FIELD MECHANISATION AND FACTORY PERFORMANCE

Part 1 of this paper appears in the Agricultural Engineering section

PART 2 : FACTORY OPERATIONS

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ABSTRACT

This paper is a summary of presentations given at a workshop combining Agricultural Engineering and Processing sections of ISSCT. The paper is in two parts, the first part being mainly field-related and included in the Agricultural Engineering Section.

The main parameters considered were sucrose content of cane, fibre and soil contents and products of cane deterioration. The different effects on milling tandems and diffusers were discussed and various cane quality payment systems were outlined.

Factory trials showed that when cane was crushed without removing trash (tops removed) the pH throughput dropped from 25 to 16 l/h. The adverse effects of tops and leaves on juice purity and colour were highlighted and increased maintenance costs of US$1.4 million per Australian factory due to soil in cane were explained. Developments in cane dry cleaning equipment and power generation from the separated fibre were outlined.

Soluble impurities arising from cane deterioration were described as being more troublesome than those arising from the harvesting of immature cane. The compromise between caneyard storage of cane (to ensure continuous supply) and cane deterioration was analysed.

Schemes for the distribution of revenue between growers, and between growers and millers were discussed in the light of the incentives they provide for increased efficiency.

Concluding discussions covered current trends towards diffusion and green cane harvesting.

Keywords: Tops, trash, soil, deterioration, cane quality, cane payment, cane cleaning.

INTRODUCTION

Changes in harvesting practices affect the quality of cane delivered to factories. The impacts on factory performance need to be closely understood if the optimum economic system for the industry as a whole is to be achieved as systems change. The major considerations relate to:

- sucrose content
- combustible fibre, including leaf material and tops
- soil in cane
- products of cane deterioration.

These may affect milling tandems differently from diffusers, making it important to take into account the current trend towards diffusion.

Ultimately, cane payment systems need careful consideration so as to encourage the most efficient practices for field and factory operations overall.
FIBRE AND SOIL IN CANE

Fibre measurements represent total insoluble matter in cane, including soil. The vegetable fibre content is therefore overestimated by an amount which will increase if increased use of mechanical harvesting and loading increases the amount of soil in cane.

The vegetable fibre content of cane is generally between 11% and 19% being strongly dependent on harvesting practices, especially burning. This variation can cause a factory to receive cane consignments with very different fibre contents which therefore require different optimum mill settings. High fibre content increases costs of preparation and extraction and it decreases extraction and cane throughput. Trials in South Africa showed that a factory handling well cleaned cane could cope with a cane throughput equivalent to 25 t pol/h whereas when trash was left on the cane (tops removed) the throughput dropped to 16 t pol/h.

The pith content of the fibre varies between about 25 and 50% according to variety and climatic conditions. This influences the behaviour of the fibre in the mill and challenges mill engineers to develop systems which adjust automatically to the nature of the fibre. Cane with a high pith content requires less energy for preparation but it may “pulp” if preparation involves too much knifing rather than judicious shredding. Pulped cane tends to cause slippage and choking in mills and poor percolation in diffusers (Wienese).

Vegetable fibre is burnt for energy generation and this factory process is the only one to benefit from high fibre cane but the benefit is only realised if there is a market for the surplus energy. Cane with a fibre content equivalent to its pol content generally provides sufficient energy for processing of the pol to raw sugar.

ALTERNATE USES OF CANE FIBRE

The three main sources of fibre are:

- bagasse
- cane tops and associated green leaves (CTL)
- trash (dry leaves).

The quantities derived from 100 t of mature cane are approximately as follows:

<table>
<thead>
<tr>
<th>Fresh matter (t)</th>
<th>Dry matter (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bagasse</td>
<td>30</td>
</tr>
<tr>
<td>Trash</td>
<td>12</td>
</tr>
<tr>
<td>Trash</td>
<td>9</td>
</tr>
</tbody>
</table>

In countries which lack coal there is economic incentive to use the bagasse fibre to generate electricity. Improvements in generation efficiency have been made possible by development of higher pressure boilers (80 bars) feeding a single turbo alternator from which part of the steam is extracted at 1,2 bars for processing requirements and the remainder is condensed. The condensing part of the system uses only about 4 kg of steam to generate each kWh of electricity.

