

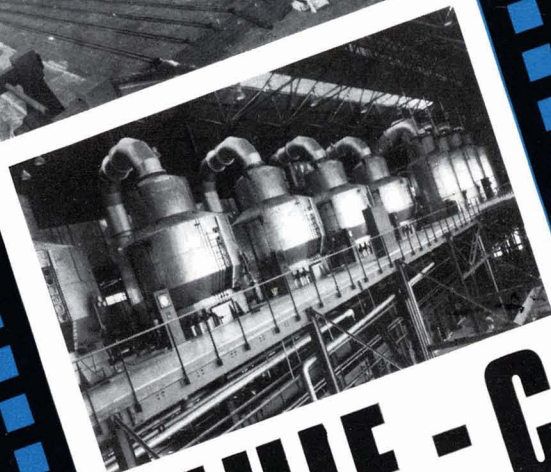
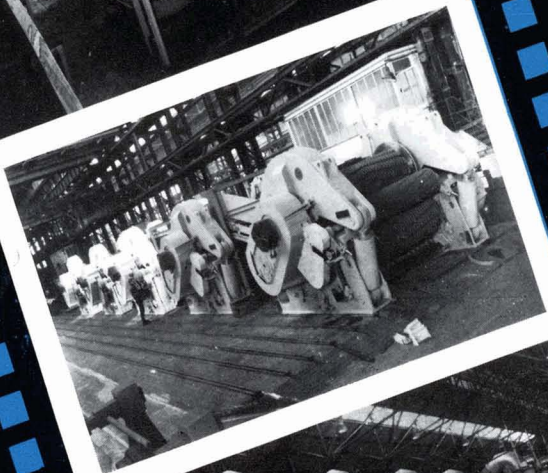
THE

International Sugar Journal



NOVEMBER 1972

at all stages of sugar manufacture



- 150 years of experience in the construction of sugar machinery
- a large number of complete plants (cane and beet) installed in the whole world
- machinery whose sturdiness has acquired a world wide fame
- technological back-up of an important Research Centre



FIVES LILLE - CAIL

SUBSIDIARIES IN BELGIUM, SPAIN AND BRAZIL
AGENTS THROUGHOUT THE WORLD
7, rue Montalivet, 75 - PARIS 8^e
Phone : 265.22.01 and 742.21.19
Telex : FVCAIL 65 328



RENOLD LIMITED

serving the cane sugar industry

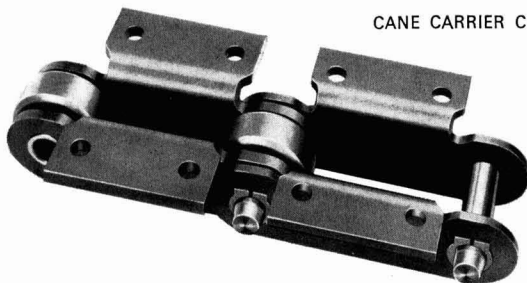
CHAINS FOR MECHANICAL HANDLING

Specialised Renold chains have been supplied to the cane sugar industry since 1920.

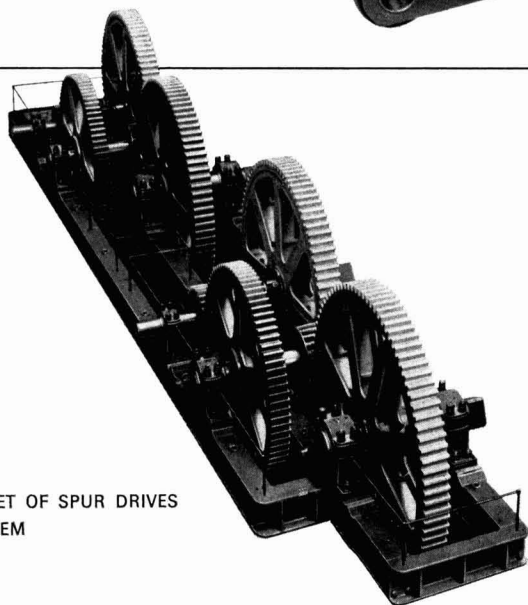
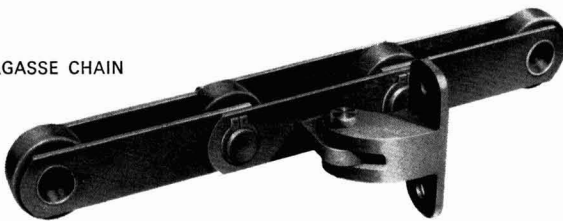
90 years of precision chain manufacture ensure a product combining high strength with compactness, minimum weight and low cost for long life and trouble free operation.

Precision power transmission chains and wheels are also available for all applications.

CANE CARRIER CHAIN



BAGASSE CHAIN



A LARGE SET OF SPUR DRIVES TO A TANDEM

POWER TRANSMISSION GEARING

Spur gears up to 127mm circular pitch, 760mm face and 4700mm diameter can be supplied for heavy tandem drives. Other gear products include worm, spur, helical and bevel gear boxes and individual gears.

