworms attracted to each bait station at least a week after setup. Wireworms are hard, elongated, wirelike larvae. An average of one wireworm per bait station would justify insecticidal control.

**Note:** Liquid formulations are not recommended for wireworm control because their persistence is limited and these formulations are extremely hazardous to the applicator.

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## Aphids

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Foliar applications of labeled pyrethroids are not recommended because of inadequate control of the yellow sugarcane aphid and sugarcane aphid.



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