Sugarcane Production Handbook – 2001

LSU AgCenter
Research & Extension

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Section I

Sugarcane Planting Recommendations and Suggestions for Louisiana Sugarcane 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 urged 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 and soil insect control. Suggestions are made on depth of cover, depth of planting, dates of planting, succession planting and use of starter fertilizers.

Healthy Seed Cane

For all varieties to yield up to their full potential, it is essential that 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 (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, RSD is spread mechanically, so equipment should be carefully cleaned before handling seed cane. Since RSD has little or no visible symptoms, growers do not know when they are introducing or spreading the disease. Therefore, seed cane should be propagated as few times as is economically feasible. A common mistake made by growers is to assume that 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% smut-infected shoots should be avoided as a seed cane source. Where practical, smut-infected plants should be rogued early in the season. Avoid planting seed cane nurseries of smut-susceptible varieties next to smut-infected cane.

Most recommended varieties are susceptible or moderately susceptible to leaf scald with the exception of LCP 85-384. The highest incidence of the disease in commercial planting has been in HoCP 85-845. 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 RSD 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 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 LCP 85-384 and

HoCP 91-555, **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 conducted by the following personnel: LSU AgCenter Research and Extension; USDA-ARS, SRRC, Sugarcane Research Unit; and the American Sugar Cane League. Four varieties, CP 70-321, LCP 85-384, HoCP 85-845 and HoCP 91-555, are recommended for general (major) planting in 2001. It must be stressed that growers should plant a variety only if a disease-free seed source is available. It is recommended that growers consider HoCP 85-845 where insecticide use may be restricted.

Variety Performance

The variety recommendations consider the most important traits of each recommended variety. The means of multi-year outfield tests from plant cane through third ratoon 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, insect and disease resistance must also be considered in choosing a variety. Table 5 summarizes variety characteristics.

Table 1. Combined plant-cane means across outfield locations from 1996 to 2000.

Variety	Sugar per Acre (lbs/A)	Cane Yield (tons/A)	Sugar per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)
CP 70-321	7907 -	30.0 -	264 -	2.8 +	21768 -
LCP 85-384	8929	33.1	270	2.3	28953
HoCP 85-845	7877 -	32.2	244 -	2.6 +	24569 -
HoCP 91-555	8443 -	31.8	265 -	2.3	27565 -

Table 2. Combined first-stubble means across outfield locations from 1997 to 2000.

Variety	Sugar per Acre (lbs/A)	Cane Yield (tons/A)	Sugar per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)
CP 70-321	7919 -	29.3 -	272	2.5 +	23366 -
LCP 85-384	9250	33.8	274	2.0	34123
HoCP 85-845	8213 -	31.7 -	258 -	2.3 +	27629 -
HoCP 91-555	8644 -	31.3 -	276	2.0	31711 -

Table 3. Combined second-stubble means across outfield locations from 1998 to 2000.

Variety	Sugar per Acre (lbs/A)	Cane Yield (tons/A)	Sugar per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)
CP 70-321	7195 -	27.8 -	259 -	2.3 +	24064 -
LCP 85-384	8564	32.1	267	1.7	38126
HoCP 85-845	7990 -	31.2	254 -	2.1 +	30151 -
HoCP 91-555	7761 -	28.3 -	273 +	1.7	34654 -

Table 4. Combined third-stubble means across outfield locations from 1999 to 2000.

Variety	Sugar per Acre (lbs/A)	Cane Yield (tons/A)	Sugar per Ton (lbs/ton)	Stalk Weight (lbs)	Stalk Number (stalks/A)
CP 70-321	6625 -	25.3 -	262	2.4 +	21426 -
LCP 85-384	7878	29.7	267	1.7	35795
HoCP 85-845	8548	33.3 +	256	2.2 +	29983 -
HoCP 91-555	8040	29.2	275	1.8	33391

- denotes that means are statistically (0.05) lower than LCP 85-384.

+ denotes that means are statistically (0.05) higher than LCP 85-384.

Varieties Recommended for Planting

CP 70-321 was selected from a cross of CP 61-39 x CP 57-614 and released in 1978. CP 70-321 is early maturing. CP 70-321 tends to lodge but less than LCP 85-384. It is resistant to smut and post-freeze deterioration of the stalk. It is susceptible to RSD and a complex of foliar diseases. It is moderately susceptible to leaf scald and does not stubble well after a severe freeze or a late spring frost. Research shows that CP 70-321 is resistant to the establishment of the sugarcane borer.

LCP 85-384 was selected from a cross of CP 77-310 x CP 77-407 and was released in 1993. LCP 85-384 is a high yielding, excellent stubbling variety. The variety produces a large number of small stalks and exceeds most others in sugar per acre. This variety generally is slow to emerge after planting. Planting this variety in poorly drained areas or covering seed cane of this variety too deeply can result in reduced stands. This is an early maturing variety with a fiber content of approximately 12.5 percent. This variety frequently lodges and is brittle and difficult to harvest when lodged. It is better suited for combine harvesting. LCP 85-384 exhibits symptoms of a complex of foliar diseases and is susceptible to rust but is resistant to smut, sugarcane mosaic virus and leaf scald. It has good resistance to post-freeze deterioration. RSD spreads more slowly in LCP 85-384 than other varieties, but the disease has caused significant yield reductions in stubble crops. The variety is susceptible to the sugarcane borer and should not be grown in areas where insecticides cannot be applied. LCP 85-384 is

tolerant to most preemergence herbicides but may be susceptible to late postemergence applications of asulam. It has exhibited sensitivity to the ripener glyphosate and may be injured by application rates exceeding 6 ounces per acre.

HoCP 85-845 was selected from the cross CP 72-370 x CP 77-403 and was released in 1993. HoCP 85-845 is erect in growth habit and suited to soldier harvesting. It is superior to CP 70-321 in yield of sugar per acre in the plant-cane crop and yield of cane per acre. To maximize yield of sugar per ton, harvest this variety before November 15. HoCP 85-845 is early to mature, but is considered only moderate in overall sucrose content. It has moderate resistance to post-freeze deterioration. The variety has acceptable fiber content (13.5 %), and it is moderately resistant to mosaic and resistant to smut and rust. It is susceptible to leaf scald, and RSD has caused significant reductions in yield in the stubble crops. HoCP 85-845 is resistant to the sugarcane borer and tolerant to most preemergence herbicides; some injury may occur from late postemergence applications of asulam. *Note:* Planting in August will normally result in higher cane and sugar (yield of sugar per ton) yields in the plant-cane crop.

HoCP 91-555 is the most recent variety released for commercial use. It is a high yielding sugarcane variety released for commercial use in Louisiana in 1999. HoCP 91-555 is a product of the cross CP 83-644 x LCP 82-94 made at Canal Point (CP), Florida, and selected at Houma (Ho), Louisiana, and has a high population of small, green to brownish stalks. HoCP 91-555 is a high yielding, good stubbling variety. It is mostly erect in growth habit and suited to both soldier and combine harvesting. HoCP 91-555 is a high sucrose, early maturing variety with acceptable fiber content (13.6%). The variety is moderately resistant to sugarcane mosaic virus, is resistant to smut and is moderately resistant to rust under field conditions. It is susceptible to leaf scald by artificial inoculation, but it has shown adequate field resistance to natural infection. Ratoon stunting disease has caused significant reductions in yield of cane and total recoverable sugar per acre of this variety in the stubble crops. Therefore, for HoCP 91-555 to yield up to its full potential, it is essential that plantings be made with seed cane free or nearly free of this disease. HoCP 91-555 is considered susceptible to the sugarcane borer and should not be grown in areas where insecticides cannot be applied.

Table 5. Characteristics for recommended sugarcane varieties.

Varietal Characteristics	Varieties: CP 70-321 (Year Released 1978)	LCP 85-384 (1993)	HoCP 85-845 (1993)	HoCP 91-555 (1999)
Sugar per acre	M	VG	G-VG	G-VG
Harvestability	M	P-M	G	G
Erectness	P-M	P-M	G	G
Brittleness	M	P-M	G	G
Sucrose Content*	G	G	M	G
Maturity	E	M-E	E	M-E
Fiber	G	G	M	M
Tonnage	M-G	VG	G	G
Stubbling	P-M	VG	VG	M-G
Borer resistance	R[1]	S	R	S
Smut resistance	R	R	R	R
Mosaic resistance	M	R	MR	R
RSD tolerance	P	M	P	P
Leaf scald	M	R	S	M
Rust resistance	M	S	R	M
Post-freeze deterioration	VG	G	M	P-M
Herbicide tolerance	M-G	M-G[2]	M-G[2]	M-G
Shading	G	G	G	G
Ripener response	M-G	VG[3]	M	M-G

*Sucrose content is measured as theoretical recoverable sugar (TRS) per ton of cane

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

[1]Research shows less tolerant to borer damage than other resistant varieties.

[2]Can be injured by late applications of asulam.

[3]Rates exceeding 6 oz/acre have caused damage in subsequent stubble crops.

New Variety Release

No new variety was released for 2001.

Sugarcane Variety Production Update

The annual sugarcane variety census is conducted cooperatively by the Louisiana Cooperative Extension Service and provides acreage data on variety plantings by growers. A better understanding of variety evaluation by growers can be seen in a comparison of several years of variety surveys. Table 6 shows the 1996-2000 variety survey results as compiled and reported by agricultural agents in the 24 sugarcane-producing parishes of Louisiana.

Only one variety, LCP 85-384, increased in acreage in 2000 from the previous year. All other varieties either decreased or remained the same as reported from the previous year. CP 70-321 declined the most at 7 percentage points while LCP 82-89 declined 3 points. HoCP 85-845 remained the same from the previous year. All other varieties are grown on only limited acreage. The continued increase in acreage of LCP 85-384 has led to the increase in the number of combines operating in Louisiana. HoCP 91-555 is a high yielding, good stubbling variety; however, its yield is generally lower than LCP 85-384. Consequently, the acreage of HoCP 91-555 is not expected to increase significantly in the near future.

Table 6. Louisiana Sugarcane Variety Trends, 1996-2000.*

	% of state acreage by year					
Variety	1996	1997	1998	1999	2000	1 yr. change
CP 65-357	10	6	3	1	1	0
CP 70-321	40	35	29	20	13	-7
CP 72-370	9	7	5	3	2	-1
CP 74-383	3	2	1	<1	<1	0
CP 79-318	3	3	2	1	<1	-1
LCP 82-89	16	10	7	5	2	-3
LHo 83-153	4	4	3	3	2	-1
LCP 85-384	13	29	43	58	71	+13
HoCP 85-845	2	4	6	8	8	0
LCP 86-454	<1	<1	1	1	<1	0
HoCP 91-555	-	-	-	<1	<1	0
Others	<1	<1	1	<1	<1	0
Total	100	100	100	100	100	

*Based on annual variety survey reports from county agents in sugarcane-producing parishes, 1996-2000.

Planting Recommendations and Suggestions

Selection of Seed Cane: As discussed previously, growers should plant seed cane that is as close to disease free as possible. Cane that is growing well and is free of borer and mechanical damage 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 freezes occur.

Stalk cold tolerance should be considered when selecting varieties, especially in the northern parishes. CP 70-321 and LCP 85-384 have shown better stalk cold tolerance than other varieties.

Billet Planting: Whole stalk planting will continue to be a recommended practice, because research has shown that, over time, the highest yields will be obtained with the least risk planting whole stalks. However, when seed cane is badly lodged, the best option will probably 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 CP 70-321. Plantings of whole stalks have out-yielded billet plantings of LCP 85-384 in the plant-cane crop in the majority of experiments, but stubble crop yields have usually been comparable.