Other Renold group products:

Precision roller chains and wheels.
Hydraulic and mechanically operated variable speed systems.
Couplings, clutches and brakes.
Power transmission ancillaries.

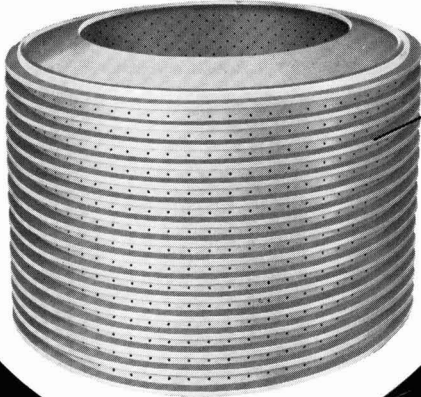


RENOLD LIMITED
SALES DIVISION
MANCHESTER ENGLAND

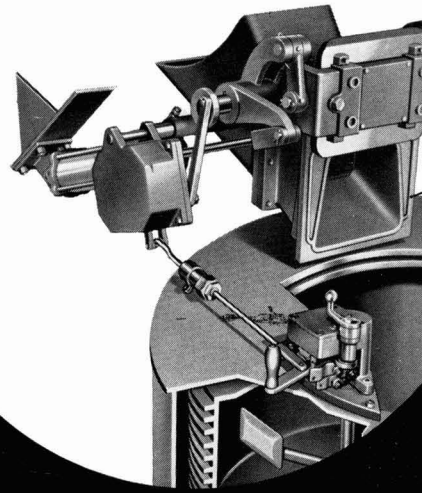


basket

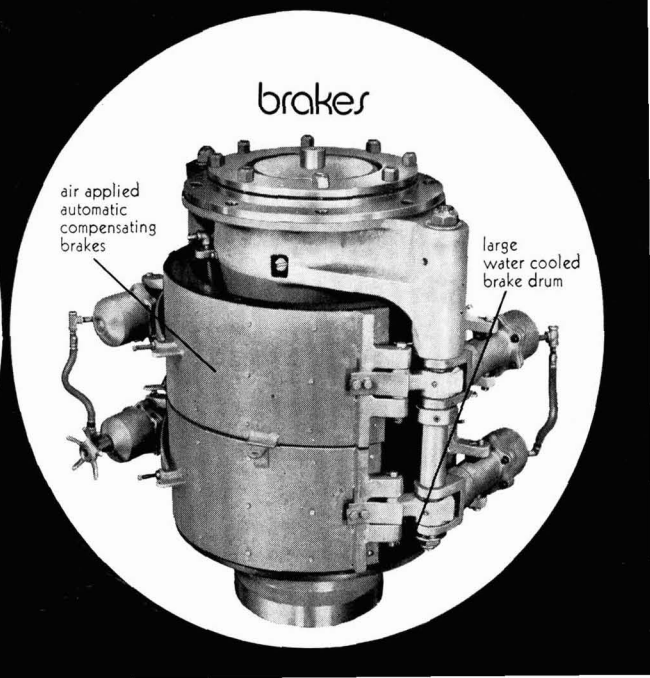
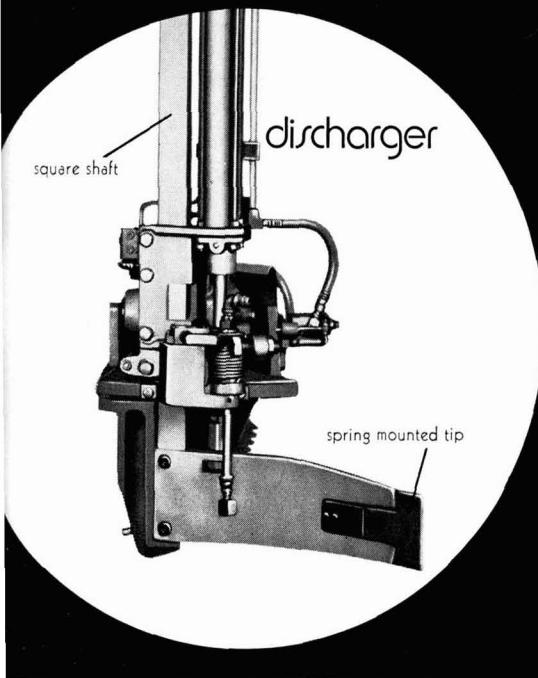
high tensile
reinforcing rings



charging gate



**western
centrifugals
cost more and
are worth more**



states

Worth more . . . because the Western States centrifugal design has been guided by over 50 years of centrifugal manufacturing experience. The value added by this experience shows up in the strength and dependability features needed for high volume production.

At Western States we build only centrifugals, and our design is expressly for the sugar industry. No other centrifugal application requires the high volume productivity. We know it and build for it. There's a battery of our machines which has been in continuous high production operation for 33 years. How's that?

At Western States our basket is reinforced by high tensile steel rings for safety, strength and dependability.

