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SIRI'S LABORATORY RECEIVES INTERNATIONAL ACCREDITATION

By Dr. Maureen Wilson & Mrs. Althea Lawson

The Hon. Sharon Ffolkes-Abrahams, left, presents Accreditation Certificate to Mrs. Althea Lawson in the presence of representatives of the SIRI Lab, Mrs. Salina Campbell, Dr. Maureen Wilson, Mrs. Marvlyn Adams, Mrs. Yvette Bryan and Dr. Cliff Riley of JANAAC (second row)

The Central Laboratory of the Sugar Industry Research Institute in Mandeville is now officially regarded internationally as among the best in the World for carrying out sugar analyses. This stamp of approval came with the achievement of "ISO/IEC 17025" accreditation on May 28, 2013.

The process of accreditation is of necessity long, painstaking and extremely thorough since it involves "the independent evaluation of an organization to carry out specific activities against recognized standards to ensure their impartiality and competence". For the laboratory, the assessment process began with a pre-assessment visit by JANAAC in February 2012 and a full assessment in January 2013. Once the non-conformances cited by JANAAC were satisfactorily addressed, the Laboratory was awarded ISO/IEC 17025 accreditation and the award was presented on World Accreditation Day, June 11, 2013. Phases involved a documentation process and setting up a quality management system. After implementation this system had to be maintained for several years prior to applying for accreditation.

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DEAD HEARTS

by Trevor Falloon

Trevor Falloon

The term "dead heart" may sound like a description reserved for an unresponsive partner. Sugar cane growers however understand the term to mean that condition when the spindle or heart leaf of the cane withers and dies.

Death of the heart leaf is only the outward appearance of something gone wrong. The real location of damage is the growing point of the cane stalk, killed by some invader, resulting in the withering of leaves at the top of the cane.

CAUSES

Dead hearts may be the result of a number of causes. Any insect that bores into the stalk can produce a dead heart. However, two borers, namely jumping borer and the stalk borer, are the main causes in Jamaica. Generally, dead hearts occurring in the first six weeks of cane growth are caused primarily by the jumping borer (*Elasmopalpus lignosellus*). There is then a transition period when both jumping borer and the cane stalk borer (*Diatraea saccharalis*) may simultaneously occupy the field and do damage to sprouts. As the jumping borer field infestation declines, the stalk borer increasingly becomes responsible for dead hearts. Other insects such as the shot hole borer, weevil borer, wireworms, subterranean termites and even white grubs may occasionally cause damage to the growing point leading to the appearance of dead hearts.

Jumping Borer

Jumping borer moths typically are attracted to fields by the smell of burning cane. By the time the cane is cut and loaded jumping borer eggs are already

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Fig. 1: Dead heart caused by the stalk borer in sprouts

