SUGAR CANE

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SUGAR CANE VARIETY UPDATE 2005

by M. Bennett-Easy

Mr M Bennett-Easy

A number of new sugar cane varieties have been in circulation for some time now. Some are in nurseries developed under the CFC (Common Fund for Commodities) project on various farmers' holding across the country. These are varieties tested and observed by SIRI at different locations over several years and are now regarded as truly adapted and suitable for official release. Nonetheless, the final proof is in the eating and so farmers' own evaluation and feedback are always invaluable.

The varieties being promoted for commercial use are BJ8532, BJ8534 and J9501. These have the potential to increase sugar yield and profitability. However, as always, results depend on the degree of care and good agronomic practices employed in farm production. Growers are therefore encouraged to apply all recommended inputs and practices starting with use of suitable seed cane to ensure good germination and field establishment.

It is always prudent to broaden the variety base on farms as an insurance against unforeseen circumstances such as disease and pest outbreaks. It is also well established that, at the time when they are released, newer varieties are usually more productive than the older ones and therefore have the capability, to achieve higher yields, thereby increasing profitability. In this period of contemplation of a move away from a sugar industry to a new *sugar cane* industry, in which the full potential of the sugar cane plant will be exploited to produce a range of products, it is of particular importance to have as wide a range of varieties as possible. Some might confer advantages to new processes being considered.

BJ8532

Parentage: BJ73405 x B73785

BJ8532 is recognized by persistent trashy brownish grey stalks and narrow pale green leaves. It is a promising recent selection that is being recommended for extensive planting. The variety bears slight resemblance to BJ82119 but stalks and leaves are smaller.

BRIEF BOTANICAL DESCRIPTION

Stalks: The stalks have a slightly zigzag profile and are usually of medium thickness. Internodes are medium in length. Young internodes have a well-defined wax covering and wax ring. The basic stalk color is brownish-grey but young internodes are usually light brown in appearance. There are no internode cracks or bud grooves. Root band, growth ring and leaf scar are broad but not swollen.

Buds: The buds are round and inserted between the leaf scar and growth ring.

Leaves: Leaves are erect, light green in color, of medium length and narrow blades. The leaf sheath is smooth with light sheath wax and greenish red on mature stalks.

Arrows: Rarely arrows

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Sugar Cane Variety Update 2005

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AGRICULTURAL FEATURES

Germination: Germination is usually reliable with good early growth even from older sections of stalks.

Tillering: Tillering is rapid and profuse giving good early growth, thereby enabling good ground cover to be quickly achieved. Stalks are dense, fairly upright, non-brittle with clinging trash. Few late tillers have been observed.

Growth Pattern: Steady growth in absence of flowering over twelve months. The variety has not been productive as stand-over cane in the irrigated area.

Habit: Erect at first but semi-recumbent in heavy crops at maturity.

Trashing: Persistent trash but not very difficult to remove.

Flowering: It is so far non-flowering (in Jamaica).

Ratooning: Appears to be a fairly good ratooner.

Quality: The juice quality is above average throughout the season. Fibre content is moderate.

Adaptability: Adapted to a wide range of soils in the rain-fed and irrigated areas.

Disease Reaction: BJ8532 is resistant to rust and moderately resistant to smut in screening trials. The development of smut has not been observed in nurseries or commercial fields. It is moderately susceptible to ring spot and brown stripe diseases.

Recommended: The variety is recommended for use on light to medium soils, with adequate water supply, in the irrigated plains and high rainfall areas. BJ8532, however, should not be planted in fields coming out of smut-infected BJ8226. It is always a good practice to examine nurseries and stool - rogue for smut if necessary.

BJ8534

Parentage: BJ3405 x BJ3785

The main distinguishing features of BJ8534 are its semi-erect posture, greyish-purple trash free stalks with long internodes and absence of hairs.