The charging gate is stellite strip sealed,

so that, initially, it is leak free and easily maintained and repaired to keep it that way.

At Western States we use an air actuated discharger. Its square shaft and spring mounted metal tip provide stability, high productivity and long screen life. Our braking is combined regenerative and mechanical with shortest time deceleration . . . water cooled drum . . . long lived brake lining. These are just a few of the design characteristics that are important to you.

It could be worth even more to you to write, now, to Mr. A. H. Stuhlreyer, Director of Sales, for complete details on Western States centrifugals.



ROBERTS
STEVENS

**THE WESTERN STATES
MACHINE COMPANY**

Hamilton, Ohio 45012 U.S.A.



Throughout the cane-producing world, the rugged MF201 is proving itself a truly reliable, high-output harvester.

MF 201: the ton-a-minute, dollar-a-ton cane harvester

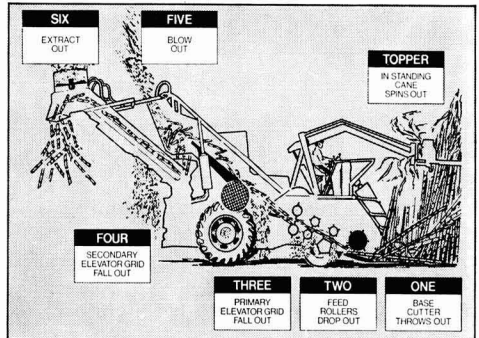
The facts and figures behind the MF 201 Cane Commander are as impressive as the machine itself. Introduced in 1969, the MF 201 has established a harvesting record unequalled by any other machine.

Over three hundred of the Australian-built MF 201 have been marketed by Massey-Ferguson throughout the world. Performances have been outstanding - 2½ million tons of sugar cane had been harvested by MF 201's by the end of 1970, with outputs of up to 450 tons/day being recorded regularly in some areas. The MF 201 handles any kind of crop, from 9 to 90 tons an acre, with costs as low as U.S. \$0.60 per ton.

The MF sugar cane system. The MF 201 is the heart of a comprehensive sugar cane harvesting system, which takes you from tillage to transport. This is made possible by Massey-Ferguson's position as the world's biggest manufacturer of tractors, combines, diggers and loaders, and diesel engines, besides being the world's largest producer and exporter of cane harvesters.

MF coverage in the cane countries
 Angola, Antigua, Argentina*, Australia*, Bahamas, Barbados, Bolivia, Brazil*, British Honduras, Burma, Cambodia, Cameroon, Ceylon, Colombia, Republic of Congo, Congolese Republic, Costa Rica, Dominica, Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, Fiji, French Guiana, Ghana, Grenada, Guadeloupe, Guatemala, Guyana, Guinea, Haiti, Hawaii, Honduras, India*, Indonesia, Ivory Coast, Jamaica, Japan, Kenya, Lebanon, Malagasy, Malawi, Malaysia, Martinique, Mauritius, Mexico*, Mozambique, Nicaragua, Nigeria, Pakistan, Panama, Paraguay, Peru, Philippines, Puerto Rico, Reunion, Rhodesia, Ryukyu Islands, Sierra Leone, Somalia, Spain, St. Lucia, St. Vincent, St. Kitts & Nevis, Sudan, Surinam, Taiwan, Tanzania, Thailand, Trinidad & Tobago, Uganda, Union of S. Africa*, Uruguay, U.S.A.*, Venezuela, Vietnam, Virgin Is., Zambia.

* MF Operation Units or Associate Companies.



MF's 6-stage cleaning cycle ensures maximum return of clean chopped cane.

If you would like further information about the MF 201 and MF crop mechanisation, please return this coupon.

To: Special Crop Systems Manager, Massey-Ferguson (Export) Ltd, Coventry, CV49GF, England.

Please send me the following:

MF 201 Cane Commander leaflet*

Booklet on Sugar Cane Crop Mechanisation*

MF newspaper "Cane News"*

Tell me how I can see a MF 201 in action*

* Delete if not applicable.

NAME (Block letters please) _____

ADDRESS _____

TITLE OR POSITION _____

MF

Massey Ferguson



Jewels from sugar

Sparkling sugar - jewels for the youth of our world! Their health, energy and vitality depend on sugar. It is priceless for them, as jewels are. It moves their muscles and minds as they are building their fascinating future. Our world's duty is to satisfy their needs, to make sugar - one of man's most vital staple foods - available in abundance.

We of Stork-Werkspoor Sugar N.V. are on the spot wherever sugar is being produced. In fact we have been there for more than a hundred years, building sugar mills and all necessary equipment. We are sugar industry engineers; our interests and activities are centered on sugar. Our vitality is the same as when we started a century ago. That's what sugar can do. We shall be glad to show you!