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Cane Growing Area	Harvesting Period	Light Soils	Clay Loams	Clays	Cane Growing Area	Harvesting Period	Light Soils	Clay Loams	Clays
		BJ7465	BJ7465	BJ7465			BJ7465	BJ7465	BJ7465
		BJ7015	BJ7015	BJ7015			BJ7938	BJ7938	BJ7938
		CR892023	CR892023	CR892023			BJ8783	BJ7452	BJ7452
		BJ7314	BJ7314	BJ7452			BT80311	BJ7627	BJ7627
	Early	BJ8783	BJ8783	BJ8783		Early	CR892023	BJ7314	BJ7314
		BJ82105	BJ82105	BJ82105				BJ82105	BJ82105
		BJ7938	BJ7938	BJ7938				CR892023	CR892023
		BJ7452	BJ7452					BJ8783	BJ8783
		BJ78100	BJ78100					BT80311	BT80311
Westmoreland		BJ7504	BJ7504	BJ7504	St. Thomas		BJ78100	BJ7627	BJ7627
&		BJ7015	BJ7015	BJ7015			BJ7938	BJ7938	BJ7938
Hanover		BJ7938	BJ7938	BJ7938			BJ82105	BJ82105	BJ82105
		BJ82119	BJ82119	BJ82119			BJ82119	BJ82119	BJ82119
	Middle	BJ7452	BJ7452	BJ7452		Middle	BJ8783	BJ8783	BJ8783
		BJ7465	BJ7465	BJ7465			BJ7504	BJ7504	BJ7504
		BJ82105	BJ82105	BJ82105			BT80311	BT80311	BT80311
		BJ8783	BJ8783	BJ8783				BJ78100	
		BJ78100	BJ78100	BJ78100					
		BJ7627	BJ7627	BJ7627			BJ7627	BJ7627	BJ7627
	Late	BJ82119	BJ82119	BJ82119		Late	BJ8783	BJ8783	BJ8783
		BJ8783	BJ8783	BJ8783			BJ7938	BJ7938	BJ7938
		BJ78100	BJ78100	BJ78100			BJ78100	BJ78100	
		BJ7465	BJ7465	BJ7465			BJ7465	BJ7465	BJ7465
		BJ7015	BJ7015	BJ7015			BJ82119	BJ82119	BJ82119
		BJ7938	BJ7938	BJ7938			BJ8783	BJ7504	BJ7504
		BJ82119	BJ82119	BJ82119			CR892023	CR892023	CR892023
	Early	BJ82102	BJ82102	BJ82102		Early	BJ78100	BJ78100	BJ8783
		BJ82105	BJ82105	BJ82105			BJ7938	BJ7938	BJ7938
		BT80311	BT80311	BT80311			BJ7015	BJ7015	BJ7015
		CR892023	CR892023	CR892023			BJ7548	BJ7548	BJ7548
Irrigated		BJ8783	BJ8783	BJ8783	Trelawny			BJ8783	
Clarendon &		BJ82119	BJ82119	BJ82119	St. James		BJ82119	BJ82119	BJ82119
St. Catherine		BJ7548	BJ7548	BJ7548	& St. Ann		BJ7938	BJ7504	BJ7504
Plain		BJ82102	BJ82102	BJ82102			BJ8783	BJ7465	BJ7465
	Middle	BJ78100	BJ78100	BJ7504		Middle	BJ7548	BJ7548	BJ7548
		BJ8783	BJ8783	BJ8783			BJ7627	BJ7627	BJ7627
			BJ7504				BJ78100	BJ78100	BJ8783
								BJ7938	BJ7938
								BJ8783	
		BJ7627	BJ7627	BJ7627			BJ7627	BJ7627	BJ7627
	Late	BJ8783	BJ8783	BJ8783		Late	BJ8783	BJ8783	BJ8783
		BJ78100	BJ78100				3BJ78100	BJ78100	BJ82119
							BJ82119	BJ82119	

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WHY APPLY SECONDARY AND MICRO-NUTRIENTS?

Clarence Fearon

by Clarence Fearon

The sugarcane grower often asks why are secondary and micro-nutrients not applied to the sugarcane crop routinely since these are required nutrients. This question now becomes even more relevant with certain fertilizer manufacturers now incorporating these nutrients in their popular blends – at an added price. The answer lies in the fact that although secondary and micro-nutrients are important for growth, the quantities required are relatively small compared to the major nutrients and the yield increase obtained when added are often not impressive and the economic returns questionable.

The sugarcane plant uses fifteen elements (nutrients) for growth and yields. These nutrients may be classified as major nutrients, secondary nutrients and micronutrients.

Major Nutrients

There are three major nutrients:

» Nitrogen (N)

» Phosphorus (P) and

» Potassium (K)

These are nutrients traditionally applied in fertilizer mixtures for growing sugarcane. Typically, a farmer puts on a blend of these major nutrients in what is referred to as an "NPK fertilizer dressing" such as 16-9-18 where all elements tend to be low in the soil or say 17-0-17 where analysis shows the soil already adequately supplied with phosphorus. Should the analysis show the soil having enough P and K then the grower may apply just a nitrogen fertilizer such as sulphate of ammonia or sometimes urea.

Secondary Nutrients

Another three elements are regarded as secondary nutrients:

» Calcium(Ca)

» Magnesium (Mg) and

» Sulphur (S)

These are nutrients used by the plant in smaller quantities than the major nutrients. Local soils are well supplied with calcium except for pockets of acidic soils which may be "limed" (that is calcium is applied to make the soil less acid). Calcium deficiency in Jamaican sugarcane is very rare because so many of our soils have a limestone base (and limestone is a source of calcium). Magnesium also tends to be adequate in most local soils except for pockets of acid soils which may be marginal in this nutrient. Sulphur is not found to be lacking as supplies are frequently replenished by our use of NPK mixtures or in applying sulphate of ammonia. Some sulphur also enters the soil in the form of sulphur dioxide in rainfall.