The impact of stalk rots is greater in billets because of their shorter length and the wounding that occurs during cutting and planting. This means billet plantings suffer greater damage if there is any kind of planting problem or environmental stress, and the risk of stand reduction is, therefore, 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.

The potential for stand problems is greater with billet planting; however, severe stand reductions have not occurred over six years of research when certain planting practices were used. These practices include planting longer (20-24 inch) billets with as little physical damage as possible, using a planting rate averaging at least six billets running in the planting furrow, using good planting practices (good soil preparation and proper depth of cover), and providing good drainage and careful weed control. If these practices are followed, billet planting can be recommended as an alternative to whole stalk planting for LCP 85-384, particularly when seed cane is lodged.

Planting Furrow Width: Research has shown good yield increases in tonnage and sugar per acre when the planted row was widened from the V-furrow to the 15- to 18-inch furrow. It showed further yield increases as the furrow width was increased from 15 to 18 to 24 inches. Based on this research and the problems encountered by growers in handling furrow widths of more than 18 inches, it is suggested that growers use a 15- to 18-inch furrow for planting in 2001. Growers who can successfully handle the 24-inch width furrow are encouraged to do so.

It is also 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. This opening configuration can be obtained by attaching a single disk on each side of the row opener to dig out the furrow sides and deposit the soil in the furrow middle.

Some growers have found that packing rows ahead of opening will give more uniform furrows when opening with a three-row opener.

Planting Rate: For planting, growers should use the best seed cane available. (See section on selection of seed cane.)

Based on research results and field observations, the planting rate recommendation is three 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 good 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 mid- August to mid- October have been conducted in recent years (Table 7). Results have been variable but generally showed an advantage of mid-August

over mid-October planting. Planting date trials over the last four years also indicate significantly higher yields in sugar per ton of cane for HoCP 85-845 in plant-cane crops when planted in mid-August.

Table 7. Combined plant cane yields from different planting dates during 1996-97-98.

Dates	Cane/A (tons)	Sugar/T (lbs)	Sugar/A (lbs)	St. Wt. (lbs)	Population (no)
			CP 70-321		
Aug.	43.3	280.8	12176	2.69	32372
Sept.	37.1	277.7	10287	2.74	27100
Oct.	35.5	272.1	9659	2.73	26115
LSD(0.5)	3.6	NS	1107	NS	2854
			LCP 85-384		
Aug.	40.5	288.8	11694	2.25	36046
Sept.	41.5	286.5	11858	2.49	33213
Oct.	40.4	280.9	11372	2.43	33313
LSD(0.5)	NS	NS	NS	0.13	NS
			HoCP 85-845		
Aug.	48.4	278.1	13456	2.57	37861
Sept.	41.6	260.7	10850	2.55	32752
Oct.	39.2	257.9	10105	2.64	29875
LSD(0.5)	4.3	11.4	1248	NS	3590

Amount of Soil Cover Over Seed Cane

Research on depth of soil cover over seed cane indicates that soil cover in excess of 4 inches can cause yield losses even if the excess is removed in the spring following planting.

Heat-treated cane should be covered with 2 inches of packed soil. After the 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 regular late August, September and October planting, cover with 3 to 4 inches of packed soil at planting time. This recommendation is for all varieties including LCP 85-384. Farmers in the southern part of the belt can normally 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. 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.

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. Clean quarter drains before spraying herbicides. Where soil washing occurs in the fall before a hard freeze, it is suggested that the middles be sunk and rows rebuilt for winter protection.

Depth of Planting with Relation to Water Furrow

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

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 seed cane.

Starter Fertilizer Application

Recent fertilization trials have often shown yield responses to starter fertilizers applied in the planting furrow for cane planted after a fallow year as well as succession planted cane. Yield responses have been obtained in both plant-cane and stubble-cane crops with an application of 15-45-45 lbs/A of N-P_2O_5-K_2O.

Based on these recent findings, it is suggested that growers apply 15-45-45lbs/A of N-P_2O_5-K_2O into the planting furrow ahead of planting. Applying nitrogen at rates exceeding 15 lbs/A is not recommended.

As an alternative to starter fertilizer, a rotational crop of soybeans might be considered. 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 in the fall.

Succession Planting Sugarcane (cane planted without fallow)

Succession planting is an alternative planting system that has been investigated for several years by the LSU AgCenter at St. Gabriel and USDA-ARS, SRRC, Sugarcane Research Unit at Houma and is being used by some growers. It has the advantages 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 and on farms where equipment and labor are available for planting during the harvest season. Weather often becomes unsuitable for planting during the harvest season, and some varieties are not tolerant of late planting. LCP 85-384 appears well suited to succession planting; HoCP 85-845 is not.

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 or 45-45-45 lbs/A of fall-applied N-P_2O_5-K_2O fertilizer produced yields similar to cane planted conventionally after a fallow period.

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

Suggested Procedure 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 as follows:

1. Shave existing stubble deep or lightly disk row top to break up the cane stubbles into smaller, more manageable pieces.
2. Roto-till rows.
3. Subsoil each row if time permits.
4. Rebuild rows with disk chopper.
5. Culti-pack and then open planting furrow 15 inches to 18 inches as recommended.
6. Apply fertilizer in planting furrow at 15-45-45 or 45-45-45 lbs/A of $N\text{-}P_2O_5\text{-}K_2O$ before planting succession cane. (In addition, the normal recommended $N\text{-}P_2O_5$ and K_2O rates for plant and stubble cane should be applied in the spring of each crop year, depending on soil type and soil test results.)
7. Plant seed cane of a variety that tolerates late planting (LCP 85-384) and cover as recommended.
8. Pack rows after planting.
9. Apply preemergence herbicides as recommended.

Section II

Controlling Weeds in Sugarcane

Introduction

A chemical program for weed control can help Louisiana growers produce maximum yields of sugarcane when combined with sound agronomic practices such as timely cultivation, selection of adapted varieties, proper fertilization, and disease and insect control.

Herbicides are expensive, and, unless applied properly and at the correct time, they will not provide maximum control of weeds. Spray equipment should be in good condition, properly calibrated (several times during a season) and should have vigorous agitation capability (especially important for wettable powders). Herbicides also should be accurately measured or weighed.

When ground equipment is used, herbicides usually should be applied on a band over the top of the row. Banding the herbicide reduces the cost per acre.

The importance of early control of johnsongrass and bermudagrass cannot be overstated. Johnsongrass established from seed begins to develop rhizomes within a few weeks. These rhizomes have a large number of buds, each capable of producing a johnsongrass plant. Heavy infestations of johnsongrass can reduce yields by 50% or more. Bermudagrass is also a perennial that produces rhizomes and stolons. Bermudagrass can reduce the yield of sugar per acre about 5% to 17% per year over a three-year crop cycle. Once established johnsongrass and bermudagrass become more difficult to control. In contrast, itchgrass is an annual weed which reproduces only by seed. Season-long itchgrass interference has reduced sugar yield by 43%. In early planted cane, the growing season is sufficient to allow for itchgrass seed production to occur. Control of these weeds may be enhanced by keeping ditches clean, preventing movement of rhizomes and seed into fields and by implementing an effective fallow program.

Herbicides to control weeds are essential to prevent weed competition and losses in sugarcane production. Sugarcane is most susceptible to weed competition during the first eight to 10 weeks after cane emergence. Unless herbicides are applied immediately after planting, weed seed present in the soil following a fallow program will germinate, producing viable seeds and/or rhizomes. As a result weeds can quickly reinfest a field, with the benefits of weed control in the fallow period rapidly lost.

Selection of preemergence herbicides should be based on soil texture and organic matter content, weed problem and the variety of sugarcane. For best results, apply preemergence herbicides immediately after planting. The information that follows on sugarcane weed control supercedes Louisiana Cooperative Extension Service publication 2314, "Controlling Weeds in Sugarcane." NOTE: Herbicide rates are presented on a formulated broadcast basis.

Note: Follow Label Directions

If herbicides are handled or applied improperly, or if unused portions are not disposed of safely, they may injure humans, domestic animals, desirable plants and fish or other wildlife, and they may contaminate water supplies. Use herbicides only when needed, and handle them with care. Follow the directions and heed all precautions on the container label. Make sure that water used with herbicides has the proper pH; otherwise, product may not perform as expected.

Herbicides in sugarcane may be applied broadcast or banded on the row top. Herbicide rates are provided based on the amount of active ingredient and formulated product per acre on a broadcast basis.

To calculate the band rate, use the following formula:

Band width in inches / Row width in inches X Broadcast RATE per acre = Band RATE per acre

This calculation will provide the correct band rate for any formulation, liquid or dry.

At Planting Preemergence Weed Control

Rate/Acre Active Ingredient Broadcast	Rate/Acre Formulated Material Broadcast	Weeds Controlled (see table "Weed Control With Sugarcane Herbicides" for specific control values)	Remarks
terbacil 0.8 - 1.2 lb/A	Sinbar 1.0 - 1.5 lb for all soils, except 1.0 lb on very sandy soils	Seedling johnsongrass, other seedling grasses and broadleaf weeds. Winter grasses and broadleaf weeds. Poor on browntop panicum and itchgrass.	After planting roll or pack top of row before applying herbicide. Can provide suppression of bermudagrass at higher rates. Addition of Prowl/Pendimax can increase control of browntop panicum and itchgrass.
metribuzin 1.5 - 3.0 lb/A	Sencor 4 1.5 - 3.0 qt OR Sencor DF 2.0 - 4.0 lb	Seedling johnsongrass, other seedling grasses and broadleaf weeds. Winter grasses and broadleaf weeds. Fair to good on browntop panicum. Poor on itchgrass.	After planting roll or pack top of row before applying herbicide. This product is safe to use on all soils and varieties of cane when applied at labeled rates. Can provide suppression of bermudagrass at higher rates. Addition of Prowl/Pendimax can increase control of browntop panicum and itchgrass.
trifluralin 2.0 lb/A	Treflan, Trifuralin, Trilin, Tri-4, Trific, Treflan HFP (4 EC formulations) 2.0 qt OR Triflin 5 (5 EC formulation) 1.6 qt	Seedling johnsongrass, itchgrass, browntop panicum, other annual grasses. Winter grasses.	Incorporate as soon as possible after application, but within 24 hours. Avoid incorporation at a depth that will damage seed pieces. Can provide suppression of bermudagrass at higher rates. After incorporation, other herbicides may be applied to soil surface for broadleaf weed control.
pendimethalin 2.0 - 3.0 lb/A	Prowl 3.3 EC, Pendimax 3.3 2.4 - 3.6 qt	Seedling johnsongrass, itchgrass, browntop panicum, other annual grasses. Winter grasses.	May be surface applied or soil incorporated. Use higher rate if surface applied, planting in July or August, or if itchgrass is a problem. Other herbicides may be applied to the soil surface for broadleaf weed control.

Rate/Acre Active Ingredient Broadcast	Rate/Acre Formulated Material Broadcast	Weeds Controlled (see table "Weed Control With Sugarcane Herbicides" for specific control values)	Remarks
atrazine 2.0 - 4.0 lb/A	AAtrex 4L, Atrazine 4L 2.0 - 4.0 qt OR AAtrex Nine-O, Atrazine 90 DF, Atrazine 90 WDG 2.22 - 4.44 lb	Broadleaf weeds and some annual grasses. Winter broadleaf weeds and some grasses.	Use higher rate on heavy soils or when cane is planted in July or August.
diuron 2.4 - 3.0 lb/A	Direx 4L 2.4 - 3.0 qt OR Karmex DF, Direx 80DF 3.0 - 3.75 lb	Broadleaf weeds and some annual grasses. Fair control of seedling johnsongrass and browntop panicum. Winter broadleaf weeds and some grasses.	Use higher rate on heavy soils or when cane is planted in July or August.
halosulfuron 0.031 - 0.062 lb/A	Sempra 0.67 - 1.33 oz	Purple and yellow nutsedge.	Apply lower rate for suppression and higher rate for control. Heavy nutsedge infestations may require sequential applications. May be applied after cane emerges and with atrazine or 2,4-D to control other weeds. Nonionic surfactant or crop oil concentrate should be added with atrazine and nonionic surfactant with 2,4-D. Do not disturb area for at least 7 days following treatment.