Trials with CTL and trash as boiler fuel have indicated that some shredding and dewatering are necessary. The amount of fuel available from these sources could exceed that from bagasse but at present the residues are generally unexploited because of collection and preparation costs. The
negative impact of the fibre does not allow whole cane with its CTL and trash to be fed to the mill. Alternative approaches include the collection of partially dried CTL from fields or the operation at the factory, of cleaning plants, which remove CTL and trash and divert them to the boilers. A pilot plant to handle 150 t cane/h in this manner is being commissioned in Mauritius (Deepchand).

Other large-scale uses for cane fibre include paper manufacture, board manufacture and furfural manufacture. A number of other products can be made but are not economically attractive at this stage.

Further commercial exploitation of cane fibre, especially CTL and trash, will need close collaboration between agronomists, agricultural engineers, economists, developmental chemists and factory personnel. In Colombia residues left in the field by unburnt cane may exceed 100 t/ha and this has negative effects on subsequent growth thus promoting attempts to seek alternative uses for the residues and efficient means of collecting them (Cock). In Brazil only 3% of the cane is unburnt (target increase of 12% per year to 2004) and residues range between 7 and 15 t/ha (dry matter). Trials have indicated that application of vinasse and filter cake to this residue promotes decomposition so that the resulting compost can be harrowed into the soil within 30 days. Nutrients derived from the trash included 32 kg/ha N, 6 kg/ha P2O5 and 30 kg/ha K2O (Manechini). Some work in Mexico is concentrated on developing equipment for incorporating cane residues into the soil (Martinez).

EFFECTS OF SPECIFIC EXTRANEOUS MATTER COMPONENTS

Tops and leaves

With whole stalk harvesting the word “top” generally refers to the top part of the stalk (above the natural breaking point) together with its associated leaves whereas with billeted cane the “top” is the uppermost billet with some leaf sheath but little leaf blade material. Some misunderstanding may have arisen in the past because of these different interpretations.

The first effect of leaves in the cane supply is a reduction in packing density which causes a reduction in payloads (22% reduction when 10% leaves were included in billeted cane and 44% reduction when all leaves were included in whole stalk cane). Cane handling during tipping and conveying may also be adversely affected by leaf material.

The major impact of leaf material is on sugar recovery and colour. Leaf extracts are generally of very low purity (10% to 35%) and being less pure than final molasses they cause sugar to be diverted to molasses. Furthermore their colour content per unit impurity is from two to six times that of clean stalk (Mason). Costs associated with processing leaf in the cane supply are not easy to estimate accurately but are associated mainly with the increased crushing capacity and boiling capacity necessary to process the increased fibre and impurities.

Soil and stones

A single large stone can cause immense and immediate damage to cane preparation equipment. Smaller stones are generally pulverised by the shredder and join with sand in causing wear on the equipment, particularly the milling train, juice circuits and boiler tubes. In milling tandems about 40% - 50% of the sand enters the juice and is removed as filter mud. Increased sand therefore demands increased clarifier and filter capacity. In diffusers more than 90% of the sand remains in the bagasse and causes tube erosion and combustion problems in the boilers.
Annual maintenance costs attributable to soil in cane are estimated to average US$1.4 million for each Australian factory (Mason).

Metal objects

Increased mechanisation tends to increase metal objects in the cane supply. Such objects include parts of harvesters and mechanics’ tools, and being indestructible they can cause damage to a range of equipment during their passage through the factory. The installation of an effective magnet to remove metal objects has become increasingly important.