Micronutrients

There are seven micronutrients (sometimes called trace elements) which the plant uses in very small quantities:

» Zinc (Zn)

» Copper (Cu)

» Boron (B)

» Molybdenum (Mo)

» Manganese (Mn) and

» Iron (Fe)

» Chlorine (Cl)

Although required in only small quantities, these nutrients play important roles in plant growth and development. They may also easily become toxic to the plant if present in too high concentrations. Plants usually show some form of symptom, such as an odd leaf colouration, distorted leaf or stunting where a micronutrient is deficient or is in excess of a certain critical level in the soil.

Finally, three elements are obtained from water and air. Absence of these brings the most dramatic results for, as the saying goes, "water is life." Water and air are the sources of

» Carbon (C)

» Oxygen (O) and

» Hydrogen (H)

We know that all living things require oxygen. Plants breathe in oxygen through stomata on the leaves and even roots require an oxygen supply for healthy growth. This is assisted through tillage which increases air supply around the roots. Take away water, as occurs during a drought, and suddenly we are faced with a disastrous crop.

Are Jamaican Soils lacking in Secondary and Micronutrients?

This question has been investigated over many years. In the early 1950s when the local sugar industry was setting up field experiment to find the correct quantities and balance of nitrogen, phosphorus and potassium for growing canes, attention was also given to secondary and micro nutrients. These investigations have revealed pockets of secondary and micronutrient deficiencies based on foliar analyses. However, when followed by numerous formal field experiments in which these elements were applied as foliar sprays or as soil dressings no consistent meaningful yield increases have been obtained.

Recent Investigations

More recent investigations with secondary and micronutrients conducted in the 1990s on the major clays in the Wet West gave no statistically significant yield increases. Furthermore, the occasional readings of 3-5 tc/ha "increase" would

never have been sufficient to cover the added cost associated with applying the secondary and micronutrients.

With Efficient Irrigation

It has always been argued however that perhaps significant yield increases may not have been achieved because some other critical factor such as water supply may have been lacking. So with the introduction of the relatively efficient drip and centre pivot irrigation systems in recent years further attempts were made to seek yield increases through addition of secondary and micronutrients. Within the period 1980 to 2012 a total of 15 such experiments with added micronutrients were conducted.

Statistically significant yield increases were obtained in only two of those 15 experiments. Those two experiments however were on sites markedly deficient in micronutrients. These were peculiar light textured soils found only in certain areas of Trelawny. Magnesium, zinc and copper were applied via drip irrigation.

Micronutrient applications via centre pivot irrigation systems have so far given only disappointing results. Some treatments produced more lush looking foliage without any substantial yield increase.

Conclusions

The main soils planted to sugarcane in Jamaica are heavy clays. Based on experiments conducted, these soils are unlikely to produce significant yield increases with addition of secondary and micronutrients. A grower would be making an unwise decision in applying costly nutrients which contribute nothing to yields and profits.

Given the findings of SIRI experiments over the years, it would be totally unjustified to engage in the practice of routine application of secondary and micro-nutrients unless they are provided at no additional cost. SIRI's fertilizer recommendations to the industry, based on the results of numerous experiments, have never been for routine application of secondary or micronutrients (apart from the use of lime to correct soil acidity where required).

Timely application of adequate and balanced nitrogen, phosphorus and potassium (NPK) mixtures along with proper attention to other agronomic practices (weed control, irrigation and drainage in particular) will guarantee good yields. The addition of secondary and micronutrients is likely to make no difference. When a balance in major nutrients is achieved the canes are better able to extract micronutrients already present in small quantities in the soil. There are also residues of micronutrients in regular NPK mixtures which are available to the crop.

The interactions of nitrogen, phosphorus and potassium in fertilizer dressings support high yields as one nutrient enhances the role of the other. Growers should therefore never eliminate one element from his recommendation (using 17-0-17 instead of 16-9-18, for instance) just in order to cut costs. In the present climate of high costs, any additional input which does not contribute to yield must be viewed as wasted money. Growers are therefore urged to collaborate with SIRI to have new products tested for economic returns before committing to extra expenses ❀

Fig. 1: High yield achieved in Jamaican cane field by paying attention to basic agronomy – no commercial secondary nutrients or micronutrients applied

Fig. 2: Centre Pivot irrigation system – allows more efficient delivery of micronutrients in a field

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SIRI's Laboratory Receives International Accreditation

Continued from page 1

What is ISO?

» Sugar interests automatically associate "ISO" with the International Sugar Organisation. In this context ISO refers to the International Organisation for Standardisation, a global federation of national standard bodies, headquartered in Geneva, Switzerland. This multinational grouping formed in 1947 chose to use "ISO" as their symbol (instead of IOS).