NOTE: *If johnsongrass and itchgrass are not controlled at planting treatments, Asulox/Asulam can be applied postemergence in the Fall (see section on "Postemergence Control of Johnsongrass and Other Grasses" for rates). If broadleaf weeds are not controlled at planting 2,4-D or Weedmaster/Brash can be used in non-restricted areas as a late Summer/Fall application (see section on "Winter Weed Control" for rates).*

Succession Planting

Herbicides listed above may also be used when cane is succession planted. Rates may be reduced due to later planting dates.

Use of Shielded or Hooded Sprayers

Shielded application of glyphosate herbicide to row middles after planting, after fall harvest or in the spring has provided good to excellent control of emerged bermudagrass. Apply 1.0 to 2.0 qt/A of the 4.0 lb ai/gallon formulations OR 0.8 to 1.6 qt/A of the 5 lb formulations in 5-20 gallons per acre as a shielded application to the row middles (see table below for labeled glyphosate sugarcane herbicides and rate conversions). Severe cane injury can occur if herbicide comes in contact with green cane foliage.

Winter Weed Control

Preemergence: Apply atrazine, Sinbar, Sencor or Karmex/Direx to early-harvested cane or reapply to newly planted cane for preemergence control of winter broadleaf and grass weeds. Rates specified in the "At Planting Preemergence Weed Control" section for Sinbar and Sencor can be reduced for the later applications. Add nonionic surfactant or crop oil concentrate if weeds are emerged at application. See table "Weed Control With Sugarcane Herbicides" for specific control values.

Postemergence: Apply Weedmaster/Brash at 1.0 qt/A or 2,4-D amine at 2.0 qt/A after broadleaf weeds have emerged and when air temperature is above 65° F. Weedmaster/Brash and 2,4-D are classified as phenoxy herbicides and their use is restricted in some parishes. Check local restrictions before application. See table "Weed Control With Sugarcane Herbicides" for specific control values. Apply Gramoxone Extra (2.5 lb ai paraquat/gallon) at 0.5-1.5 qt/A or Gramoxone Max (3.0 lb ai paraquat/gallon) at 0.42-1.25 qt/A plus nonionic surfactant or crop oil concentrate prior to cane emergence or when cane has no more than 4 leaves. Apply Boa (2.5 lb ai paraquat/gallon) ONLY PRIOR TO CANE EMERGENCE at 0.5-1.5 qt/A plus nonionic surfactant or crop oil concentrate. Apply all paraquat treatments in a minimum of 10 gallons per acre. Karmex/Direx may be added to improve burndown and provide soil residual activity. See table "Weed Control With Sugarcane Herbicides" for specific control values.

Spring Preemergence Weed Control

The preemergence herbicide programs described below should be implemented in late winter or early spring before weed seeds have germinated. If heavy winter weed cover or sugarcane residue is present, apply the higher end of herbicide rate range. Herbicides may be applied broadcast, but in most cases are banded on the row top (refer to information on broadcast and band rates presented earlier). If scattered infestations of winter weeds are present, add Weedmaster/Brash at 1.0 qt/A or 2,4-D amine at 2.0 qt/A. Both Weedmaster/Brash and 2,4-D are classified as phenoxy herbicides and their use is restricted in some parishes. Check local restrictions before application.



Rate/Acre Active Ingredient Broadcast	Rate/Acre Formulated Material Broadcast	Weeds Controlled (see table "Weed Control With Sugarcane Herbicides" for specific control values)	Remarks
terbacil 0.80–1.2 lb/A	Sinbar 1.0 – 1.5 lb for all soils, except 1.0 lb on very sandy soils	Seedling johnsongrass, other seedling grasses and broadleaf weeds Poor control of browntop panicum and itchgrass	Apply before weeds emerge. Addition of Prowl/Pendimax can increase control of browntop panicum and itchgrass. For bermudagrass suppression apply at higher rate prior to bermudagrass green up. Stubble crops appear to be more tolerant.
metribuzin 1.5 – 3.0 lb/A	Sencor 4 1.5 – 3.0 qt OR Sencor DF 2.0 - 4.0 lb	Seedling johnsongrass, other seedling grasses and broadleaf weeds Fair to good control of browntop panicum, poor control of itchgrass	Apply before weeds emerge. Safe to cane on all soil types. Addition of Prowl/Pendimax can increase control of browntop panicum and itchgrass. For bermudagrass suppression apply at higher rate prior to bermudagrass green up.
trifluralin 2.0 lb/A	Treflan, Trifluralin, Trilin, Tri-4, Trific, Treflan HFP (4 EC formulations) 2.0 qt OR Trilin 5 (5 EC formulation) 1.6 qt	Seedling johnsongrass, itchgrass, browntop panicum, other annual grasses	Apply to a clean drill and incorporate as soon as possible after application, but within 24 hours. Sugarcane and weed residue should be removed prior to application by shaving or mowing. This practice may contribute to disease spread. Can provide suppression of bermudagrass at higher rates. Atrazine, Karmex/Direx or Sencor should be applied to the soil surface for broadleaf control.
pendimethalin 2.0 – 3.0 lb/A	Prowl 3.3 EC, Pendimax 3.3 2.3 – 3.6 qt	Seedling johnsongrass, itchgrass, browntop panicum, other annual grasses	May be surface applied or incorporated. Use higher rate if surface applied or if itchgrass is a problem. Atrazine, Karmex/Direx or Sencor should be applied to the soil surface for broadleaf control. Karmex/Direx plus nonionic surfactant or crop oil concentrate can be added to control 1 to 3 leaf itchgrass.
atrazine 2.0 – 4.0 lb/A	AAtrex 4L, Atrazine 4L 2.0 – 4.0 qt OR AAtrex Nine-O, Atrazine 90 DF, Atrazine 90 WDG 2.22 – 4.44 lb	Broadleaf weeds and some annual grasses	Use higher rate on heavy soils. Addition of nonionic surfactant or crop oil concentrate will improve the control of small broadleaf and grass weeds.
diuron 2.4 – 3.0 lb/A	Direx 4L 2.4 – 3.0 qt OR Karmex DF, Direx 80DF 3.0 – 3.75 lb	Broadleaf weeds and some annual grasses. Fair control of seedling johnsongrass and browntop panicum	Use higher rate on heavy soils. Small broadleaf weeds and 1 to 3 leaf itchgrass can be controlled with the addition of nonionic surfactant or crop oil concentrate.
halosulfuron 0.031 - .062 lb/A	Sempra 0.67 - 1.33 oz	Purple and yellow nutsedge	Will control nutsedge after emergence (4 to 12 inches tall). Apply lower rate for suppression and higher rate for control. Heavy nutsedge infestations may require sequential applications. Nonionic surfactant or crop oil concentrate should be added. Do not disturb area for at least 7 days following treatment.

Postemergence Control of Johnsongrass and Other Grasses – Asulox/Asulam Program

Ground Application: Asulox/Asulam can be applied broadcast, banded or as a spot treatment when johnsongrass is scattered. The most accurate and economical method of spot treating is to use a calibrated sprayer at a constant speed with the operator turning the sprayer on and off as needed. If a high-volume cattle gun sprayer is used for spot treatment, apply a 2% solution of Asulox/Asulam (equivalent to 2 gallons of herbicide in 98 gallons of water) plus nonionic surfactant at 0.25-0.50% volume/volume basis or crop oil concentrate at 1.0% volume/volume. If water pH is above 9.0, addition of a buffer may be beneficial.

1) **First application:** Apply 4.0 qt/A Asulox/Asulam broadcast (or the correct proportion if applying on a band) plus nonionic surfactant at 0.25-0.50% volume/volume basis or crop oil concentrate at 1.0% volume/volume in 15 to 30 gallons per acre to thoroughly wet johnsongrass leaves. Application of Asulox/Asulam on a band will reduce herbicide cost per acre. To enhance coverage of johnsongrass foliage, nozzles mounted on drops should be used. At application, average air temperature should be at least 60°F and johnsongrass should be 12 to 18 inches tall and actively growing. DO NOT cultivate, fertilize or otherwise disturb the johnsongrass root system 7 days before or 7 days after Asulox/Asulam application. With some variation caused by weather conditions, johnsongrass will be at the recommended treatment size in early April. Research has shown that a 20-hour rain-free period following Asulox/Asulam application may be needed to maximize control. Asulox/Asulam applied at 3.0 to 4.0 qt/A also controls foxtails, goosegrass and barnyardgrass/junglerice when 6 to 8 inches tall. Itchgrass less than 8 inches tall may be controlled with 4.0 qt/A. Vaseygrass that is less than 8 inches tall can be partially controlled with Asulox/Asulam at 4.0 qt/A, but activity is very slow.
2) **Second application:** A second application of Asulox/Asulam at 3.0 to 4.0 qt/A can increase johnsongrass control, but may not increase yields over that obtained with a single Asulox/Asulam application. This may be beneficial in the plant-cane or first-stubble crop to reduce infestations in subsequent crops. The second application of Asulox/Asulam should be made to johnsongrass regrowth, usually about eight weeks after the first application. Sugarcane injury is more likely when Asulox/Asulam is applied to sugarcane stressed from drought, excessive temperature or flooded soils, especially after June 1. Of the currently or previously recommended sugarcane varieties, CP 72-370, LCP 85-384, HoCP 85-845 and LCP 82-89 appear more sensitive to late May/June applications of Asulox/Asulam than other varieties.

Aerial Application: Asulox/Asulam may also 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 ditchbanks and headlands also receiving application.

Fall Asulox/Asulam Application: In early planted or early harvested sugarcane, johnsongrass may reinfest fields prior to the winter dormancy period. When applied in the fall (around mid-October), Asulox/Asulam at 3.0 qt/A plus nonionic surfactant at 0.25-0.50% volume/volume or crop oil concentrate at 1.0% volume/volume has provided johnsongrass control and reduced johnsongrass infestation the following spring.

Layby Preemergence Weed Control

Herbicides at layby are applied broadcast and directed underneath the sugarcane canopy usually following the last cultivation. Coverage of row tops and middles is critical to provide weed control until harvest. Avoiding herbicide contact with newly emerging cane leaves can reduce sugarcane injury potential with some herbicides. Directed application also increases herbicide coverage of smaller emerged weeds.