STORK-WERKSPOOR SUGAR

sugar industry engineers

P.O. Box 147 Hengelo (O) - the Netherlands

Member of VMF/Stork-Werkspoor

Cables: Stowesugar Telex: 44485 Tel.: 05400 - 54321

KASTEL is the registered trade mark of the ion exchange resins produced by Montedison in a wide range covering all fields of application. The following types of exchangers are available:

For industrial water treatment

KASTEL C 100	weakly acidic exchanger with carboxylic active groups	exchanger, monofunctional (tertiary amine active groups)
KASTEL C 101	weakly acidic cation exchanger with carboxylic active groups, and higher exchange capacity	KASTEL A 300 strongly basic exchanger (type II) with dialkyl-alkanol amine active groups
KASTEL C 300	strongly acidic exchanger with sulphonic active groups	KASTEL A 300 P porous strongly basic exchanger (type II) with dialkyl-alkanol amine active groups
KASTEL C 300 P	porous strongly acidic exchanger with sulphonic active groups	KASTEL A 500 strongly basic exchanger (type I) with trialkylamine active groups
KASTEL C 300 AGR	porous highly crosslinked exchanger with sulphonic active groups	KASTEL A 500 P porous strongly basic exchanger (type I) with trialkylamine active groups
KASTEL C 300 AGR/P	porous highly crosslinked exchanger with sulphonic active groups	KASTEL A 510 highly absorbent resin with strongly porous matrix and strongly basic active groups: specially recommended as scavenger
KASTEL A 101	highly porous, weakly basic anion	

KASTEL®

For sugar juices treatment

KASTEL C 300	strongly acidic exchanger with sulphonic active groups	KASTEL A 105 weakly basic exchanger with tertiary amine active groups
KASTEL C 300 AGR	porous highly crosslinked exchanger with sulphonic active groups	KASTEL A 501 D decolourizing resin with a highly porous matrix and strongly basic active groups

The Technical staff of Montedison, with their wide experience in both the laboratory and industrial fields, are available for consultation and collaboration on the various problems which may be encountered by end users and engineers in the application of these products.

For further information please apply to:

MONTEDISON

Divisione Prodotti Industria - Vendite Resine Kastel - Piazza della Repubblica, 14/16 - 20124 Milano (Italy)
Tel. 6333 - Telex 31679 Montedis

or to the General Representative
Joseph Weil & Son Ltd. - 11A West Halkin Street - London SW1X 8LF - Tel. 01-235 8642/50 - Telex 918743
Inland Telegrams: London Telex 918743 - Overseas Cables: Ullubrossa London

BROTHERHOOD '229'

alias

60 years of sugar mill experience

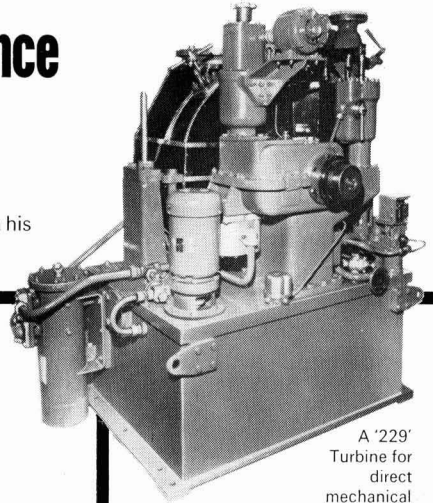
Brotherhood Turbines of proven design, built to suit your own plant. The '229' range incorporates world-wide experience of mill turbine operation.

Component standardisation increases availability of stock parts for off-the-shelf spares service to customers.

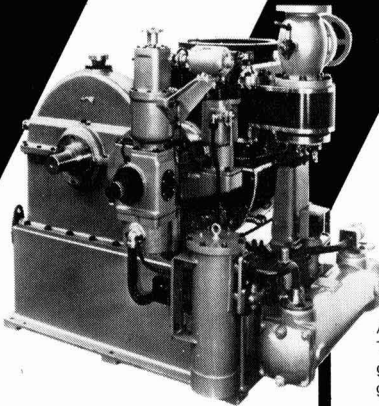
Off-the-shelf spare service relieves customer from tying up capital in his own stores.

Please send for publications SMT/66 and SMT/70.

- True interchangeability
- Low cost
- Short deliveries
- Minimum site spares
- Minimum operating and servicing trainings
- Rugged reliability



A '229'
Turbine for
direct
mechanical
drive



A '229'
Turbine with integral hardened and
ground gears for mechanical or
generator drive.

PETER BROTHERHOOD LIMITED

Peterborough, England Tel. 0733 71321 Telex: Brotherhd Pboro 32154

London Office: Dudley House, 169 Piccadilly, London, W1. Tel: 01-629 7356/7/8.

MANUFACTURERS OF STEAM TURBINES

COMPRESSORS

SPECIAL PURPOSE MACHINERY



P5051



POLIMEX-CEKOP LTD.