The cost of extraneous matter in Australian cane is now so high that consideration is being given to the installation of cleaning equipment to remove leaves and soil.

SUCROSE CONTENT AND SOLUBLE IMPURITIES

A comparison of two factories in Southern Africa suggests that although both performed at very similar efficiencies in terms of overall recovery the one factory probably made 24% more profit per ton of sugar produced because it received cane with a higher sucrose content (14.65 vs 12.4%). In this case the purities of the mixed juices were very similar (85.7 vs 85.3). The increased profits were possible because the mill processed less cane to produce the same amount of sugar (Smith).

The effect of impurities varies according to their nature - those associated with young immature cane are less troublesome than those formed during deterioration of cane. The former are mainly reducing sugars which cause a relatively minor drop in recovery and no viscosity problems. In contrast, the products of deterioration include large molecules (microbial gums) which cause significant decrease in recovery and lower boiling rates. Severely deteriorated cane produces extremely viscous massecuites, which may be impossible to process despite having purity as high as 75%. Fresh immature cane of similar purity is usually easy to process.

Deterioration of cane billets is accelerated by high temperature, short billet length, billet shattering and burning. Under adverse conditions as much as 10% of the CCS can be lost in 48 hours. Long, sound green cane billets give increased flexibility in cane supply arrangements because of their relatively slow deterioration (Mason).

Tops, leaf and trash are sources of soluble impurities whose effect is usually intermediate between those present in immature cane and those formed during deterioration (Smith).

In a test done in Argentina, mechanically harvested green cane gave the expected colour increase with increasing amounts of extraneous matter but with burnt cane the colour diminished with increase in extraneous matter (Cardenas).

The judicious use of ripeners and control of delays between burning and crushing are the most effective means of minimising the adverse effects of low sucrose content and impurities.

CANEYARD MANAGEMENT

In most countries harvesting is restricted to daytime so some form of caneyard is necessary to store cane for processing at night. There is however a trend towards 24 hour harvesting operation, particularly for factories processing more than 8000 tcd, because of the advantages of lower investment and less cane deterioration. Cane grower dislike for nighttime delivery forces
many factories to operate cane yards.

The relatively slow deterioration of whole stalk cane makes it more amenable to storage, thus facilitating continuous factory operation thought short periods of rain. With chopped cane the close link between harvesting and transport causes deliveries to stop immediately field conditions become unsuitable for the heavy mechanical equipment. Where storage is necessary (e.g. when night harvesting is not possible) the billeted cane is held in trailers, not on the ground. The extra trailers required represent an expensive form of caneyard.

Caneyards for whole cane involve either gantry cranes or tractors for moving the stored cane to the feeder table. The former involves less ground space because the cane can be piled higher.

In Brazil the costs for 3000 t cane storage facilities are:

<table>
<thead>
<tr>
<th>Yard type</th>
<th>Capital cost (US$)</th>
<th>Operating cost (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gantry (&quot;cane building&quot;)</td>
<td>1 000 000</td>
<td>140 000</td>
</tr>
<tr>
<td>Yard with tractors</td>
<td>1 000 000</td>
<td>250 000</td>
</tr>
<tr>
<td>Trailers</td>
<td>3 000 000</td>
<td>100 000</td>
</tr>
</tbody>
</table>

A study of daily dextran levels in Brazil showed a distinct weekly peak on Mondays when the cane processed had been stored to provide supplies when deliveries ceased for Sundays and most of Monday (Zarpelon).

Comparisons of milling time efficiencies for two Brazilian mills with and without cane storage gave the following results:

<table>
<thead>
<tr>
<th>Mill:</th>
<th>Sao Martinho</th>
<th>Santa Adelia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage (% of daily supply)</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>Stoppages due to cane supply -</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a) dry period</td>
<td>1,1</td>
<td>0</td>
</tr>
<tr>
<td>(b) wet period</td>
<td>12,3</td>
<td>7,8</td>
</tr>
</tbody>
</table>

The simple summary is that there is no best method suitable for all circumstances but storage should be as little as possible for the particular circumstances and should follow the "first in first out" principle.