Rate/Acre Active Ingredient Broadcast	Rate/Acre Formulated Material Broadcast	Weeds Controlled (see table "Weed Control With Sugarcane Herbicides" for specific control values)	Remarks
atrazine 2.0 – 4.0 lb/A	AAtrex 4L, Atrazine 4L 2.0 – 4.0 qt OR AAtrex Nine-O, Atrazine 90 DF, Atrazine 90 WDG 2.22 – 4.44 lb	Broadleaf weeds and some annual grasses	Use higher rate on heavy soils; nonionic surfactant or crop oil concentrate should be added if broadleaf weeds are emerged.
diuron 2.4 – 3.0 lb/A	Direx 4L 2.4 – 3.0 qt OR Karmex DF/ Diuron 80WP 3.0 – 3.75 lb	Broadleaf weeds and some annual grasses Fair control of seedling johnsongrass and browntop panicum	Use higher rate on heavy soils; broadleaf weeds and 1 to 3 leaf itchgrass can be controlled with the addition of nonionic surfactant or crop oil concentrate.
trifluralin 2.0 lb/A	Treflan, Trifluralin, Trilin, Tri-4, Trific, Treflan HFP (4 EC formulations) 2.0 qt OR Trilin 5 (5 EC formulation) 1.6 qt	Seedling johnsongrass, itchgrass, browntop panicum, other annual grasses	Incorporate as soon as possible after application, but within 24 hours. After incorporation, atrazine, Karmex/Direx or Sencor may be applied to the soil surface for broadleaf weed control. Add nonionic surfactant or crop oil concentrate if broadleaf weeds are emerged.
pendimethalin 2.0 – 3.0 lb/A	Prowl 3.3 EC, Pendimax 3.3 2.4 – 3.6 qt	Seedling johnsongrass, itchgrass, browntop panicum, other annual grasses	May be surface applied or soil incorporated. Use higher rate if surface applied or if itchgrass is a problem. Atrazine, Karmex/Direx or Sencor may be applied to the soil surface for broadleaf weed control. If broadleaf weeds are emerged, add nonionic surfactant or crop oil concentrate.
metribuzin 1.5 – 3.0 lb/A	Sencor 4 1.5 – 3.0 qt OR Sencor DF 2.0 – 4.0 lb	Seedling johnsongrass, other seedling grasses and broadleaf weeds. Fair to good on browntop panicum. Poor on itchgrass	This product is safe to use on all soils and varieties of cane when applied at labeled rates. Addition of Prowl/Pendimax can increase control of browntop panicum and itchgrass. Nonionic surfactant or crop oil concentrate should be added if broadleaf weeds are emerged.
terbacil 0.5 lb/A	Sinbar 0.625 lb on medium and heavy soils; do not use on light soils unless previous use has indicated no injury problem	Seedling johnsongrass, other seedling grasses and broadleaf weeds Poor control of browntop panicum and itchgrass	Addition of Prowl/Pendimax can increase control of browntop panicum and itchgrass. Stubble crops appear to be more tolerant.
halosulfuron 0.031 - 0.062 lb/A	Sempra 0.67 - 1.33 oz	Purple and yellow nutsedge	Will control nutsedge 4 to 12 inches tall. Apply lower rate for suppression and higher rate for control. May be applied with other herbicides to control grasses and broadleaf weeds. Nonionic surfactant or crop oil concentrate should be added. Do not disturb area for at least 7 days.

NOTE: 2,4-D and Weedmaster/Brash can be added at layby in non-restricted areas to control emerged broadleaf weeds.

Postemergence Weed Control After Layby

To control annual morningglories (tie-vines) and other broadleaf weeds, apply 2,4-D amine at 1.5 qt/A or Weedmaster/Brash at 1.0 qt/A. Use precautions to prevent herbicide movement to non-target areas. Since both are phenoxy herbicides, use is restricted in some parishes. Check local restrictions before application. Research has shown that with some varieties, application of 2,4-D within 4 weeks of planting seedcane can reduce plant cane stands.

To achieve partial control of bermudagrass in row middles apply Gramoxone Extra or Boa at 1.5 qt/A or Gramoxone Max at 1.25 qt/A plus nonionic surfactant as a directed spray in late June. Herbicide contact of young sugarcane tillers can cause significant injury. This application desiccates bermudagrass and, combined with shading from the crop canopy, can prevent or reduce bermudagrass regrowth. This treatment can also reduce the amount of bermudagrass transported with seed cane.

Fallow Weed Control

The fallow year provides the opportunity to control johnsongrass, itchgrass, bermudagrass and other weeds by killing rhizomes and reducing weed seed reserves in the soil. Weed control programs during the fallow period can include use of tillage (plowing/disking) and herbicides. Frequent and timely cultivation, where weeds are destroyed and prevented from reestablishing, can be an effective management tool, if weather permits. Tillage, however, can reduce soil moisture in the seedbed, which in dry years can hinder plant cane emergence and growth. Several herbicides are labeled for use in fallowed sugarcane fields and can be used in conjunction with or a substitute for fallow plowing.

Fallow Preemergence: After bedding in May or June, apply preemergence herbicides to a weed and clod-free bed. Packing of the row top may enhance weed control.

Rate/Acre Active Ingredient Broadcast	Rate/Acre Formulated Material Broadcast	Weeds Controlled (see table "Weed Control With Sugarcane Herbicides" for specific control values)	Remarks
metribuzin 1.5 – 3.0 lb/A	Sencor 4 1.5 – 3.0 qt OR Sencor DF 2.0 – 4.0 lb	Seedling johnsongrass, other seedling grasses and broadleaf weeds Fair to good control of browntop panicum Poor control of itchgrass	Can provide suppression of bermudagrass at higher rates. Addition of Prowl can increase control of browntop panicum and itchgrass. Nonionic surfactant or crop oil concentrate should be added if broadleaf weeds are present.
diuron 2.4 – 3.0 lb/A	Direx 4L 2.4 – 3.0 qt OR Karmex DF/ Diuron 80WP 3.0 – 3.75 lb	Broadleaf weeds and some annual grasses Fair control of seedling johnsongrass and browntop panicum	Use higher rate on heavy soils; emerged broadleaf weeds and 1 to 3 leaf itchgrass can be controlled with the addition of nonionic surfactant or crop oil concentrate. Addition of Prowl can increase grass control.
pendimethalin 2.5 lb/A	Prowl 3.3 EC 3.0 qt	Seedling johnsongrass, itchgrass, browntop panicum, other annual grasses	Apply to clean seedbed at least 60 days prior to planting. Deep incorporation (4 inches) by plowing or rotary tiller will increase the control of rhizome johnsongrass and bermudagrass. If not incorporated, atrazine, Direx/Karmex or Sencor can be added to increase weed spectrum. Nonionic surfactant or crop oil concentrate should be added if broadleaf weeds are emerged.
atrazine 2.0 lb/A	AAtrex 4L, Atrazine 4L 2.0 qt OR AAtrex Nine-O, Atrazine 90 DF, Atrazine 90 WDG 2.2 lb	Broadleaf weeds and some annual grasses	Use higher rate on heavy soils; addition of Prowl can increase grass control.

Fallow Postemergence: Postemergence herbicides should be applied to actively growing weeds.

Johnsongrass and Other Weeds: Apply glyphosate (see table below for labeled glyphosate herbicides and rate conversions) in 3 to 40 gallons per acre. For most applications, rates of 1.0 to 2.0 qt of the 4.0 lb ai/gallon formulation is sufficient. If only a single application of glyphosate is to be made, apply at least 7 days prior to planting. If tankmixing 2,4-D with glyphosate for additional broadleaf weed control, do not apply 2,4-D at an active ingredient rate that is more than one-half the glyphosate active ingredient rate or reduced grass control may be observed. For example, if applying 2.0 qt of a 4.0 lb ai/gallon glyphosate formulation, do not add 2,4-D at a rate greater than 1.0 qt/A. Again, do not cultivate prior to 7 days after application. If purple or yellow nutsedge is present, the combination of Sempra at 0.75 to 1.0 oz/A and glyphosate herbicides can be beneficial.

Bermudagrass: Apply 3.0 qt/A of the 4L glyphosate formulation (see table below for labeled glyphosate herbicides and rate conversions) for partial control and 5.0 qt/A for control in 3-20 gallons per acre. Retreatment may be necessary to maintain control. Do not cultivate for 7 days after application. This allows adequate time for the glyphosate to be taken into the plant and moved to underground rhizomes. If necessary, make a second application but do not apply more than 8.0 qt /A per year of the 4L formulation. Research has shown multiple applications of Roundup Ultra to be more effective in controlling bermudagrass than a single application.

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

Labeled Glyphosate Herbicides for Use in Sugarcane

Herbicide Trade Name *	Formulation (lb ai/gallon)	Manufacturer	Rate Equivalent to 1.0 qt/A Roundup Ultra
Roundup Ultra	4L	Monsanto	1.0 qt (32 oz)
Roundup Original	4L	Monsanto	1.0 qt (32 oz)
Roundup Custom	4L	Monsanto	1.0 qt (32 oz)
Roundup Ultra Max	5L	Monsanto	0.8 qt (25.6 oz)
Roundup D-Pak	6.7L	Monsanto	0.63 qt (20 oz)
Touchdown	4L	Syngenta	1.0 qt (32 oz)
Touchdown	5L	Syngenta	0.8 qt (25.6 oz)
Glyphomax	4L	Dow AgroScience	1.0 qt (32 oz)
Glyphomax Plus	4L	Dow AgroScience	1.0 qt (32 oz)
Glyfos Original	4L	Cheminova	1.0 qt (32 oz)
Glyfos X-tra	4L	Cheminova	1.0 qt (32 oz)
Glyphosate Herbicide	4L	DuPont	1.0 qt (32 oz)
Rattler	4L	Helena	1.0 qt (32 oz)
Glyphosate Original	4L	Griffin	1.0 qt (32 oz)

*This list may be incomplete due to label changes. Surfactant must be added to Roundup D-Pak at 0.25-0.50% volume/volume.

Ditchbank Weed Control

Problem weeds such as johnsongrass, itchgrass, bermudagrass, Equisetum (horsetail/poppingweed) and Rubus species (briars) should be controlled on ditchbanks. This will aid in field drainage, prevent weed infestation into adjacent sugarcane fields and reduce weed populations that serve as alternate hosts or "storage sites" for insects, diseases and other sugarcane pests, which may subsequently infest sugarcane fields. These recommendations are for non-irrigation, drainage ditch use only. **DO NOT** apply herbicides to a ditch when water is present unless explicitly permitted by the most-restrictive label.

Rate/Acre Active Ingredient Broadcast	Rate/Acre Formulated Material Broadcast	Weeds Controlled (see table "Weed Control With Sugarcane Herbicides" for specific control values)	Remarks
MSMA 4.0 lb/A	Bueno 6.0 2.68 qt	Johnsongrass and itchgrass Will not control bermudagrass	Apply and repeat as necessary. If nonionic surfactant is not present in the formulation, add nonionic surfactant at 0.25% volume/volume. If the objective of ditchbank weed control is to encourage bermudagrass growth for ditchbank stabilization, application of MSMA alone would be an excellent choice.
glyphosate 1.0 – 5.0 lb/A	Roundup Ultra, Glyphomax Plus, Touchdown, many others (4L formulations) 1.0 to 5.0 qt OR Roundup Ultra MAX (5L formulation) 0.8 to 4.0 qt	Johnsongrass, itchgrass, and other weeds Weak on bermudagrass and briars at low rates	Johnsongrass, itchgrass and most other weeds controlled at 1.0 to 2.0 qt/A. Bermudagrass and briar control at 2.0 qt/A is weak. Label states bermudagrass control at 3.0 to 5.0 qt/A of the glyphosate 4L formulation. Karmex/Direx 5.0 lb ai/A (see diuron information below) can increase initial control and provide extended control of many annual weeds. Ensure spray solution covers foliage and reaches the soil. Residual effect will be improved if soil in the ditch is moist at application. DO NOT ALLOW HERBICIDE TO CONTACT ROOTS OF DESIRABLE PLANTS.
diuron 2.0 to 15.0 lb/A	Direx 4L 5.0 - 15.0 qt OR Karmex DF, Direx 80DF 6.25 - 18.75 lb	Many annual weeds	Preemergence, residual control of many annual weeds. Apply prior to weed growth; however, addition of nonionic surfactant will increase contact activity on small, emerged weeds no more than 3 inches tall. To adequately cover soil and foliage, apply in a carrier volume of least 25 gallons per acre. Herbicide activity will be improved if soil in the ditch is moist at application. DO NOT ALLOW HERBICIDE TO CONTACT ROOTS OF DESIRABLE PLANTS.
pendimethalin 2.5 – 3.3 lb/A	Prowl 3.3 EC 3.0 – 4.0 qt	Seedling johnsongrass, itchgrass, other annual grasses	Apply in a minimum of 20 gallons per acre prior to weed emergence; will NOT control emerged weeds. May tankmix with other labeled herbicides to control emerged weeds or to enhance residual activity.