BRIEF BOTANICAL FEATURES

Stalks: The stalks of BJ8534 are semi-erect and medium in length and thickness. The colour of the stalks is greyish-purple. The internodes are cylindrical with thick wax covering and well-defined wax ring. The young internodes are light greyish purple but gradually becoming greyish purple with age. Internode cracks and bud grooves are absent. The root band is not well defined but root initials are cream in colour and conspicuous. Growth ring is greenish to purple, becoming darker with age and slightly raised.

Buds: The buds are inserted between the growth ring and leaf scar. The bud is round, large and slightly bulging with prominent bud wings.

Leaves: The leaf blade is of medium length and width. The blade is fairly erect, drooping only at the tip. Auricle is not visible. The leaf sheath is pale green in colour and smooth.

Arrows: This character has not been observed in Jamaica.

AGRICULTURAL FEATURES

Germination: Germination is fairly good, but planting material and conditions must be good.

Tillering: Tillering is quite rapid and reliable. Elongation is faster than in BJ8532 with few or no late suckers. The erect leaf profile provides poor early weed cover.

Growth Pattern: The variety grows quite rapidly, especially in response to adequate rainfall or irrigation supply.

Habit: It may lodge when yields exceed 90 tonnes cane per hectare. Light crop remains erect.

Trashing: The variety is trash free.

Flowering: It is a non-flowering variety (Jamaica)

Ratooning: Appears to have good ratooning ability.

Quality: The juice quality is better than BJ8532 and BJ82119.

Fibre content: Moderate

Adaptability: Suitable for well-drained soils in irrigated and high rainfall areas

Disease Reactions: It is resistant to smut but moderately susceptible to ring spot and brown spot diseases.

Recommended: BJ8534 is recommended for clay loam and well-drained clay soils in the irrigated and high rainfall areas. The variety is well suited for reaping with mechanical harvesters.

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Sugar Cane Burning and Persistent Organic Pollutants (POPs)

By Elaine Manning

Mrs Elaine Manning

Apart from the usual soot and smoke nuisance, as well as distress to persons with respiratory problems, the burning of sugar cane has tended not to be regarded as an issue of major concern. Nonetheless, green cane harvesting has always been seen as preferable for conserving soil moisture and maintaining soil fertility. Now it turns out, there is much more to cane burning than meets the eye. Burning produces substances called POPs (persistent organic pollutants) such as certain "dioxins" and "furans," which have much more severe consequences in the environment.

What are POPs?

POPs are organic pollutants that persist in nature. They include various substances, which are mainly industrial chemicals like PCBs (polychlorinated bi-phenyls), products of burning such as dioxins, and pesticides like DDT. These remain in the environment for very, very long times, are usually quite toxic and accumulate in the food chain. They form as unwanted by-products of not just sugar cane burning but processes such as waste incineration, coal burning, cigarette smoking, bush fires etc. The Environmental Protection Agency (EPA) of America considers "uncontrolled combustion," including open burning of household trash, agricultural burning and landfill fires, to account for an estimated 57% of total dioxin releases.

What Problems Do POPs Cause?

POPs such as dioxins and furans are stable, persistent compounds that are believed to have a half-life of seven to twenty years in the human body, that is, it takes any time between 7 and 20 years for the quantity of dioxin present to decrease to half its original concentration. Once taken in they attach themselves to body fat and accumulate over time. POPs also magnify, which means that their concentration increases in animals at the top of the food chain. They are semi-volatile, so they can stay on the ground for many years and then are transported hundreds of miles away, get deposited in another place until they end up in animals and humans.

Dioxins are dangerous poisons with the potential to produce a wide range of adverse effects in humans. Dioxins interfere with the central nervous system, the immune system, and the reproductive system, with the potential of preventing normal growth and development of the young. They are even believed to be linked to various types of cancer.

How Does Cane Burning Contribute to POPS?

The sugar cane plant does not naturally produce dioxin. However when the sugar cane or other plant containing cellulose is burnt, furans are produced. These chemical compounds will combine with chlorine atoms (derived from the reaction of chlorofluorocarbons, or CFCs, with ozone) which are present in the atmosphere, to form dioxins.