**CANE CLEANING SYSTEMS**

**Manual cleaning of whole stick cane**

Mayaguez factory in Colombia is an example where manual cleaning has been made effective through careful attention to quality control of the harvesting process. Each cutter is part of a crew which has a quality monitor. The factory provides feedback to cutting crews by sampling cane and measuring the major components of extraneous matter (tops, leaf/leaf sheath, soil/stones, suckers/dry cane/stools). Comparative quality reports are developed for each cutting group, each crew within the group, each quality monitor and each "cutterman". This system has steadily reduced extraneous matter from 11.3 % in 1990 to 4.68 % in 1996. Soil decreased from 1.45 % to 0.56 % (Briceno).
Dry cleaning (excluding chopper harvester systems)

A trial system has been operating at Providencia factory in Colombia. The cleaning system involves two modules - the first using air to blow leaf trash and soil from the whole stick cane, and the second involving a billetor followed by a roll which passes the billets over a gap to a second roll. Soil and stones fall through the gap. The first module removes 75% of the leaf trash and 70% of the soil and small stones with a further 12% of the soil being removed in the second module.

With only 20% of the cane going through this system it has been possible for the factory to shut down one clarifier and one filter.

With the move towards green cane harvesting (whole stick) the mechanical dry cleaning system is regarded as the only option for separation of extraneous matter (Briceno).

In Mauritius a pilot dry cleaning plant capable of handling 150 tch was tested during 1997 at Union St Aubin. Cane is first billeted then trash is blown off to a shredder before being mixed with bagasse leaving the last mill. Electricity generated from the trash is sufficient to pay for the collection and separation of the trash.

Cane washing

Five factories in Colombia use cane washing because they need to remove soil which is a particular problem with cane harvested from areas which are almost permanently wet. The washing system includes trash extractor rolls but is almost ineffective in removing trash.

The washing involves dousing the cane with water as it moves up in inclined carrier. It has proved very effective in removing soil (55 - 75% depending on soil type) thereby reducing wear in the factory and improving boiler efficiency and clarification efficiency. It does however involve a large ponding system for treatment of the water prior to recirculation. Some sugar is lost but one estimate suggests that this is as little as 0.004% cane - i.e. considerably less than that measured from billeted cane (Briceno).

CANE PAYMENT SYSTEMS

Mr Andy Duff presented results of an international survey conducted by LMC, UK.

Ownership systems

Three kinds of ownership have to be taken into account in developing payment systems:
- integrated ownership, where the cane is grown and processed by a single commercial entity - cane payment is irrelevant
- co-operative ownership, where the mill is owned and supplied by a number of growers - distribution between growers is the major issue so as to prevent subsidisation of poor quality cane by better quality cane
- separate ownership where growers and millers are separate commercial entities - the most common arrangement - requires systems to distribute proceeds between growers and millers and between individual growers.
Basis for payment

Different bases in use include:

- weight only - used in Fiji, India and some Colombian mills - a penalty for excess trash may be imposed but in general this system encourages high yields of low quality cane.
- weight combined with average cane analysis for the mill - used in Mexico - saves on analytical costs but does not provide direct incentives for individuals. In Mexico the mills provide cutter training and co-ordination of harvesting and transport.
- weight combined with analysis of individual’s cane - used in Australia, Brazil, Jamaica and South Africa.
- weight plus individual analysis and relative payment - used to encourage steady rates of delivery throughout the season by compensating early and late season deliveries for their seasonally related low quality.

Distribution between growers and millers

In most industries the distribution is related to the final revenue obtained from the sugar produced - i.e. there is revenue sharing. India is an example where the price of cane is fixed without being directly linked to the value of sugar produced. The mill then carries the risk of sugar price fluctuations.