WARSZAWA · POLAND · CZACKIEGO 7/9
P.O. BOX 815 · TELEX 814271
PHONE 26 80 01

**POLIMEX-CEKOP tops the
world in the export of**

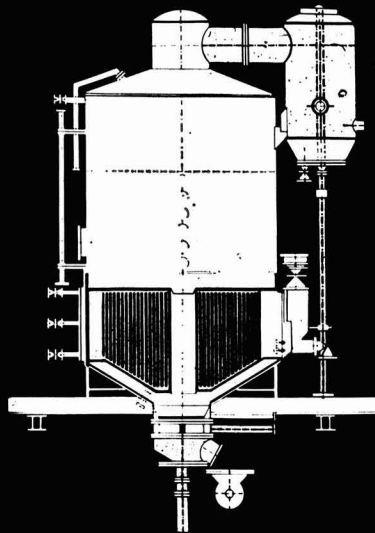
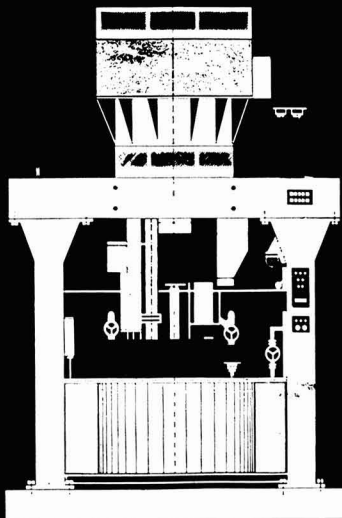
**COMPLETE SUGAR PLANTS
and SUGAR INDUSTRY EQUIPMENT**

POLIMEX-CEKOP has built abroad more than 40 complete beet and cane sugar factories—with an annual production capacity of more than ONE MILLION TONS OF SUGAR—in Iran, Morocco, Greece, Spain, Pakistan, China, Ghana, Ceylon, and the U.S.S.R.

**For a COMPLETELY NEW FACTORY
MAJOR MODERNIZATION
or SUGAR INDUSTRY EQUIPMENT**

contact

 **POLIMEX-CEKOP** LTD.



FS can help you...

Whether purchasing major items of plant or a complete sugar factory the question which frequently poses the greatest problem to a buyer is that of raising finance.

SECOND —

When dealing with Fletcher and Stewart who have specialised in the manufacture of sugar machinery for over 130 years, superiority in design, quality and service can be taken for granted, but arranging credit facilities also requires a special type of ability in which they are very experienced.

**THE
FINANCIAL
PACKAGE**

They design "Financial Packages" to suit the individual needs of their customers ranging from the comparatively simple provision of extended credit for the purchase of equipment, to comprehensive arrangements which include assistance in the financing of down payments as well as local civil and erection work for complete factory projects.

The fact that they have been entrusted with the building of five sugar factories within the last four years and have now secured a sixth speaks for itself.

When you think of sugar machinery—think of FS.

FS

FLETCHER AND STEWART LIMITED

A member of the Booker Group

DERBY

ENGLAND

DE2 8AB



Tel: Derby 40261

Telex: 37514

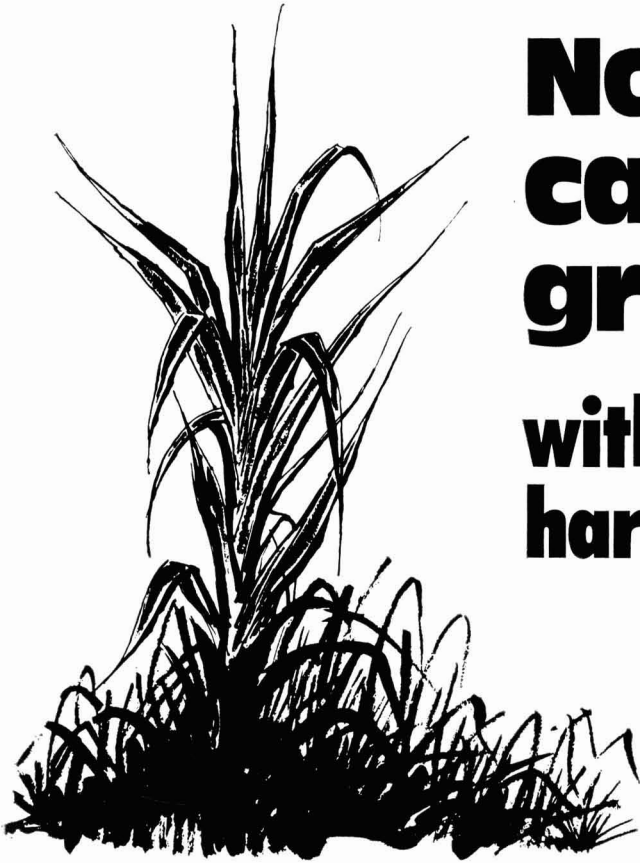
Cables: "Amarilla" Derby Telex

CRAIG



**Complete
sugar factories:
Replacing old equipment:
extending existing plant:
Consult CRAIG, specialists
in all sugar machinery.**