Reducing POPs in Cane Harvesting

Jamaica is one of 151 signatories to the Stockholm Convention which seeks to restrict and ultimately eliminate the production, use, release and storage of POPs. Dioxins and furans are two of the twelve POPs that are initially being targeted under the convention.

In Jamaica, the burning of garbage, hospital waste and sugar cane fields are considered the three major sources of dioxins and furans.

Pic. Courtesy Dept. of the Environment and Heritage, Australia

Sugar Cane Burning and POPs

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Table 1. Action plan for phasing out cane burning in Jamaica

Action/Goals	Lead & other Agencies	Completion Date	Success indicators or Milestone
Establish policy for complete phasing out of sugar cane burning and achieving 100 % green cane harvesting (GCH)	**SIRI, SIA, SPF**	**Dec 2006**	**Policy (based on detailed socio-economic study developed by sugar industry groups)**
Conduct detailed economic analysis of moving towards full introduction of GCH	**SIRI, SIA, SPF, Min of Agriculture**	**Dec 2006**	**Costs of alternatives**
Develop implementation Plan for GCH	**SIRI, SIA, SPF, Min of Agriculture**	**Jun 2006**	**Documented plan**
Implement Plan		**2007 – 2010**	
Increase GCH to 100% over 5 years	**SIRI, SIA, SPF**	**Dec 2010**	**Area of GCH each year**

In order to fulfill our obligation under the Convention, the National Environment and Planning Agency (NEPA), has developed a draft National Implementation Plan for the POPs. This plan includes recommendations on policies, and specific action plans for the various sectors including the sugar cane industry. The plan aims to significantly reduce or eliminate cane burning and ultimately return to 100% green cane harvesting over a certain time frame as set out in Table 1.

The Next Steps

The Sugar Industry Research Institute as the technical arm of the SIA will actively consult with NEPA and will work with sugar cane stakeholders to promote achievement of industry goals. The first step will be to initiate development of a policy on green cane harvesting for the industry. A return to green cane harvesting (GCH) will not be easy. The challenges are well known.

Green Cane Harvesting

GCH was part and parcel of the new technology, introduced during the sixties, facilitating mechanical loading, and which largely marked the end of manual loading of cane into haulage vehicles. This will not be reversed. To do GCH today would probably require fully mechanised (chopper) harvesting as workers are unavailable or unwilling to handle un-burnt cane at affordable rates. The challenges are well recognised:

1. Output of both manual and mechanical operations are slowed in GCH
2. Certain sections of the Industry may not benefit, in a normal year, from GCH
3. Large scale GCH would necessitate an increase in labour force and perhaps investment in transport equipment
4. A return to GCH will result in increased cost at a time when the Industry desperately needs to reduce costs

Nevertheless, environmental pressures now override all those considerations. There is no longer a choice as to whether or not we cease burning. We are now expected to phase out cane burning completely over a five year period beginning in 2006.

GCH however offers certain opportunities. Fields will be better able to withstand recurring severe drought. Soil fertility and farm productivity should increase while the nuisance of smoke and soot would be reduced and we all (and especially the sick and elderly) enjoy fresher, cleaner and healthier air on a year round basis.

Green cane harvesting avoids releasing of atmospheric pollutants, mulches and adds organic matter to soil

FARMERS STEP UP TO MODERN IRRIGATION

By Trevor Falloon and Lancelot White

Major changes bringing cane farmers into the 21st Century are occurring in the irrigated belt. A group of 18 growers in the Content region of Clarendon have formed themselves into the Content Pivot Group and are benefiting from a centre pivot covering 60.08 hectares (some 148 acres). Five other small farms in Clarendon and three in St Catherine totalling 23 hectares (roughly 57 acres) are also being wet by drip irrigation.