Where revenue is shared on a fixed basis this tends to blunt incentives to both parties because any improvements made have to be shared with the other party. This is a particular disincentive to investment in new technologies by millers and is also a disincentive to efforts by growers to improve cane quality.

Variable revenue sharing (Australia and Jamaica) ensures that, relative to standard levels of cane quality and factory efficiency, any improvements benefit the party making the improvement. While the principle is sound it has caused dissatisfaction to growers in Australia because their share of revenue has declined due to unexpected advances in processing efficiency.

Effectiveness of quality incentives

The effectiveness of quality incentives may not always be evident. Weather and pests (e.g. Eldana) may have an overriding effect and small scale growers in particular may be limited in the responses which they may be able to introduce - e.g. use of ripeners.

The question of whether rewards to farmers are adequate to compensate for increased costs is obviously an economic decision for the farmer but to facilitate such decisions the cane payment scheme needs to be transparent and rational. Growers might chose to concentrate on lowering costs rather than raising revenue.

Thailand provides an example of where a cane quality scheme had an immediate effect on quality. A CCS-based scheme replaced a weight-based scheme in 1992/93 and since then the average CCS has been above that of all years prior to 1992. Improvements were achieved by reducing use of fertilisers, and harvesting ripe rather than heavy cane; both changes representing cost savings.
Even the most sophisticated quality payment formulae appear unable to capture the true costs/benefits associated with raising quality and improving factory recovery. Experiences in a number of industries indicate that payment systems need to evolve with the industry if they are to remain accurate and equitable, and provide realistic incentives to both parties.

Future priorities

Future priorities are influenced by anticipated market liberalisation which is likely to cause domestic prices in most countries to decline and to be more volatile because of their closer linkage to world prices. Price volatility creates instability in supply of raw materials because it can influence the growers' willingness to produce cane throughout the price cycles. It also introduces profit instability. Cane payment schemes have an important role to play in guiding grower-miller relationships and overall optimum responses to lower prices and volatile prices.

Cane payment systems in Australia and the effect of mechanical harvesting (Milford)

A review of different forms of relative payment schemes in Australia shows that under one of these the effect of adding trash to cane is relatively small, perhaps leading to a growers' perception that increase in tonnage due to trash could be sufficient to negate the effect of the trash. When harvesting and transport costs are taken into account however this is not the case.

Another problem in Australia is the application of "class" fibre whereby individual growers' cane is not analysed for fibre but fibre content is averaged for different production areas or classes of cane. Individual's efforts to minimise fibre are therefore not directly rewarded. In Queensland, bonuses and penalties were found to have little effect on harvesting practices, and measurement of extraneous matter is expensive. The advent of green cane mechanical harvesting has seen large increases in extraneous matter.

An indirect penalty which growers pay for increased extraneous matter is a decline in average CCS due to extended crushing seasons brought about by the increased load of extraneous matter.

A future hope is the use of NIR equipment to measure fibre in each cane consignment.

Cane payment in Southern Africa (Ravnø)

A review of payment systems in operation in countries of Southern Africa shows diversity in major payment parameters such as quality measures, ultimate cane price and growers share. With the exception of Mauritius, where the cane price is relatively high at US$45/t, the price in other countries ranges between US$25 and US$30/t, with the higher prices generally being for better cane quality.

CURRENT TRENDS AND CHALLENGES

Diffusers and their implications for cane supply and cane quality (Koster)

Steady conversion from milling to diffusion has taken place in some industries, especially the South African industry where more than 80% of cane is now extracted in diffusers. Within this trend there has also been a trend from bagasse diffusers (involving a first mill) to cane diffusers.
Implications relating to cane quality include:

- A greater sensitivity to soil in cane
- An increase in colour extraction, particularly from extraneous matter
- The elimination (with cane diffusion) of the option to sample first expressed juice.