Rate/Acre Active Ingredient Broadcast	Rate/Acre Formulated Material Broadcast	Weeds Controlled (see table "Weed Control With Sugarcane Herbicides" for specific control values)	Remarks
triclopyr 2.0 – 3.0 lb/A	Garlon 4 2.0 – 3.0 qt + nonionic surfactant at 1.0 – 2.0 qt	Poppingweed, briars, 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 0.75 qt + 1.0 to 2.0 qt nonionic surfactant. Apply in a spray volume of 40 to 60 gallons per acre to thoroughly soak all stems and plant crowns at the soil line.
2,4-D 2.0 lb/A + triclopyr 1.0 lb/A	Crossbow 4.0 qt + nonionic surfactant at 0.25% volume/volume	Poppingweed, briars, woody species	Best control obtained when applied to young poppingweed, less than 2 years old. For control of briars and smaller diameter woody species, apply at 1.0 to 1.5% volume/volume and add 0.25% volume/volume nonionic surfactant. Apply in a spray volume of 40 to 60 gallons per acre to thoroughly soak all stems and plant crowns at the soil line.
hexazinone 0.50 lb/A + diuron 2.0 lb ai/A	Velpar L 1.0 qt + Direx 4L 2.0 qt + 0.25% volume/volume nonionic surfactant OR 1.0% volume/volume crop oil concentrate	Most ditch bank weeds including poppingweed (timing may be important) Very weak on rhizome johnsongrass and curly dock, some bermudagrass activity	USE ONLY ON SPLIT DITCHES. DO NOT USE ON OUT-FLOW DITCHES OR DITCHES NOT DIRECTLY BETWEEN TWO CANE FIELDS. Very slow activity on poppingweed. Inclusion of 2.0 qt Glyphomax Plus OR 2.67 qt Bueno 6 has increased rhizome johnsongrass and curly dock control. USE WITH CAUTION: hexazinone (Velpar) is EXTREMELY water-soluble and may move down the ditch.

Estimated Weed Control With Sugarcane Herbicides

The values listed are estimates of the degree of weed control that can be expected with a specific herbicide at recommended rates. Many factors such as herbicide rate, soil texture, moisture, temperature and the extent to which the herbicide spray covers the weeds will affect the results obtained. These estimates are derived from research and field experience. This information should help in developing the most effective weed control program for your farm. Preemergence estimates are for 28 to 35 DAT (days after treatment) and postemergence estimates are for 14 to 21 DAT.

Control ratings: Weed control evaluations are on a scale from 0 to 10 with 0 = no control and 10 = complete or 100% control.

	seedling johnsongrass	rhizome johnsongrass	itchgrass (Raoulgrass)	bermudagrass	browntop panicum	annual grasses	morningglories (tie-vines)	other broadleaf weeds	nutsedge	winter grasses**	winter broadleaf weeds***
Fallowed Fields											
Glyphosate Herbicides	9	8	9	7	9	9	7	8	6	-	-
Atrazine	3	0	3	0	4	7-8	8	8	5	-	-
Sencor	8-9	0	3	5-6	7-8	9	8	8-9	8	-	-
Prowl/Pendimax	8	6-7*	8	6-7*	8-9	9	2	2	3*	-	-
Planted Fields											
Preemergence											
Sinbar	8-9	0	2	6-7	3	9	7	7	7	6	5
Sencor	8-9	0	2	5-6	7-8	9	8-9	9	7	7	8
Treflan/others (incorporated)	9	5	9	7-8	9	9	2	2	7	8	2
Prowl/Pendimax	8-9	5*	8	2	8-9	9	2	2	3	6	2
Atrazine	3	0	2	0	4	7-8	7-8	8	5	7-8	9
Karmex/Direx	7	0	5	1	6	8	6-7	7	2	7-8	8
Postemergence											
Sempra	0	0	0	0	0	0	0	2	8-9	-	-
2,4-D	0	0	0	0	0	0	8	8	3	0	8
Weedmaster/Brash	0	0	0	0	0	0	9	9	3	0	9
Atrazine	2	0	2	0	2	7	7	8	4	6	7-8
Karmex/Direx	6	2	5	0	5	8	7	8	3	6	8
Asulox/Asulam	8-9	7-8	7	2	8	9	0	0	0	5	0
Gramoxone Extra/Gramoxone Max/Boa	8	4	8	6	8	9	8	8	5	7-8	7-8
Glyphosate Herbicides (Hooded Application)	9	9	9	8	9	9	7	7	6	8-9	8-9

*Herbicide must be incorporated to obtain this level of control.

**Includes ryegrass, rescuegrass and timothy.

***Includes sowthistle and wild geranium.

Herbicide Recommendations for Heat-treated Sugarcane

Generally heat-treated cane and some early planted cane are lightly covered (2 inches of packed soil), with more soil added before winter. Since additional soil will be added, two herbicide applications will be needed.

The first treatment after planting should be one of the following herbicides: Sencor 4, Sencor DF, Sinbar 80W for Johnsongrass only and Treflan, Trifluralin, Trilin, Fri-4 or Prowl for johnsongrass and itchgrass. Do not incorporate Treflan, Trifluralin, Trilin or Tri-4 with only a 2-inch soil cover. For the second treatment, after additional soil is added, apply one of the following herbicides: Atrazine 80W, Atrazine/Aatrex 4L, Aatrex Nino-), Karmex DF or Direx 4L.

Section III

Sugarcane Fertilization

Sugarcane production is important to Louisiana, accounting for more than $700 million after first processing annually. Fertilizer and lime costs are two of the largest 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 tests. The following recommendations supercede Louisiana Cooperative Extension publication 2473, "Sugarcane Fertilization."

To maximize returns from your fertilizer dollar, 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? and (4) How and when should they 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. Intensive, thorough sampling is the only way to detect these variations and adjust fertilizer and lime rates accordingly.

Soil samples may be collected anytime before fertilizing or liming, but soon after harvest is recommended, if possible. Turn-around time in the soil testing laboratory is faster in the fall and early winter. 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 county agent.

Lime

Availability of most plant nutrients is usually 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 5.0. Root growth slows rapidly when soil solution levels of aluminum or manganese become toxic.

When the soil pH drops below 5.8 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 should always 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 in the fall or winter. Lime takes several months to reach its maximum effectiveness. Table 1 shows the results of a lime experiment conducted by LSU AgCenter personnel.

Table 1. Effect of lime on sugarcane yields.*

Treatment	Plant-Cane	First-Stubble	Second-Stubble	Plant-Cane	First-Stubble	Total Increase
	lbs sugar/A					
No Lime	6126	4431	4708	6372	5299	-----
Lime	6382	4702	5348	6720	5515	-----
Increase	+256	+271	+640	+348	+216	+1731

*Initial soil pH was 4.8. Soil pH after liming was 6.0. Lime applied one time previous to the first plant year.

Source: Golden, L.E., "Proceedings of 1972 Meetings of ASSCT," pp 45-48. Soil was Baldwin silty clay loam.

In this study, sugar yields were increased 1731 pounds per acre in a five-year period from a single lime application. Yield increases were still being obtained after the five-year study was terminated. If lime is needed, it is a very profitable investment.

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. For more information, read "Lime Use in Louisiana Soils," Louisiana Cooperative Extension Service Publication 2442. It is available at your county agent's office.

Nitrogen

Nitrogen Rates: Nitrogen 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), stand age (plant cane vs. stubble cane) and whether the cane stand is strong or weak. Table 2 shows the recommendations for nitrogen rates on sugarcane in Louisiana.

Table 2. Recommended nitrogen rates for sugarcane in LA.*

Soil Type	Cane Stand	Plant-cane	Stubble-cane
		lbs N/A	
Light	Strong	80-100	120-140
Light	Weak	60-80	100-120
Heavy	Strong	100-120	140-160
Heavy	Weak	80-100	120-140

*Applying more than 120 lb N/A to LCP 85-384 to first-stubble cane may actually result in lower economic returns.

Nitrogen Placement: Nitrogen fertilizer can be applied to either row top or off bar. No difference in yield has been shown with regards to row placement (Table 3).

Table 3. Effects of urea N-rates and placement on acreage yields for LCP 85-384 sugarcane across four crop years.

N-rate (lbs/A)	Method of Application	Sugar Yield (lbs Sugar/A)
0	-----	9160
120	On row top	11990
120	In off-bar	11960

Source: Hallmark et al, Sugarcane Research Annual Progress Report. 1999. Pp. 151-156.

Nitrogen Timing: The recommended time for nitrogen application is April 1 -April 30, but nitrogen applications made in May yield almost as well as those made in April. Nitrogen applied earlier than April 1 has the potential to be lost to leaching and denitrification and can stimulate early weed growth. Table 4 shows the research results conducted by LSU Agricultural Center scientists on nitrogen timing on sugarcane.

Table 4. Effect of nitrogen timing on sugar yield.

Application Date	Sugar Yield (lbs sugar/A)
Mid February	4743
Mid March	4865
Mid April	5217
Mid May	5154

Split Applications of Nitrogen: Split applications of nitrogen may be beneficial under certain situations. These include high tonnage cane free of weeds and with weather conditions which 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. Table 5 shows research data conducted by LSU AgCenter scientists on split application of nitrogen on sugarcane.

Table 5. Effect of split application of N on sugar yields.*

Soil Type	N Source	All Early April	Split
		lbs sugar/A	
Mhoon sil	Urea	5970	5828
Iberia c	Urea	6253	6330
Iberia c	Urea	5608	6041
Mhoon sil	Urea	3189	3157
Mhoon sicl	Urea	3873	4336
Iberia c	Urea	4039	4088
Iberia c	Ammonium Nitrate	3661	3981
Average		4656	4823

Notice that split applications did not always increase yields, but in some instances gave good yield increases. Weather circumstances which tend to favor split applications of nitrogen are heavy rainfall between the first nitrogen application and lay-by.

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 decision(s) on nitrogen sources on price, service, convenience and personal preference.

Phosphorus and Potassium

Phosphorus (P) and potassium (K) are used by sugarcane in fairly large quantities. Potassium is used in particularly large quantities. Phosphorus is expressed in fertilizer analyses and for our purposes in speaking of nutrient removal as the phosphate (P_2O_5) equivalent. Potassium is expressed as the potash (K_2O) equivalent.

Phosphorus (P): Phosphorus is critical in 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. This is because of 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 lbs per ton of cane. Of this, about half is in the millable stalk and is removed from the field, and about half is in the tops, trash, stubble and roots and returned to the soil in decomposition.

Base phosphate fertilizer rates on soil test results. Phosphate is recommended according to soil test levels of P and age of cane stand. These recommendations are based on research conducted by LSU AgCenter scientists. Table 6 shows the phosphate fertilizer recommendations from the Louisiana Cooperative Extension Service for sugarcane. Although a suggested rate is shown for situations when soil tests are not available, soil testing is strongly encouraged. Using a general fertilizer rate instead of one based on soil tests can waste money or reduce yields.