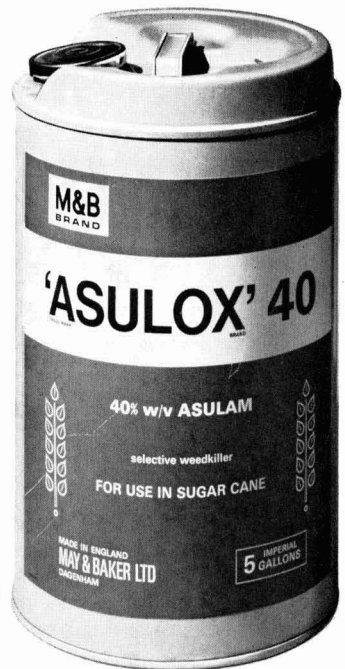
A.F.CRAIG & COMPANY LIMITED
CALEDONIA ENGINEERING WORKS, PAISLEY, SCOTLAND.
Telephone, 041-889 2191. Telegrams: CRAIG, Paisley
Telex: 778051
London Office: 727 Salisbury House, London Wall, London E.C.2



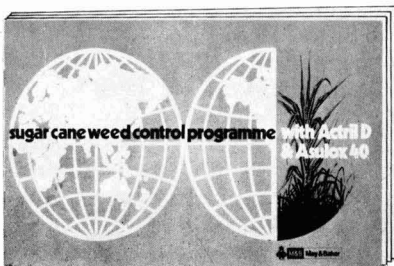
Now you can kill grasses without harming cane!

'ASULOX' 40 IS THE NEW HARD-HITTING KILLER FOR TOUGH GRASSES, SUCH AS *SORGHUM HALEPENSE* (johnsongrass) AND *PANICUM PURPURASCENS*.

... and the perfect partner for 'Asulox' 40 to give a complete programme of weed control is 'Actril' D - which gives rapid knockdown of the toughest broadleaved weeds.



SEND FOR FULL DETAILS OF THESE OUTSTANDING WEEDKILLERS NOW!



To May & Baker Ltd Dagenham Essex RM10 7XS England
PLEASE SEND INFORMATION ON 'ASULOX' 40 AND 'ACTRIL' D

Name

Position Company/Estate

Address

.....

.....

.....

.....

.....

.....

.....

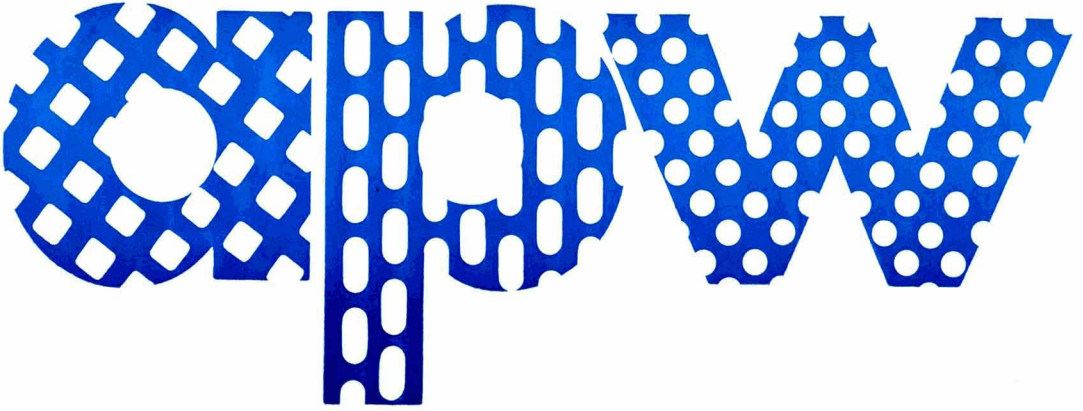
.....



M&B May & Baker

'Asulox' and 'Actril' are trade marks of May & Baker Ltd

ISJ 10



The only name you need to know in perforated metals

Associated Perforators & Weavers Limited are experts in their field. They produce every kind of perforation, from .012" to 1" thick, (0.3mm to 25mm).

In a wide range of materials—mild steel, high tensile steel, stainless steel, tinplate and most non-ferrous metals. APW also perforate precious metals and many non-metallic materials such as hardboard, rubber and rubber laminates.

Perforating that can be purely functional or totally decorative. But it is always precisely made to meet your requirements.

Try them out for your company, discuss your particular need with them. You will find them friendly, helpful and expert no matter how big or small the job.