Other effects of diffusion include:

- Higher average extractions at a cost of higher imbibition application
- 6% more evaporation work to cater for the higher imbibition rates
- A shift in high maintenance areas from mill rolls to boilers (more sand in bagasse)
- 50% less clarifier mud, but with inferior filtration characteristics
- A higher boiling house recovery is achievable for a standard juice purity due to lower cake losses
- Capital plant requirements for clarifiers, mud filters, bagacillo separation and conveying are reduced
- 4% more energy in available bagasse.

Green cane harvesting and its implications for field and factory (Mason)

The trend towards green cane harvesting has been strong in Australia with some northern areas using it for 90% of the crop. Similar trends are likely in other countries.

The discussion leader (Mason) used this session to collate ideas drawn from the delegates on an interactive basis. The collated ideas on the implications of the trend towards green cane harvesting deal with a core issue of the workshop and are included in full as an appendix to Part 1 of the paper. Advantages and disadvantages identified specifically for factories were:

Advantages:

- Greatly reduced dextran levels hence easier processing of older cane
- When wet weather comes, there is no burnt cane left in the field
- Higher total sucrose available (depending on cane cleanliness, cut-to-crush delays and a variety of other factors including the level of trash and leaf in cane etc)
- Increased boiler fuel availability
- Can start harvesting earlier with green cane because no delay for cane to dry before burning
- Wax from the outside of the stalk is retained

Disadvantages:

- More leaf in cane implies
  - More molasses and higher sugar loss
  - Reduced milling/grinding capacity
  - Increased capacity required in low-grade equipment areas
  - Reduced income because of cane losses in the harvester
- More wax entering the factory
- More colour entering the factory
- Increased handling problems
- Increased starch
- Green leaf can reduce the ability to burn in boilers because green leaf has higher moisture levels
- Can result in increased fly ash production because green leaves will not burn as well
- Possible need to install a dry cleaning plant so that the leaves can bypass the extraction system (which implies that additional electrical power must be generated to be used to drive the cane cleaning plant).

Note: It is important to take into account the differences associated with clean green cane and dirty green cane.
Presentations

Presentations on factory operations were made by the following participants:

Briceno, C. Canicana, AA 91-38, Cali, Colombia.
Cardenas, GJ. EEAOC, Salas y Valdez 1049, 4000 San Miguel de Tucuman, Argentina
Deepchand, K. Mauritius Sugar Authority, Port Louis, Mauritius.
Duff, A. LMC International, 14-16 George St., Oxford, UK.
Jacquin, E. MSIRI, Reduit, Mauritius.
Koster, KC. Illovo Sugar Ltd, PO Box 194, 4001 Durban, South Africa.
Manechni, C. Centro de Tecnologia, Copersucar, Piracicaba, SP - Brasil
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Michal, V. CA Central la Pastora, Carretera Panamericana KM 495, 3050 La Pastora, Venezuela.
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Smith, I. Tongaat Hulett Sugar, P Bag 3, 4022 Glenashley, South Africa.
Vilakazi, H. PO Box 1, Mhlume, Swaziland.
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Zarpelon, F. Usina Ester, Brasil.

Topics for future factory commission focus

During this and previous factory workshops the following topics were identified by delegates as being worthy of future attention in workshops and congresses:

• Juice preparation
• Evaporation
• Chromatographic recovery
• Quality systems and quality standards
• Maintenance management and materials of construction
• Cane cleaning and cane preparation
• Refining
• On line measurements and automation
• Sugar boiling
• Cane payment schemes
• Chemical control and developments in monitoring and control
• Colour control
• Management of cane intake
• Factory utilities
• Continuous pans
• Effluent treatment
• Costs and benefits of modernisation
• Crystallisation
• Bagasse handling
• Off-season use of factories
• Co-generation

Some of these subjects are being dealt with in the present congress but others present interesting topics for future workshops.
CONCLUSIONS

The workshop provided a useful opportunity for international and inter-sectoral interaction between delegates on a friendly, informal basis. Many facts and ideas were shared on a topic which is likely to affect most sugar industries. The event reinforced the growing value of workshops for ISSCT members. The Mexican hosts and GEPLACEA played a major role in ensuring its success.