CFC PROJECT

These methods of water application represent the latest in irrigation technology. The scheme is part of a project funded by the Common Fund for Commodities (CFC), an agency of the United Nations headquartered in Amsterdam. Under this project, selected farmers also benefit from having nurseries of the latest varieties established on their farms to provide a ready supply of good quality cane seed to growers within their areas. Some farmers also participate in evaluating these recently released varieties on their own farm plots. Several demonstration plots showing best practices from planting to harvesting and ratoon maintenance have been established across the industry and growers are taken to field days wherever matters of interest are being highlighted. The issue of yield decline is being addressed by crop rotation on some farms. A study of various farm modules is being done to determine which combinations of inputs are more profitable in various settings. Finally, the results of all this will be made available to cane growers locally and abroad.

CENTRE PIVOT IRRIGATION

Work started on the centre pivot project in 2004. In selecting the site the main objectives were to find a relatively flat zone with a convenient and reliable water source and a land surface free of impediments such as public roads, farm houses, utility poles major gullies, orchards, forests etc. The Content area met all those conditions. Water was available from the National Irrigation Council (NIC) canal. There was a cluster of farmers engaged primarily in cane production. No public roads or utility poles crossed the area.

Farmers in the area selected were called to a meeting and told of the prospects. They would be upgraded from the traditional wasteful furrow irrigation to the modern efficient centre pivot sprinkler system. Another meeting was called to form them into a Water User Group that would manage their affairs. A Chairman, Secretary and Treasurer were selected

Group of farmers gathered for launch of CFC centre pivot irrigation project, Content Clarendon

CFC project: Centre pivot assembled, Content, Clarendon

and plans made to open a bank account in the Group's name. Members also volunteered to be specially trained to operate the pivot.

SUSTAINABILITY

Funds used by the CFC to replant or cultivate fields for the growers involved would be collected as an interest-free loan, repayable over three years, and lodged to the Group's bank account to serve exclusively as a start up reserve fund for operating and maintaining the system. The group would also agree to the withdrawal of a fee from cane sales from the area covered by the pivot. This fee, estimated to cover the cost of electricity and water charges, would also be lodged to the account so that after the formal end of the CFC project the scheme would be self-sustaining. The Group would, from time to time, review the accounts to determine whether this fee needed to be increased or decreased, depending on actual cost of operation.

IMPLEMENTATION

Installation of the pivot was beset by a series of problems resulting in delays. For instance, half way through construction in 2004 the machine had to be dismantled and taken back to the warehouse for safe storage during the passage of hurricane Ivan. Nonetheless assembly was essentially complete by the end of the year. Cane growers from the project area are registered at the Monymusk factory. Delays in start up of that factory in 2005 meant the land could not be cleared for a proper inspection of the path to be traversed by the pivot wheels to determine points requiring installation of culverts, bridges etc. By the time that inspection was done the rainy season intervened and the normally dry month of July saw the passage off the coast of two hurricanes making the area too soggy for movement of the machine. The first test run was eventually carried out in August and the system has since been in operation with ongoing minor adjustments.

CFC drip irrigation plot: land prepared, drip tubes inserted and connected to main control box (right), Lakes Pen, St Catherine

Growers have now taken control of the system and are continuing efforts to improve the standard of agriculture to take full advantage of benefits of efficient irrigation.

DRIP IRRIGATION

In 2005, a new phase of irrigation projects was started with the contract being awarded for installation of drip irrigation systems on small plots on eight farmers' holdings. Farms selected had to have adequately pressurised, reliable water source, and an existing hydrant. The growers would have to show a commitment to cane farming and have a track record of following recommendations from SIRI.

INSTALLATION

Wet weather during the implementation phase caused an adjustment to the planned sequence of operations. Land should have been prepared and tubes installed prior to planting. However, with fields wet and inaccessible to machinery following land preparation, the decision was taken to plant the canes and insert the tubes after sufficient drying out had occurred. The growers inserted dibbled tops, for the most part, on either side of each bank. Results were not always most satisfactory but there was considerable saving of time by planting before tube insertion.