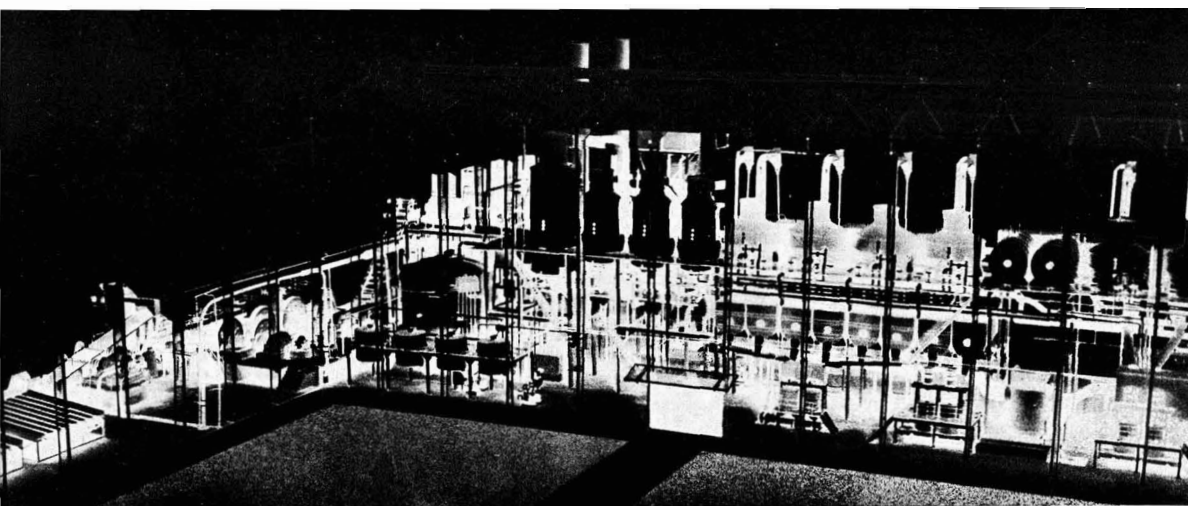
Write to:

Associated Perforators & Weavers Ltd.,
Woolwich Road, London, SE7 7RS.

Telephone: 01-858 6401 Telex: 896648

Northern Office and Works,
P.O. Box 161, Warrington WA1 2SU, Lancs.
Telephone: 0925 34119 Telex: 62508

apw



IT IS BEING ASSEMBLING IN VENEZUELA ONE OF THE MOST MODERN SUGAR CANE PLANT. WHO DID BUILD IT? M.DEDINI DID.

After an international bid for the construction of "Central Santa Maria C.A.", in Venezuela, M. Dedini built a complete Sugar Cane Plant, turn-key sistem.

Also in other countries, like Argentina, Bolivia, Paraguay and El Salvador there are in operation several Sugar Cane Plants equipped by M. Dedini.

These Dedini's achievements are becoming Brazil so known, that Dr. Emile Hu-

got, a famous sugar technician, due to his works on sugar technology, declared: "I have the great pleasure to certify that Brazil is also able furnish a complete Sugar Cane Plants, among the world competitors."

M.DEDINI S.A. METALÚRGICA

- an interprise of Mario Dedini Industrial Group
Av. Mario Dedini, 201 - Phone: PABX 2-3080
Piracicaba - SP - Brazil - São Paulo Office: Rua
Tagipuru, 235 - 13th floor - Phones: 51-2034,
51-5649, 51-5316, 52-0582 e 52-7663 - Gua-
nabara Office: Avenida Presidente Vargas, 542
22nd floor - Phone: 223-9949.

International agreements:

GHH (Gutehoffnungshütte
Sterkrade Aktiengesellschaft),
West Germany
BMA (Braunschweigische
Maschinenbauanstalt),
ERIE CITY ENERGY
DIVISION (Zurn Inc.), U.S.A.
ATELIERS DES
CHARMILLES, Switzerland
ATELIERS BELGES
RÉUNIS
(ABR Engineering), Belgium

Hodag CB-6 Increases Sugar Recovery ... Increases Pan Floor Output

Hodag CB-6, an easy-to-use additive, permits boiling pans to a higher brix and boiling of lower purity syrups. **Increased exhaustion of final molasses and recovery of more sugar is the result.**

A small amount of patented Hodag CB-6 makes possible greater processing capacity by increasing fluidity and circulation and reducing surface tension of syrups and massecurites.

Pan floor output is increased because boiling time is reduced—a vital improvement especially where pan or crystallizer capacity is limited.

CB-6 also helps overcome operating headaches caused by burnt, muddy, or delayed cane. It can keep

your pan floor operating in spite of low purity, hard-to-boil syrups.

This product can improve the quality of your sugar—helps to achieve higher purity, lower ash, better color, and better filterability through more uniform crystal formation, better purging.

Why not benefit from the experience of factories and refineries throughout the world that use Hodag CB-6. Let a Hodag representative show you how to use CB-6 to improve your boiling house operation.

Send the coupon below for more information.

-
- Please have a Hodag representative contact me.
 - Please send complete literature and case history data on Hodag CB-6.
 - Send information on other Hodag products for the Sugar Industry.

HODAG CHEMICAL CORPORATION / HODAG INTERNATIONAL S.A.