Table 6. Recommended phosphate rates for sugarcane in Louisiana.

Soil Test	Plant cane	Stubble cane
	lbs P_2O_5 per acre	
Very Low	50	60
Low	45	50
Medium	40	40
High	0	0
Very High	0	0
No Soil Test Available	0	20-40

Phosphorus availability in the soil is largely controlled by soil pH. When the soil pH is highly acidic (pH < 5.8), phosphorus becomes tied up in insoluble compounds with iron and aluminum. When the soil pH is alkaline (pH > 7.0), phosphorus becomes tied up in insoluble compounds with calcium. Phosphorus is most available to plants when the soil pH is 6.0-7.0.

Phosphorus fertilizers attach strongly to the soil particles. In Louisiana soils, phosphorus losses to leaching are almost non-existent. 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 P level. Do not broadcast phosphate if the soil pH is below 5.0 or above 7.5. If soil test levels of P are low or very low, band applications should be made to increase the efficiency of the phosphate fertilizer. On soils with a pH of 6.0-7.0 and testing medium in P, broadcast application of phosphorus will probably 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 K. Potassium deficiency inhibits the ability of the plant 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 lbs. of potash (K_2O) per ton of cane produced. Of this amount, about 2.9 lbs. are contained in the millable stalk and removed from the field. The remaining 3.8 lbs. of potash are contained in the tops, trash, stubble and roots and are returned to the soil in decomposition.

Base potash fertilizer rates on soil test results. Potash is recommended according to soil test levels of K and age of cane stand. These recommendations are based on research conducted by LSU AgCenter scientists. Table 7 shows the potash fertilizer recommendations for sugarcane from the 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 7. Recommended potash rates for sugarcane in Louisiana.

Soil Test	Plant cane	Stubble cane
	lbs K_2O per acre	
Very Low	50	60
Low	45	50
Medium	40	40
High	0	0
Very High	0	0
No Soil Test Available	0	20-40

Sugarcane rarely shows yield increases to potash rates over 100 pounds per acre. 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 build-up 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 semi-banding 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 which regulate plant growth.

Yield increases to applied sulfur fertilizers on sugarcane have been observed in Louisiana under certain situations. The main situations under which a yield increase to sulfur fertilizer may be expected include: (1) stubble cane is more likely to respond to S fertilization than plant cane and (2) sugarcane grown on fine-textured soils (clays) is more likely to respond to S fertilization than sugarcane grown on coarse-textured soils (sandy loams and silt loams).

The data in Table 8 were collected on sulfur fertilization of sugarcane with a sulfate source. The data were collected on stubble cane. Based on this research, the Louisiana Cooperative Extension Service recommends the use of 24 lbs. of S annually on stubble cane grown on medium heavy and heavy soils.

Table 8. Yield increases caused by fertilizer S applied to stubble cane grown on medium-fine and fine-textured soils.*

Soil Texture	No. of Tests	Yield Increase Due to S (lbs sugar/A)
medium - fine (sicl)	19	302
fine (c)	8	529

*Source: Golden, L.E., "Some relationships of Soil, Fertilizer, and Leaf-Blade Sulphur to Sugarcane Yields in Louisiana," Louisiana Agricultural Experiment Station Bulletin 723, 1979.

If an economical source can be obtained, gypsum (calcium sulfate) can be substituted for sulfur fertilizer in areas where sulfur responses are expected. The data in Table 8 show the results of applying 1 ton of gypsum in the fallow year and its effects on the following cropping cycle.

Table 9. Average yield increases from sugarcane where gypsum treatment was 1 ton per acre on medium to fine-textured soils, 1975-83.*

Age Class of Cane	No. of Tests	Sugar Yield Increase Due to Gypsum (lbs sugar/A)
Plant-cane	7	281
1st - Stubble crop	6	556
2nd - Stubble crop	4	591
3rd - Stubble crop	1	813

*Source: Golden, L.E., "Report of Projects Department of Agronomy 1983," pp. 339-340

Based on these data, we recommend either 24 lbs. of sulfur per acre annually on stubble cane on medium-fine or fine-textured soils or 1 ton of gypsum in the fallow year under the same situations. Base your choice of sulfur or gypsum on price, availability and convenience.

Micronutrients

Generally speaking, micronutrient deficiencies are not common on sugarcane in Louisiana. Research by LSU AgCenter 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. However, we do not recommend applications of micronutrients unless a deficiency of a particular micronutrient has been confirmed by soil or tissue analysis.

Table 10 shows data from micronutrient experiments by LSU AgCenter researchers. The data do not indicate any yield increases from blanket micronutrient applications.

Table 10. Sugar yields as related to micronutrient treatment.*

Micronutrient	No. of Tests	Sugar Increase or Decrease Due to Micronutrient (lbs sugar/A)
Zinc	5	-170
Copper	3	-99
Boron	1	- 7

*Source: Golden, L.E., "Report of Projects Department of Agronomy 1983," pp. 339-340

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 or 45-45-45 lbs/A of N-P_2O_5-K_2O should be applied in the planting furrow before planting succession cane. In addition the normal recommended N, P_2O_5 and K_2O 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: Because of recent research at the St. Gabriel Research Station by Dr. Ray Ricaud, we suggest that a starter fertilizer be placed in-furrow when planting either succession planted cane or cane planted behind a fallow year. Yield responses have been noted in both plant and stubble cane crops from the one-time in-furrow application. For planting after a fallow year, the most consistent yield response has been noted with a 15-45-45 per acre (N, P_2O_5, K_2O) applied in-furrow. Some yield response has been seen with a 45-45-45 per acre (N, P_2O_5, K_2O) applied in-furrow (Table 11). These yield responses would be quite profitable for a fertilizer application which costs $20 to $25 per acre.

The spring fertilization application should be based on soil test results and be made in addition to the starter fertilization in the fall. At this time, we do not suggest subtracting the starter fertilizer amounts from the spring application.

Table 11. Yield response (lbs sugar/A) to starter fertilizer on cane planted after a fallow year, St. Gabriel, Louisiana.*

		Fall Fertilizer Rates (lb/A of N, P_2O_5, K_2O				
Year	Cycle	0-0-0	15-45-45	45-45-45	90-90-90	LSD 0.05
		lbs sugar/A				
1991	Plant-cane crop	5110	5727	5420	5444	522
1992	First-stubble crop	5998	7136	6971	5724	599
1993	Second-stubble crop	6889	7964	7075	6361	649
	3 yr. average	5999	6942	6489	5843	
1994	Plant-cane crop	7517	7855	7820	7515	336

*Data are for CP 70-321 grown at the St. Gabriel Research Station. From Ricaud and Arceneaux, "Reports of Projects from 1991-94," Department of Agronomy, LSU AgCenter.

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 miracle products. You'll harvest better yields and make more profit if you do.

Section IV

Pest Management of Sugarcane Insects

Sugarcane Borer

This stalk borer is the most destructive insect attacking the Louisiana sugarcane crop. Losses in sugar yields may range from 0% to 75% or more and average 20% annually in fields where season-long infestations are not kept below the economic threshold level. The sugarcane borer is responsible for more than 95% of the insect problems encountered by Louisiana sugarcane farmers. It is the only insect found in sugarcane fields that still requires insecticide applications each year to avoid crop loss.

A system of pest management allows the sugarcane farmer to get the highest yield possible with the least amount of insecticide contamination in the environment. Pest management takes full advantage of arthropod predators, varietal resistance, cultural practices and adverse weather conditions to control sugarcane borer populations. In pest management, insecticide treatments are used only when needed to avoid economic injury to the crop and not on fixed application schedules. Pest management requires weekly surveys in individual fields from mid-June to mid-September. Make insecticide applications only after internodes are visible above soil surface and when 5% of the stalks contain small larvae in the leafsheaths.

The recommendations that follow supercede Louisiana Cooperative Extension Service publication 1982, “Pest Management of Sugarcane Insects.”

Arthropod Predators

Fire ants, spiders, ground beetles and earwigs are valuable natural control agents, especially in the spring and early summer when sugarcane borer populations are usually lowest. These beneficial arthropods should be protected from the detrimental effects of insecticides or harmful cultural practices whenever possible. If the following practices are followed, predators and parasites can survive and reduce pest populations by as much as 25%.

1. Do not apply insecticide for control of first generation sugarcane borer infestations which occur in the spring. Crop injury from this generation is of no economic importance.
2. Do not apply more than recommended rates of insecticides. This will cause unnecessary reduction in predator populations and could create greater problems with fish kills and environmental pollution.
3. Cease insecticide applications as early as possible to prevent a reduction in overwintering predator populations.

Varietal Resistance

Some varieties of sugarcane withstand sugarcane borer attack better than others. The following commercial varieties are ranked in order of their response to attack.

Table 1. Relative Susceptibility to Borer Injury.*

Resistance Category	Variety
Resistant	CP 70-321
	HoCP 85-845
Susceptible	LCP 85-384
	HoCP 91-555

*Note: HoCP 85-845 merits strong consideration where there is high borer pressure and environmentally sensitive areas (adjacent to schools, homes, major aquatic areas, etc.).

Plant each variety in as large an acreage block as possible; this helps the scouting program and cuts down on the treatment of resistant varieties when mixed with susceptible varieties. Plant resistant or moderately resistant varieties wherever appropriate. This will greatly reduce the number of insecticide applications needed to control damaging infestations. Use of resistant or moderately resistant varieties in a region tends to reduce areawide populations and supplies about 25% of the suppressive effect annually to control the sugarcane borer.

Cultural Practices

These farming practices can reduce sugarcane borer infestations and damage.

1. Plant noninfested seed cane to improve crop stands. Sugarcane borer larvae in seed cane can destroy 20% or more of the vegetative buds (eyes).
2. Plant corn as far as possible from sugarcane. This reduces mid-summer moth migration from senescing corn fields to sugarcane. A dominance of susceptible sugarcane varieties and corn in an area greatly enhances borer problems.
3. Plow out old stubble as quickly as possible after final harvest to reduce the number of overwintering larvae.

Insecticide Control

Insecticide applications are recommended only when the sugarcane borer is attacking millable internodes and only for control of infestations that exceed the economic threshold level of 5% stalks infested with live larvae in the leafsheaths. When weekly surveys show that these conditions exist in specific fields, use an insecticide application to reduce borer populations below the threshold of crop injury. Do not repeat applications until weekly surveys show that the infestation has again reached a level of 5%. Only the following insecticide formulations are recommended for sugarcane borer control in Louisiana. When you get ready to use an insecticide, check with your county agent to see if there are additional new or temporary labels (section 18) which may also be appropriate to consider for commercial use.

Table 2. Insecticide for Control of the Sugarcane Borer.

Formulation	Amt. of active ingredient/A (lbs/A)	Total amt. of finished formulation/A
Asana XL .66EC	.033	2 gals (6.4 ozs Asana + Water)
Baythroid 2EC	.033	2 gals (2.1 ozs Baythroid + Water)
Confirm 2F*	.12	2 gals (8 ozs + 1/4% CL-7 + Water)

Sprays should not be applied if conditions favor runoff, during rain, during temperature inversions or when wind exceeds 10 mph.

* Confirm does not control non-lepidopterous insects.

Application of Insecticides

Tests conducted by AgCenter researchers indicate that insecticides applied by ground equipment or aircraft will control sugarcane insects. For best results, the equipment must be in good condition, properly calibrated and operated by a skilled, conscientious operator. Applications cannot be made to saturated soils under conditions that favor runoff or in the rain.