By September, most of the eight fields were fully established in canes and tubes

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CFC, drip irrigation plot, 2 months after planting (sorrel at field edge) Lakes Pen, St Catherine

Farmers Step up to Modern Irrigation...

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were laid. Earlier planted fields showed good establishment and cane was growing vigorously.

Drip tubes were buried to protect them against damage during cultivation and harvesting. Each tube was laid between two rows of cane, 18 inches apart, atop each bank so that a denser stand of cane would result. Distance between banks was the normal 5'6." Growers were provided seed cane of newer recommended varieties.

RESPONSIBILITY

Growers participating in these projects have the weighty responsibility of demonstrating that, given the best technology, they too can produce cane profitably. Their successful performance under this project will send a signal to other growers that cane farming can be viable in the new sugar cane industry being developed. What is more, their performance will be keenly followed across the world by cane growers who face challenges similar to those confronting the Jamaican grower. Indeed, results of this project will be disseminated to other cane producing countries which are members of the CFC.

ACKNOWLEDGEMENTS

Selection of growers for these ventures has been the job of the SIRI Extension officers, James Fearon, Delroy Golding and Monroe Curtis serving the areas of Clarendon and Lower St Catherine. This project is being executed in an atmosphere of great uncertainty about the future of sugar. Extension officers often go beyond just persuading the grower to participate but assist him to carry out recommended agronomic practices and convince him to keep faith even in the face of delays. Commendation must also be given to SIRI officers Lloyd Pinnock and Keith Grant who, working tirelessly, were largely instrumental in site preparation and laying drip irrigation tubes to plan at the various locations. Accessing the newer varieties for establishing the various plots would not have been possible without the assistance of Malcolm Easy and his team of variety specialists. All in all, this has been a tremendous team effort by the SIRI staff including many unnamed in the fields of agronomy, weed control, nutrition, mechanical engineering etc – but this marks only the beginning. The ongoing challenge is to see this project through to fruition. Ultimately, the measure of success will be whether growers' productivity is boosted sufficiently to ensure farm viability.

Sugar Cane Variety Update 2005...

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J9501

Parentage: Eros x BJ84124

There are no outstanding distinguishing characteristics to make easy identification of this variety. It has thick stems and clean polished appearance. This is a promising newly released variety that is being propagated extensively, throughout the industry to meet planting requirements. The variety has achieved importance in the irrigated and high rainfall areas because of its erect growing habit and potential to attain high levels of productivity.

BRIEF BOTANICAL FEATURES

Stalks: The stalk is erect with little tendency to lodge. The internodes are medium in length and thickness and cylindrical. The young internodes are pale green in colour becoming greyish - green as they age with medium wax covering and well-developed wax ring. Light black microbial deposit is quite visible on stalks in the rain-fed areas. Bud grooves are present and growth ring and root band are well defined. The root initials are quite conspicuous.

Buds: The buds are inserted just above the leaf scar and extending slightly above the growth ring. The buds are ovate to round with bulge and small bud wings. There are no auricles.

Leaves: The leaf blades are medium to large, wider than leaf sheath at junction, becoming wider upwards to widest point about half way along length, thereafter tapering gradually towards the tip. Blades are erect at base but soon forming a broad arch and drooping at the tip. The leaf sheath is smooth with medium sheath wax.

Arrows: Not available for evaluation.

AGRICULTURAL FEATURES

Germination: Germination is rapid and reliable.

Tillering: Rapid and reliable with early formation of large stools and good leaf coverage.

Growth Pattern: Early growth is quite vigorous with fairly rapid elongation thereby providing good cover against weeds.

Habit: The variety is generally erect but heavy crop may lodge in the high rainfall area.

Trashing: The trash is self shedding or easily stripped.

Handling: The variety is fairly soft, thick canes are easy to harvest unless heavy tonnages are lodged.

Flowering: Non flowering (Jamaica)

Ratooning: Very reliable except under dry condition.

Quality: The juice quality is good during early part of crop but may deteriorate late in cropping season. The fibre content is moderate.