MECANIZACIÓN DEL CAMPO Y RENDIMIENTO DE LA FÁBRICA
SEGUNDA PARTE: OPERACIONES DE LA FÁBRICA

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RESUMEN

Esta ponencia es una resumen de ponencias presentadas en un taller que combinó las secciones de ingeniería agrícola y de procesamiento de ISSCT. Esta ponencia es de dos partes, la primera que es mayormente relacionada con el campo y incluida en la sección de la Ingeniería Agrícola.

Los parámetros principales considerados fueron el contenido de sacarosa en la caña, fibra y contenidos de la tierra y productos de la deterioración de caña. Se discutieron los diferentes efectos de sobre molinos en tándem y difusores y también los varios sistemas de pago de calidad de caña.

Experimentos de fábricas mostraron que cuando se molinaron caña sin evitar los residuos (evitar la copa) el pol a lo largo del proceso bajó de 25 a 16 t/h. se destacaron los efectos de copas y hojas sobre la pureza y color del jugo se explicaron el costo de US$1.4 millones del mantenimiento aumentado por cada fábrica australiana a causa del lodo en la caña. Se discutieron los desarrollos en el equipo limpiador seco de caña y la generación de energía a partir de la fibra separada.

Se describieron las impurezas surgentes de la deterioración de caña como ser más difíciles que las surgentes de la cosecha de caña inmadura. Se analizó el arreglo entre el almacén de caña (para asegurar un suministro continuo de caña) y la deterioración de caña.

Se discutieron esquemas para la distribución de ingresos entre los cultivadores, y entre los cultivadores y molineros teniendo en vista los incentivos que ellos proveen para una eficiencia aumentada.

Los argumentos terminantes se trataron de las tendencias actuales hacia difusión y la cosecha de caña verde.

Palabras claves: copas, residuos, lodo, deterioración, calidad de caña, pago de caña, limpiar la caña.
LA MECHANISATION DU CHAMP ET PERFORMANCE DE L'USINE
PARTE - 2: LES OPÉRATIONS DE L'USINE

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RÉSUMÉ

Ce papier est un résumé de présentation donné à un atelier qui combine l'Agricole Génieet les sections Développant d'ISSCT. Le papier est dans deux parties, la première partie qui est le principalement le champ raconté et qui inclus dans la section de l'ingénieur Agricole.

Les paramètres principaux considérés étaient contenu de saccharose de canne, fibre et contenu du sol et produits de détérioration de la canne. Les effets différents en moulants des tandems et des diffuseurs ont été discutés et les plusieurs systèmes du paiement de la qualité de la canne on été esquissés.

Les essais factoriles ont montré que quand la canne a été écrasée sans enlever les ordures (les sommets ont enlevé) le débit du pol est tombé de 25 à 16t/h. L'effet adverse de sommets et permissions sur pureté du jus et couleur a été mis en valeur et a été augmenté coûts de l'entretien d'USA $ 1.4 million par l'usine Australienne dû à sol de canne qui était de la fibre séparée ont été esquissées.

Les impudicités solubles qui surviennent de détérioration de la canne ont été décrites comme être plus gênant que ce qui surviennent de la moisson de canne immature. Le compromis entre stockage du caneyard de canne (assurer la provision continue) et la détérioration de la canne a été analysée.

Plans pour les distributions de revenu entre cultivateurs, et entre cultivateurs et meuniers a été discuté dans la lumière des motivations qu'ils fournissent pour efficacité augmentée.

Les discussions finales ont couvert des tendances courantes vers diffusion et moisson de la canne du vert.

Mot-clés : Les sommets, Saccagez, souillez, détérioration, qualité de la canne, paiement de la canne, nettoyage de la canne.