» The ISO develops standards in response to sectors and stakeholders that express a clearly established global need for them.

What is IEC?

» The International Electrotechnical Commission, or IEC, is a non-governmental organisation that prepares and publishes international standards for all electrical, electronic and related technologies.

» International Standards are used in technical regulation of products, processes and services. They ensure that the purchaser of a product in global trade can be relatively confident about its safety, quality and technical compatibility regardless of origin.

The ISO/IEC 17025 therefore, is the standard for testing and calibrating laboratories. A laboratory must demonstrate that it operates a Quality System, is technically competent, and is able to generate technically valid results. The standards specify the general requirements for competence to carry out tests and/or calibrations including sampling.

Management Requirements cover: organization of the lab's activities, the management system in operation, its document control system, its review method for tenders and contracts, subcontracting of test and calibration, purchasing services and supplies, service to customers, complaints, control of non-conforming work, improvements, corrective actions, preventive actions, control of records, internal audits and management reviews.

Technical Requirements cover:personnel matters, accommodation and environmental conditions, test methods and method validation, equipment, measurement traceability, sampling, handling of test items quality assurance and results reporting.

The accreditation specifies the tests, the methods of analysis to be used and the operating range associated with the method.

What are the benefits of accreditation?

» Being accredited means that the competence of the testing laboratory is recognised internationally

» Accreditation signals that the laboratory has achieved certain benchmarks for performance

» Accreditation brings marketing advantages and international recognition to a laboratory

The SIRI laboratory routinely samples sugar produced by the six raw sugar factories currently operating in the local sugar industry as well as it samples on request raw sugar imported into the island from the world market. The analyses include tests for pol, moisture, reducing sugars, colour – whole raw and affined, dextran, ash, insoluble solids, starch and grain size.

Accreditation means that the results of sugar analyses obtained by the SIRI Laboratory should now be accepted worldwide. SIRI now therefore belongs to that group of global laboratories covered by the slogan "tested once, accepted everywhere." More importantly, accreditation helps to remove trade barriers and increase market access. For example, in the case of sugar, if it is manufactured to certain agreed specifications and thus achieves a measurable level of quality which can be maintained routinely, it cannot be barred by an importing country or entity on the basis that it does not satisfy the prescribed quality standard.

Accreditation is not granted on a permanent basis. Thus the Central Laboratory will be subject to yearly surveillance visits by JANAAC to ensure continuing compliance and conformance with the requirements of the accredited standard. After a period of four years, a complete reassessment of the laboratory's performance will be undertaken if accreditation is to be maintained.

The next stage in the continuing effort of the Laboratory's staff to upgrade their skills and enhance their competence is to seek accreditation for the soil and leaf analyses they undertake for the cane growing sector of the industry ❀

Left to right: Dr. Cliff Riley Ch. Accreditation Council (JANAAC) Mrs. Althea Lawson of SIRI Lab, The Hon. Sharon Ffolkes-Abrahams, Minister of State in the Ministry of Industry, Investment & Commerce, Sharon Mae Shirley (Environmental Solutions which lab was also accredited), and Dr Peter Unger from ILAC (International Laboratory Accreditation Cooperation)

Dead Hearts...