Adaptability: J9501 is suited to well-drained soils, in the high rainfall and irrigated areas, where establishment can be relied upon and where growth rate can be maintained.

Disease Reactions: The variety is resistant to smut and rust but prone to minor leaf diseases such as ring spot and brown spot.

Recommended: J9501 is recommended for clay loam and well-drained clay soils in the irrigated and high rainfall areas.

TIPS FOR SAVING FUEL ON THE FARM

By Kenrick Chandon and Luis Agra

Diesel prices have risen sharply over the past few months. These price increases, amounting to some 50% over the last year, have resulting in higher operating costs for all farm machinery including tractors, combined harvesters, and loaders. Farming must continue, despite this added burden, and so the following tips are provided so that growers may minimize the actual cost of conducting essential farm operations.

Tractor

1. Train operators in the proper operation of farm tractors and equipment
2. To decrease the fuel consumed, first match the tractor to the load or operation. Operating tractor in lower gear at higher engine revolutions (throttle) increases fuel consumption (and greatly increases the wear on the drive train components). Where possible, operate in higher gears and lower throttle setting to conserve fuel.
3. Never use a large, high horsepower tractor to pull small or light loads if a smaller tractor is available. With diesel prices at J$50/litre, fuel cost for a 60-80 Hp tractor doing field work, is estimated at $800 per hour, while fuel for a 80-100 Hp tractor costs $1021 per hour and for a 100-120 Hp tractor the cost is approximately $1227 per hour. In this example, fuel consumption at maximum power was used.
4. Shut off diesel engines rather than allow idling for long periods.
5. Avoid unnecessary trips back to the service area from the field. Train operators to service tractors each day prior to starting work or at the end of work. In transport (as against field work), a 60-80 Hp tractor will consume 20 litres per hour costing $1000 per hour at $50/litre.
6. Fill fuel tanks in the morning. This avoids refuelling trips to the service area or trips from a service truck.
7. Eliminate all non-essential machinery operations.

Tyres

1. Keep tyres inflated to recommended pressure.
2. Tractors need to be ballasted appropriately. Check tractor owner's manual for tyre distribution and inflation pressure. Insufficient ballast can cause excessive wheel slip and increase fuel consumption
3. Check drive tyres for excessive wear. Worn tyres can cause wheel slip from poor traction and increased fuel consumption.

Tillage

1. Tillage uses more fuel per hectare than almost any other operation. Reduced tillage should be considered where conditions are suitable (that is, on light to medium soils).
2. Avoid working in wet fields. This will result in extra tillage, extra power and use of more fuel to break compaction.
3. Reduce the number of passes by combining operations where possible. Equipment can be modified to do inter-row cultivation while fertilizing or combine spring tines or chiselling tools with moulding discs.
4. Check tool setting and tighten bolts on tillage equipment to reduce downtime and unnecessary trips to the service area.

Maintenance

1. Proper maintenance must be done to farm tractors, harvesters, loaders, and other farm vehicles. Poor maintenance will result in higher fuel consumption.
2. Use oil of recommended viscosity to maximize engine efficiency. Oils that are too thick decrease power and lubrication and increase fuel consumption.
3. Change oil on the recommended schedule to remove contaminants that can reduce lubrication and increase friction between moving parts.
4. Clean fuel injectors if black smoke is seen from the exhaust. Fuel injector additive can be used in minor cleaning.
5. Replace dirty air cleaners which restrict airflow needed for the combustion process. Reduction in the air required for combustion result in excess fuel usage and less available power.

Other vehicles

Use more fuel-efficient vehicles for trips from field to service area. If you are considering buying a farm vehicle consider a diesel pick-up truck. Diesel fuel is cheaper per litre and diesel engines are more fuel efficient than their gasoline counterparts.