Ground Application: A spray boom with nozzles placed on 20-inch centers will be required for adequate coverage. Nozzle placement should be checked and adjusted as required in the field to assure thorough coverage of the target area. Spray pressure, ground speed and nozzle size should be matched to apply a finished spray rate in accordance with label recommendations. Mixing and calibration are very critical at low finished spray rates. Clean water, properly sized line filters and nozzle strainers must be used to ensure proper insecticide application. Filters and strainers must be serviced frequently to minimize nozzle plugging.

Aerial Application: Select an experienced aerial applicator with a proven record of protecting the environment and providing good sugarcane insect control. Establish and maintain clear channels of communication among the grower, consultant and aerial applicator throughout the growing season. This will ensure timely application of effective insecticides at the required rates. Effective communication supplemented by a detailed field identification system or aerial photographs is essential when spot-treating selected fields.

Remove trees, abandoned buildings and other obstructions within the field or along the field perimeter. Give applicators additional insecticide to allow thorough treatment of row ends and field areas adjacent to trees, power lines and other obstructions.

Finished spray rates and aircraft swath widths should be clearly established before contracting for aerial application. Higher finished spray rates and reduced swath widths may cost slightly more. However, the superior insect control resulting from better, more uniform coverage should offset this extra cost.

Based on a spray boom height of 8 to 12 feet above the crop, the following swath widths are recommended for sugarcane insect control.

Table 3. Recommended Aircraft Swath Widths.

Aircraft	Wing Span	Recommended Swath Widths (Feet)
Air Tractor 301, 400	45’5"	60-65
Air Tractor 401, 402	49’1"	65-70
Air Tractor 502	50’0"	65-70
Ag. Cat A	39’1"	45-50
Ag. Cat B	42’3"	50-55
Cessna	41’8"	50-55
Thrush 600	44’5"	55-60
Thrush	47’6"	60-70

Sugarcane insecticides can be applied with fixed or rotary-wing aircraft. When flying at a normal speed, coverage from either type of aircraft will be about equal. In most cases, coverage will be more uniform if a rotary-wing aircraft is used. Coverage can be slightly improved by reducing the speed of a helicopter. However, the improvement in insect control, if any, will probably not offset the increased application cost.

Buffer zones of 75 feet have been implemented for aerial applications on sugarcane near reservoirs, rivers, permanent streams, marshes or ponds, canals, estuaries and commercial fish farm ponds.

Water-based sprays will provide good insect control when applied at a finished spray rate of two gallons per acre (GPA). Insecticides applied at this rate will provide consistent control over a wide range of atmospheric conditions. Aerial applications must be discontinued if wind velocity exceeds 10 mph. As wind velocity increases, the uniformity of coverage and the amount of insecticide reaching the target area are reduced. In addition, drift to non-target areas such as streams, lakes and gardens increases as wind velocity increases.

Be careful in the selection of spray adjuvants. The insecticide manufacturers’ recommendations should be carefully considered. In addition, the influence spray adjuvants have on drift to non-target areas, evaporation, deposition, pH, phytotoxicity and insect control should also be considered.

Research has shown that small spray drops tend to drift off target and evaporate. Larger spray drops will reduce drift and evaporation. The following spray nozzles are suggested to minimize drift and evaporation and still assure adequate deposition and coverage.

Table 4. Suggested Spray Nozzles for Sugarcane Insect Control.

Air Speed (Miles/Hour)	Finished Spray Rate 2 Gal/A (GPA)	Finished Spray Rate 5 Gal/A (GPA)
90-110	D8-45 D6-46 or 56	D12-45 D8-46 or 56
105-125	D6-46 or 56 D8-46 or 56 CP-.078" 30 degree deflector	D8-46 or 56 D10-46 or 56 CP-.125"- 30 degree deflector
120-140	D6 or D8 Jet CP-.078" or 125"- 30 degree deflector	D8, D10 or D12 Jet CP-.125"- 30 degree deflector

In accordance with Louisiana Department of Agriculture and Forestry regulations, all spray nozzles must be orientated to discharge straight back toward the rear of the aircraft. Spray pressure must not exceed 40 PSI, and the spray boom length must not exceed 75% of the length of the aircraft wing on which it is mounted.

Follow insecticide label recommendations at all times. Misuse of insecticides can cause reduced levels of pest control, as well as increased kill of beneficials.

Note: Whenever treatable sugarcane borer and tie vine infestations occur in the same fields during late summer, insecticides and 2, 4-D can be applied (5 GPA) in the same airplane or ground sprayer (10 to 15 GPA) tank mix unless otherwise stated on the label. This saves the cost of an additional application.

pH Control

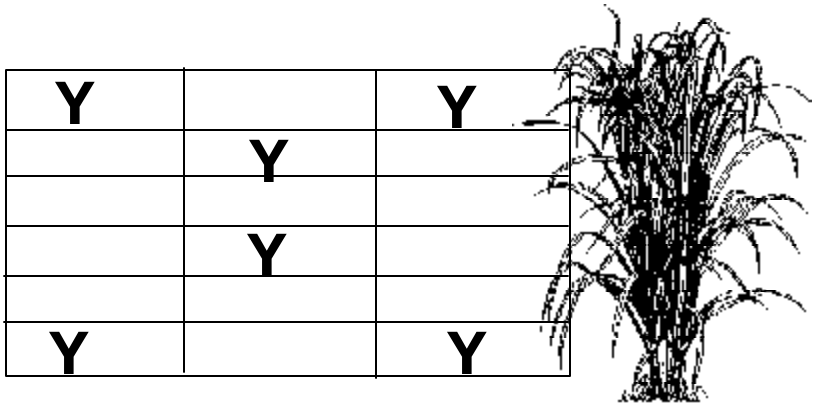
pH is the hydrogen ion concentration in water. If the water pH is in the alkaline range (above 7.0), it can cause alkaline hydrolysis of insecticides, particularly those which are organophosphates or carbamates. The higher the alkalinity (pH) of water, the more rapidly these chemicals lose effectiveness. pH can be corrected by using buffers. Several are on the market, and they are about equal in effectiveness. To adjust the pH, check the water with some type of metering system. The optimum pH is between 5.5 and 6.0. Add buffer (start with 2 oz/50 gals), recheck after mixing and add more buffer (1-2 oz at a time) as needed. The pH is affected by what is dissolved in the water and, depending on what's in the water, more or less of the buffer than the recommended amount on the label may be required. Asana is more adaptable to a greater range in pH, and buffering is usually not required.

Field Survey

Use the following procedure to determine the need for applying insecticides to control the sugarcane borer.

1. Partition the total crop acreage into individual survey units of 60 to 100 acres each. Give as much consideration as possible to arranging survey units composed of one variety, planted the same year, since infestation levels may vary greatly among different varieties and ratoons.
2. Begin weekly surveys about June 15 when small second generation larvae start to attack sugarcane, but do not treat any acreage regardless of level of infestation until internodes are visible above ground.
3. Make infestation counts in six locations in each survey unit. Cuts selected for examination should be reasonably well distributed throughout the survey unit. They can be located diagonally across the field with about the same distance between counts, or some other system of selecting can be used providing there is reasonably uniform distribution of counts within the survey unit (see grid). Change sample sites each week to reduce sampling error.
4. For each count, examine 50 randomly selected stalks at least one step apart on each of five or more rows. At least 300 stalks should be examined in each survey unit.
5. Examine each stalk selected in a count for leaf sheath discolorations or leaf feeding signs. When a stalk exhibits either of these, remove the first three to four open leafsheaths under the whorl and check leafsheaths and the exposed internodes for the presence of small live larvae which have not bored into the stalk. When an average of five stalks per 100 examined are found to contain small live larvae, treat the cane within that survey unit.
6. Continue surveys in the same manner until September 15. Retreat only when 5% of the stalks are infested again.

This method takes a lot of time and effort, but it has advantages. It provides a continuous survey of sugarcane borer infestations at the same time they are capable of damaging millable internodes, so there is no need for applying insecticide on fixed application schedules. This survey method also quickly detects poor insecticide control caused by improper timing, weak formulations, insecticide resistant sugarcane borer populations or weather factors. It permits you to treat only the sections that need treatment. It also considers the suppressive effects of beneficial insects and/or weather since the survey counts are based on the presence of live larvae and not on superficial feeding signs left by larvae that may have subsequently been destroyed by predators, dry weather or heavy rainfall.



Grid: A survey unit of 18 cuts showing counts made randomly in six locations through the field.

Minor Insects

The following insects are found in Louisiana sugarcane fields, and they may occasionally injure the sugarcane crop. However, their attacks are infrequent, sporadic and often associated with crop conditions that can be corrected without applying insecticides. Even though the following insects are described as minor pests, it is recognized that for growers that have these pests, significant yield loss is a possibility.

Sugarcane Beetles: Spring infestations of sugarcane beetle adults usually occur in sugarcane fields that contain large amounts of decaying stubbles, seed pieces or dense grass that have been turned under during plowing.

This beetle is a member of the family Dynastidae, whose larvae develop and thrive on decayed organic matter in the soil. The adult beetles are attracted to rotting organic matter, where they mate, deposit their eggs and destroy (dead heart) young cane tillers by feeding on the growing point below ground. Beetle damage invariably occurs in fields where cane has been damaged by water logging, freezing or plant pathogens that cause rotting of seed pieces and stubbles. Correct these conditions, and you will eliminate sugarcane beetle infestations.

Wireworms: Wireworm infestations in established cane fields are most often associated with light (sandy) soils heavily infested with weeds, particularly grass. Good weed control practices and fallow plowing will control wireworms by depriving larvae of food needed for development.

White Grubs: None of the white grubs (Phyllophaga spp.) found in Louisiana feed specifically on sugarcane roots. They feed and develop mostly on grass or grain crop roots. Maintaining sugarcane fields as grass-free as possible will prevent establishment of most damaging white grub populations.

Soil Insect Control at Planting Time

Growers should be ever mindful of practices they can use to decrease the possibility of soil insect damage.

Only two crop conditions require use of a soil insecticide in Louisiana sugarcane fields and usually only in sandy soils. These are:

(a) When pasture, turf or grass-infested land is brought into cane production for the first time or after being out of cane production for several years. There are usually enough grubs or wireworms already established in this type of land to warrant a preventive application of insecticide at cane planting time. However, a soil insecticide application may not be needed with the second plant-cane crop if the field has been kept reasonably free of grass during the ratoon crops.

(b) When cane fields are extremely grassy, particularly when cane is planted in a field that was not kept free of heavy grass infestation when fallow. Ongoing wireworm and white grub infestations will persist in grassy fields. Again, this may be needed only on light or mixed soils.

Growers with fields similar to those described should consider control measures for soil insects at planting time and base chemical control on verification of soil insect pest infestations (with fermented corn baits). Based on new research data, the economic threshold is slightly above one wireworm per bait sample before planting. Soil insecticides have had a suppressive effect on beneficial predators in sugarcane studies. Table 5 lists insecticides recommended for control of soil insects. County agents have more information on soil insects and control.

Table 5. Insecticide Recommendations for Control of Soil Insects.

Formulation	Total Amount of Finished Formulations/Acre	
Thimet 20G	7-10 lbs/A	Apply in-furrow directly over planted cane in a 12-inch band and cover with soil.
Mocap 20G	7-10 lbs/A	
Furadan 4F	1 lb (1 qt.)	

The key to successful management of most soil insect problems in Louisiana sugarcane fields is to plant healthy seed cane in well-drained land that is free of weeds and kept weed-free as much as possible during the ratoon crops.

Sooty Mold Producing Insects

Since the mid 1980s, the following insect pests in the order Homoptera have been observed more frequently in sugarcane fields. Although several have the ability to transmit important disease, the primary concern has been production of honeydew and an increased prevalence of sooty mold with the yellowing or early senescence of leaves. Also, because two of these pests are recent discoveries in Louisiana, the changing insecticide use patterns have at times been associated with these pest concerns.