Continued from page 3

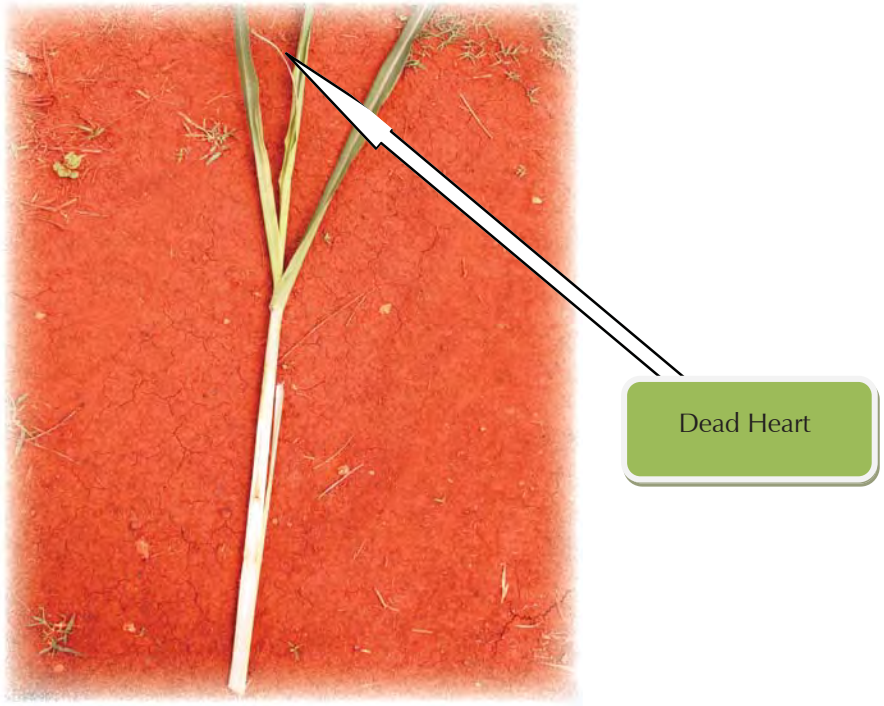

Fig 2: Dead Heart caused by pokkah boeng disease

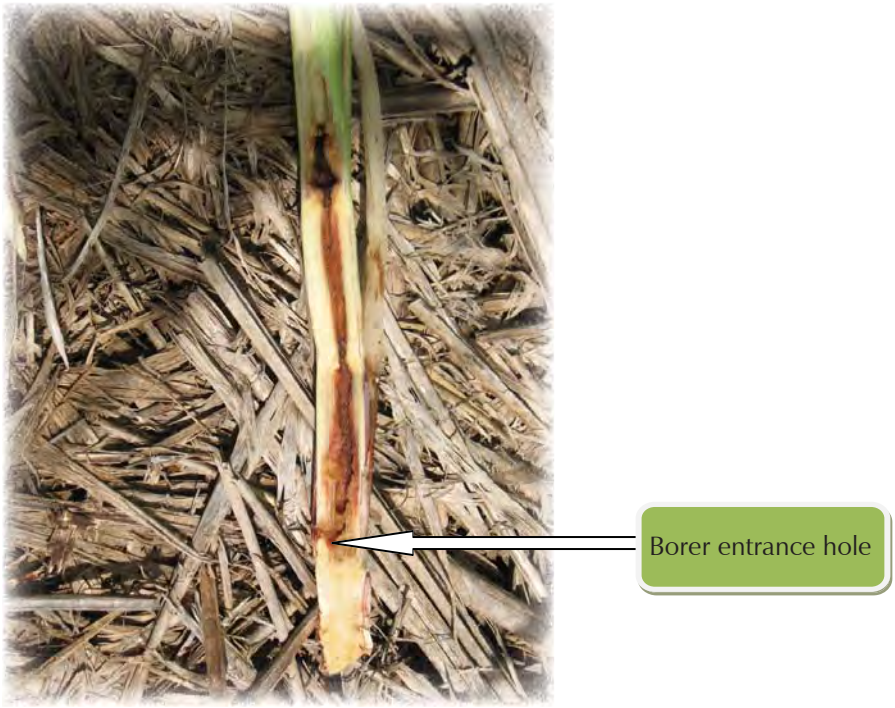

Fig 2: Internal view of stalk showing stalk borer tunnel leading to growing point

laid in and around the cane stumps. As buds on the stumps give rise to sprouts the hatching jumping borers are ready to start feeding. In these very young sprouts the entrance holes for borers may actually be at or just below ground level. Jumping borers are hidden from view in the surface soil by occupying soil covered silken tunnels from which they migrate in and out of the sprout. Sometimes they hide beneath leaf sheaths of the earliest sprouts. Soon the feeding tunnel takes a borer to the growing point and causes death of the sprout. In dry areas jumping borer typically kills as many as 20-30% of young sprouts. In high rainfall areas or where there is trash blanketing or where efficient irrigation is carried out, damage tends to be lower.

In a series of artificial damage experiments conducted by SIRI in the 1970s young sprouts were cut creating from zero to 100% in various field plots three weeks are harvest. After two months of re-growth, the highest number of tillers was actually in plots subjected to 100% sprout damage. That there could be more sprouts generated in damaged plots than in the relatively undamaged controls points to the effect of breaking "apical dominance" exerted by the primary sprout. Primary sprouts left undisturbed produce plant hormones that suppress the growth of secondary sprouts. By removing primary sprouts therefore this suppression is lifted releasing a flush of secondary tillers. Early stalk death could therefore be said to stimulate tillering.