Reduced tillage eliminates several passages of machines and so saves fuel

Variety Recommendations - 2005

by M. Bennett-Easy

Cane-growing Area	Harvesting Period	Light Soils	Clay Loams	Clays
Westmoreland & Hanover	Early	BJ7355	BJ7452	BJ7465
		BJ7465	BJ7015	BJ7452
		BJ7015	BJ7355	BJ8252
		BJ7314	J9501	BJ7355
				BJ7015
	Middle	BJ7504	BJ7355	BJ7504
		BJ7015	BJ7627	BJ7015
		BJ7355	BJ7015	BJ7938
		BJ8532	BJ7938	BJ82119
		BJ8783	BJ82119	BJ7627
	Late	BJ7627	BJ7627	BJ82119
			BJ82119	BJ7627
Irrigated Clarendon & St. Catherine Plain	Early	BJ7465	BJ7015	BJ7465
		BJ7015	BJ7355	BJ8252
		BJ7355	BJ7627	BJ7355
		BJ7938	BJ82102	BJ82119
		BJ82102	BJ7465	BJ82102
		BJ7627	BJ8252	BJ8252
		BJ7262	J9501	UCW5465
				BJ7015
	Middle	BJ82119	BJ82119	BJ7504
		BJ7548	BJ7548	BJ7627
		BJ82102	BJ82102	BJ7548
		BJ7555	BJ8534	BJ82102
		BJ78100	BJ8783	BJ7355
			BJ78110	BJ8252
			BJ8252	
			J9501	
	Late	BJ7627	BJ7627	BJ7627
Upper St. Catherine & Upper Clarendon	Early	BJ7555	BJ7555	BJ7555
		BJ7015	BJ7015	BJ7465
		BJ7465	BJ82156	BJ7015
		BJ7314	BJ7314	BJ7314
		BJ82156	BJ7627	BJ7627
		BJ7627	BJ7504	BJ7504
	Middle	BJ7555	BJ7555	BJ7555
		BJ7465	BJ7015	BJ7462
		BJ82119	BJ82119	BJ82119
		BJ7262	BJ7262	BJ82156
		BJ82156	BJ82156	
		BJ8532	BJ8783	
			BJ8534	
			BJ8532	
			J9501	
	Late	BJ7627	BJ7627	BJ7627

Cane-growing Area	Harvesting Period	Light Soils	Clay Loams	Clays
St Thomas	Early	N/A	BJ7314	BJ7465
			BJ7355	BJ7355
			BJ7452	BJ7452
			BJ82156	BJ7627
			BJ7627	BJ7015
			J9501	
	Middle	BJ7355	BJ7627	BJ7627
		BJ82119	BJ7355	BJ7355
		BJ8207	BJ82119	BJ8207
		BJ82156	BJ7627	BJ7015
				BJ82119
	Late	BJ7627	BJ7627	BJ7627
		BJ82119	BJ82119	BJ82119
Trelawny, St. James & St. Ann	Early	BJ7465	BJ82156	BJ7465
		BJ82119	BJ7015	BJ82156
		BJ82156	BJ7504	BJ7504
		BJ7504	BJ7465	BJ7465
		BJ7465	BJ8252	
		BJ8252	BJ82102	
	Middle	BJ82119	BJ7627	BJ7627
		BJ7504	BJ82156	BJ7504
		BJ82156	BJ82119	BJ82156
		BJ8532	J9501	BJ7015
		BJ8534		
	Late	BJ7627	BJ7627	BJ7627
				BJ7015
St. Elizabeth	Early	BJ7015	BJ7015	BJ7015
		BJ7314	BJ82102	BJ82102
		BJ82102	BJ7465	BJ7465
		BJ7928	BJ7938	BJ7938
		BJ7355		
	Middle	BJ7252	BJ7627	BJ7627
		BJ82119	BJ7465	BJ7465
		BJ82102	BJ8252	BJ7938
		BJ7465	BJ8532	BJ8252
		BJ8252	BJ8534	
		BJ7627	BJ8783	
		BJ82156	J9501	
	Late	BJ7465	BJ7627	BJ7465
		BJ7627	BJ7465	BJ7627
		BJ7314	BJ7314	BJ7314

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