Sugarcane Aphids, yellow-*Sipha flava* (Forbes), white-*Melanaphis sacchari* (Zehntner): Infestations of the yellow sugarcane aphid exist at low levels on most Louisiana sugarcane fields. They are normally maintained below the crop economic injury level by parasite and predators, especially ladybird beetles. Another aphid, sometimes called the white sugarcane aphid, was first observed in 1999 in Louisiana.

West Indian Canefly, *Saccharosydne saccharivora* (West wood): Infestations are sporadic and usually at low levels. They are usually maintained by borer sprays and by some parasite, predators and fungi. Injury in the field is similar to that observed with yellow sugarcane aphids, yellowing foliage and sooty mold.

Sugarcane Delphacid, *Perkinsiella saccaricida* Kirkaldy: This pest has been found in low numbers in several parishes. The potential problem is its capability of spreading the Fiji disease virus, which is damaging to sugarcane in some parts of the world.

Cottony Grass Scale, *Pulvinaria elongata* Newstead: Soft scale, primarily a grass feeder and heavily parasitized by a small wasp, also causes sooty mold and yellowing of leaves.

Pink Sugarcane Mealybug, *Saccharicoccus sacchari* (Cockerell): The sugarcane mealybug is found in most Louisiana sugarcane fields. These low level infestations are maintained below the injury level by predators and parasites. Some species of mealybugs are major sugarcane pests in certain parts of the world, but they are not now in Louisiana.

Other Occasional Pests

Armyworms: Very seldom are armyworm infestations treated with insecticides. Armyworms are invariably associated with grassy conditions early in the season in sugarcane fields. The moths lay eggs on grass, and the larvae feed on the foliage, helping to keep down the grass. In a few heavily infested fields, after the grass food source is exhausted, the remaining larvae will attempt to complete development by feeding on sugarcane leaves, but this seldom causes economic injury. Bird predation of armyworm infestations in sugarcane fields is frequent, and entomophagous disease, parasites and predators

often destroy infestations. All insecticides applied for sugarcane borer control suppress armyworm infestations.

Precautions in the Use of Pesticides

Improper use of pesticides can be harmful to humans, animals and the environment. Use them only when needed for pest control, and handle them with care. Follow the directions, and heed all precautions on the label.

Keep insecticides in closed, well-labeled containers in a dry place. Store them where they will not contaminate food or feed, and where children and animals cannot reach them. Promptly dispose of empty insecticide containers; do not use them for any other purpose. When handling an insecticide, follow label precautions for clothing and cleanup. Additional precautions include: avoid inhaling insecticide dusts or mists; avoid spilling an insecticide on the skin; and keep it away from the eyes, nose and mouth. If you spill any on your skin or clothing, remove contaminated garments immediately and wash the skin thoroughly with soap and water. Launder clothing before wearing it again. If an insecticide gets in your eyes, flush with plenty of water for five minutes and get medical attention.

Avoid drift of insecticide to nearby dwellings, gardens, wildlife habitats, bee colonies, crops or livestock. Do not apply insecticides under conditions favoring drift from the area to be treated.

Many insecticides are highly toxic to fish and aquatic animals. Keep insecticides out of all water sources such as ponds, streams and wells. Do not clean sprayers or dump excess spray material near such water.



Section V

Sugarcane Ripener Recommendations

POLADO-L is the only formulation of the sugarcane ripener glyphosate labeled for use in Louisiana. When using POLADO-L remember that it is a violation of federal law to use it in any manner inconsistent with the labeling. Therefore, before using, read the entire label. POLADO-L can be applied to all ratoon crops and can be applied in five or more gallons of water per acre. Generally, better response occurs with 10 or more gallons of spray mixture per acre but good responses occur at lower rates. *Please note that it is not labeled for use on plant cane.* Growers considering the use of POLADO-L should also read the following recommendations for best response.

1. **Rate:** Although the label states that 4 to 14 ounces per acre of product can be used, it is recommended that the following rates be considered:

   Apply POLADO-L at 6 to 10 ounces per acre to all varieties. Use the higher rate within the recommended range when treating high tonnage sugarcane of CP 70-321and HoCP 85-845, especially in the last stubble crop. Apply 8 ounces to the last stubble crop of LCP 85-384 and HoCP 91-555. Apply 6 ounces to all other stubble crops of LCP 85-384 and 8 ounces to all other stubble crops of CP 70-321, HoCP 85-845 and HoCP 91-555.

2. **Varietal Response:** The 8-ounce rate has given excellent responses for most varieties; however, LCP 85-384 appears more sensitive to glyphosate and the use of this rate may delay shoot emergence in the spring of the subsequent stubble crop. It is therefore recommended that no more than 6 ounces be used on LCP 85-384. Further, it appears that best response for CP 70-321 and HoCP 85-845 is obtained with the 10-ounce rate, particularly in the last stubble crop. The average response for several varieties at Houma for the 2000 harvest are shown in Table 1.

3. **Relative Tolerance:** New data have shown that varieties differ in their relative tolerance to annual glyphosate treatments (Table 2). Glyphosate was applied at 8 ounces per acre sequentially in the first- (plant-cane) and second- (first-stubble) year crops and harvested at 30-33 days after treatment. CP 70-321 and CP 79-318 appeared most tolerant with the greatest annual increase in yield of sugar per acre while LCP 85-384 and LHo 83-153 were least tolerant with the lowest annual increase to the annual applications of glyphosate. Although response to glyphosate in terms of the increase in yield of sugar per ton was similar to previous studies, it appeared that the annual applications at the 8-ounce rate had a negative impact on cane yield in the subsequent stubble crops. For this reason, it is now recommended that the 6-ounce rate be considered when treating LCP 85-384.

Table 1. Role of POLADO-L in increasing sugar yield of cane for the 2000 harvest year at Houma, La.

Variety	Increase/Decrease Sugar/ton (lb.)
CP 70-321	+ 9
CP 72-370	+21
LHo 83-153	+46
LCP 85-384	+36
HoCP 85-845	+12
HoCP 91-555	+22

* Harvested at 7 weeks (49 days) after application using 8-ounce rate.

Table 2. Relative tolerance to glyphosate treatment based on increases in the yield of sugar per acre[1,2].

Variety	Annual increase in yield of sugar per acre %
CP 70-321	14.2
CP 79-318	13.0
CP 72-370	8.4
HoCP 85-845	7.3
LCP 85-384	3.2
LHo 83-153	2.9

[1]Glyphosate applied at 8-ounces sequentially in first- (plant-cane) and second- (first-stubble) year crops and harvested at 30-33 days after treatment.

[2]Millhollon & Legendre, Sugar Cane, 2000.

4. **Treatment - Harvest Interval:** Please note that the label states that all cane should be harvested within 49 days of treatment. It appears that optimal response in yield of sugar per ton occurs at 35 to 49 days after treatment for all varieties; however, delaying the harvest beyond 49 days from treatment at the 8-ounces or more rate may result in a loss of sugar per acre due to a reduction in cane tonnage even though sugar per ton may actually be increased. Further, suppression of regrowth in the subsequent stubble crops may occur if treated fields are harvested beyond 49 days of treatment.
5. **Condition of the Crop:** POLADO-L should be applied to actively growing cane, free of disease (especially RSD), for maximum response in sugar per ton and per acre. Prior research has shown that the response is lessened when POLADO-L is applied to diseased cane or cane under any type of stress, particularly drought induced stress. For drought stressed cane, it may be beneficial to delay application until several days after receiving adequate rainfall to allow for resumption of growth.
6. **Use of Surfactant:** The use of a surfactant with POLADO-L is optional; however, response can be improved with the use of surfactants under various circumstances. The effectiveness of the ripener may be reduced if rainfall occurs within 6 hours of application.
7. **Use of Buffer:** The use of a buffer solution is generally not recommended so long as the spray mixture is applied immediately after mixing.
8. **Uniform Application:** To avoid streaking or over-lapped applications, use appropriate marking devices. However, regardless of the care taken in application, streaking often occurs.
9. **Lodged Cane:** If cane is severely lodged, allow sufficient time (usually 5-7 days) for the cane to erect itself before making application. Optimal response can occur only with total canopy coverage.
10. **Spray Drift:** Avoid spray drift to non-targeted fields and especially fields intended for use for seed purposes. Seed cane treated with glyphosate will not germinate or grow properly, especially if treated for more than 7-10 days. Consider the use of a drift control agent where applicable.
11. **Topping Treated Cane:** Top treated cane properly. Although topping above the last expanded internode (hard joint) will usually increase overall yield of sugar per acre, the tops will cause processing difficulties and increase the likelihood of polysaccharide, dextran, starch and ash in the raw sugar. However, if cane is too short for proper topping, it is still recommended that glyphosate be used to improve overall sugar yield.
12. **Field Burning:** POLADO-L has been shown to improve field burning of cane leaves and weeds, thus reducing trash and "fiber" and improving milling quality.

13. **Harvestability:** POLADO-L has been shown to improve the harvestability of lodged and/or brittle cane and is recommended for either whole stalk or combine harvesting systems whether harvested green or burned.
14. POLADO-L is a registered trademark of Monsanto Company.

Days to Harvest for POLADO Application
September Harvest

Date of Application		Date of Harvest September 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
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	25	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
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	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
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
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	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

Days to Harvest For POLADO Application
October Harvest

Date of Application		Date of Harvest October																													
		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
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Sept.	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
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	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
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	
	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	18	17	18	19	

Days to Harvest For POLADO Application

November Harvest

Date of Application		Date of Harvest November																												
		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
Sept.	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
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
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
	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
	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
	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
	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
	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
	7								1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	8									1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
	9										1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	10											1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	11												1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	12													1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	13														1	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

Section VI

Sugarcane Harvesting Recommendations Including Post-freeze Resistance of Varieties

To maximize the yield of sugar per acre, always strive to deliver **clean, fresh cane** to the mill for processing. It is recommended that all stubble cane be treated with POLADO-L at the recommended rate to increase the yield of recoverable sugar per ton and per acre. **Further, 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 is generally less than the growth rate in the plant-cane crop. Delaying the harvest of the plant-cane crop will generally mean an increase in yield of cane per acre during the harvest season.

Maturity Classification

Maturity studies designed to measure relative changes in juice quality of commercial varieties are conducted 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 October 1 (CP 70-370);

Early – varieties with acceptable yield of commercially recoverable sugar per ton of cane on or about October 15 (CP 70-321, CP 79-318, LCP 85-384*, HoCP 85-845, HoCP 91-555); and,

Mid-Season – varieties with acceptable commercially recoverable sugar on or about November 1 (LHo 83-153).

* CP 79-318 and LCP 85-384 are actually classified as early or mid-season depending on the year.

POLADO-L is an effective management tool to advance the maturity curve of all varieties listed above in the stubble crop; however, the rate of increase is dependent upon 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 POLADO-L at the recommended rate and proper treatment-harvest interval, is 21%. Growers are suggested to follow the recommendations for the use of POLADO-L in the publication " Sugarcane Ripener Recommendations for 2001." (See Section V of this handbook).

Post-freeze Classification

Varieties harvested after December 1 are generally vulnerable to a damaging freeze (25°F) with freezing temperatures lasting for 6-10 hours or more. However, regardless of the crop year, all varieties should be harvested after a freeze of this magnitude according to stalk cold tolerance or resistance to deterioration following a killing freeze. 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 (CP 70-321, LHo 83-153);

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 (LCP 85-384 and HoCP 85-845); and,

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 (CP 72-370, CP 79-318 and HoCP 91-555).

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