Stalk Borer

In the case of the stalk borer, damage first becomes evident in that 6-8 week period after harvest but is hardly noticed as it may be found mainly in the shorter sprouts formed beneath the developing canopy. The stalk borer may occasionally cause dead hearts even in maturing cane. This is sometimes seen in heavy outbreaks when there may be several borers in a single stalk. At this stage lateral buds may grow out and the stalk is kept alive. With the stalk borer however, the main concern is the extent of internal stalk damage and the effect this will have on juice quality. The fact that the growing point happens to be killed in the mature stalk is often neither here nor there.

Subterranean Termites

Subterranean termites, particularly *Heterotermes* spp., typically feed on dried rotting cane found in abundance as debris from a previous crop in cane fields. From their underground tunnels termites sometimes migrate into decaying cane stumps after harvest. Occasionally they also attack the base of the emerging sprout and do enough damage

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Variety Recommendations...

Continued from page 5

Cane Growing Area	Harvesting Period	Light Soils	Clay Loams	Clays	Cane Growing Area	Harvesting Period	Light Soils	Clay Loams	Clays
		BJ7015	BJ7015	BJ7015			BJ7314	BJ7314	BJ7314
		BT80311	BJ7504	BJ7504			BJ7015	BJ7015	BJ7015
		BJ7314	BJ7314	BJ7314			BJ82105	BJ7465	BJ7465
	Early	BJ7465	BJ7465	BJ7465		Early	BJ7938	BJ7938	BJ7938
		BJ7627	BJ7627	BJ7627			BJ78100	BJ78100	CR892023
		CR892023	CR892023	CR892023			CR892023	CR892023	
			BT80311	BT80311				BJ82105	
		BJ7465	BJ7465	BJ7465			BJ7262	BJ78100	BJ7627
Upper		BJ82119	BJ82119	BJ82119			BJ7465	BJ7465	BJ7465
St. Catherine		BJ7262	BJ7262	BT80311	St. Elizabeth		BJ82105	BJ82105	BJ82105
& Upper	Middle	BT80311	BT80311			Middle	BJ78100	BJ7504	BJ7504
Clarendon							BJ7938	BJ7938	BJ7938
							BJ7627	BJ7627	
							BJ82105	BJ82105	
		BJ7627	BJ7627	BJ7627			BJ7465	BJ7465	BJ7465
		BJ8783	BJ8783	BJ8783			BJ7627	BJ7627	BJ7627
	Late	BJ7015	BJ7015	BJ7015		Late	BJ7314	BJ7314	BJ7314
							BJ82105	BJ82105	
							BJ78100	BJ78100	

Dead Hearts...

Continued from page 10

to cause dead hearts. Although termites usually shun succulent cane there are many instances when they may be found tunnelling upwards through several internodes in living cane. Termite activity often shortens the ratooning life of fields but the process of replanting usually gives the grower escape from further termite damage for a year or two.

Diseases

Certain diseases such as top rot and pokkah boeng may also cause dead hearts. With pokkah boeng the tip of the heart leaf is often trapped forming a loop at the top of the leaf whorl. While smut also kills stalks, it does so by transforming the growing point into the familiar smut whip (or fruiting body of the fungus) which is distinctly different from a dead heart.

Lightning

Sometimes a spot or spots in a field may be hit by lightning. The result is initially a small area (often no more than 5 meters or so in diameter) in which cane foliage assumes a bright yellowish orange colour. Eventually dead hearts appear accompanied by lateral bud outgrowth along the stalks. In extreme cases canes may be actually uprooted, leaves might be shredded and leaf sheaths appear purplish in colour.

Effect

Dead hearts occurring among early sprouts play an important part in the natural thinning out of stalks in a cane field and may actually be beneficial as otherwise there could be overcrowding of stalks. Under good growing conditions in Jamaica stalk population tends to peak at somewhere around 120,000 per hectare at about three months (depending on cane variety) in the ratoon crop. By the time of harvest it is unlikely that the field would support more than approximately 80,000 stalks. Had there not been some thinning out, stalks would be relatively spindly and there would be a higher ratio of fibre to juice.

Put in its proper perspective, a few dead hearts in an otherwise healthy stand of cane is nothing to be alarmed about. Excessive numbers of dead hearts may however point to deeper underlying problems which the grower may be able to correct perhaps by stepping up irrigation frequency to stimulate faster sprout regeneration from say a heavy jumping borer attack. Or it could be a sign that a particular variety may be unusually prone to pokkah boeng and should therefore not be extended to occupy too large a part of the farm ❀

The Editor
Sugar Industry Research Institute
Kendal Road, Mandeville