7247 North Central Park Ave., Skokie, Illinois 60076 U.S.A.
Cable Address: HODAG SKOKIEILL Telex: 72-4417

Name _____

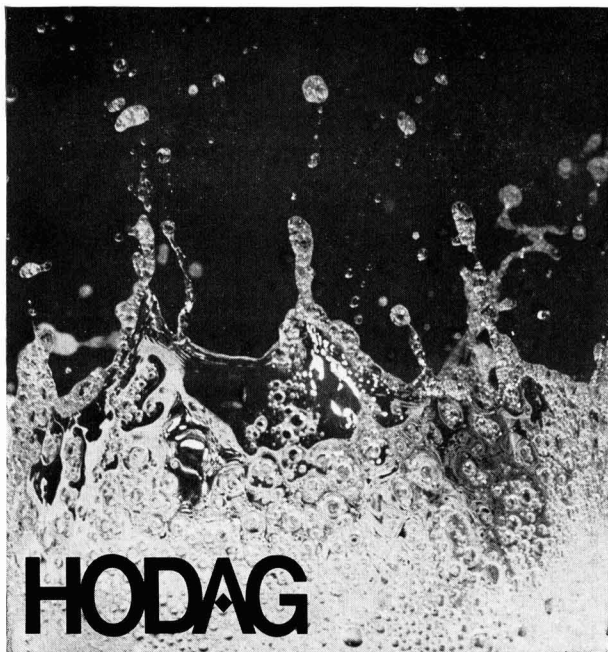
Title _____

Company _____

Address _____

City _____ State _____

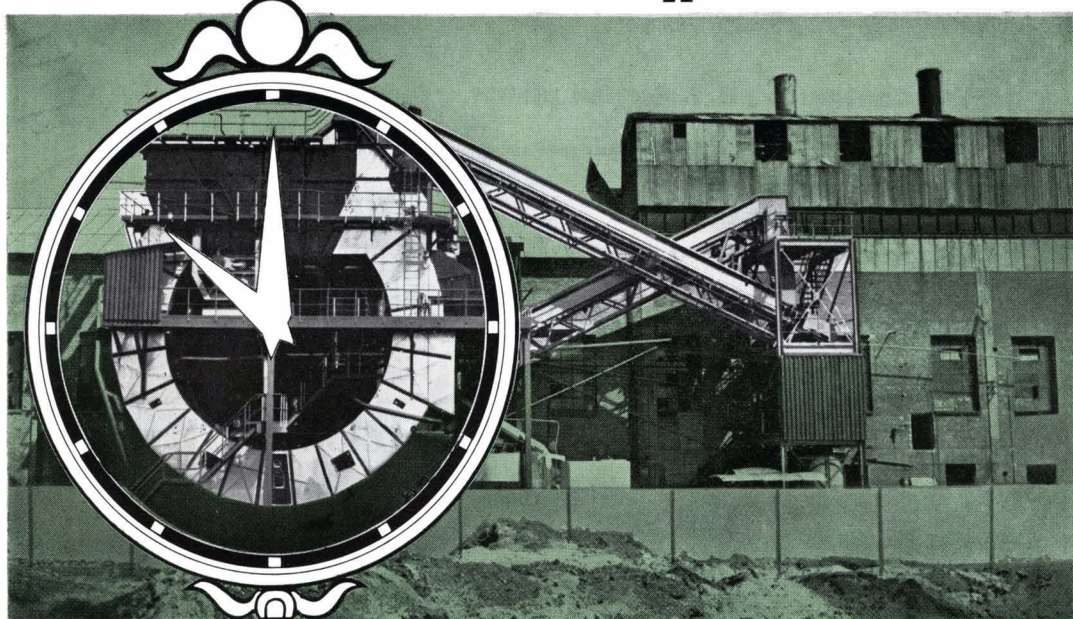
Country _____



The «SATURNE»

(PATENTED ALL COUNTRIES)

At last... true cane diffusion is here



**and
it works like a clock.**

***With its complete continuous counter current maceration
and its almost incredible mechanical simplicity.***

<i>drive ?</i>	<i>2 rollers, 1 hydraulic jack</i>
<i>construction ?</i>	<i>1 fixed circular hollow tube - 1 rotating ring</i>
<i>feeding ?</i>	<i>by gravity</i>
<i>discharge of the bagasse ?</i>	<i>by gravity</i>
<i>circulation of the juices ?</i>	<i>by gravity</i>
<i>power ?</i>	<i>about 30 HP</i>
<i>wear and tear ?</i>	<i>insignificant</i>
<i>maintenance ?</i>	<i>negligible</i>
<i>ground space ?</i>	<i>16' x 26'</i>

SAGAL Publicité - Paris - 385



For documentation on the "SATURNE" write to:
SUCATLAN ENGINEERING

18, avenue Matignon - PARIS 8^e - FRANCE

Phone: 225.60.51 - 359.22.94

Telex: 29.017 (SUCATLAN-PARIS)

Cable address: SUCATLAN-PARIS



SOCIETE SUCRIERE D'ETUDES ET DE CONSEILS

CONSULTING ENGINEERS FOR THE SUGAR INDUSTRY

R.T. CONTINUOUS DIFFUSERS — AUTOMATIC G.P. FILTERS — PRECISION DRILLS . . .

NEW! Continuous R.T. Steffen plants. Patented Process.

- Completely redesigned and simplified equipment
- White sugar yields: up to 90% on input molasses sugar
- Reduced labour costs and lime consumption
- Production of concentrated waste waters

Full information including feasibility studies on request.

S.S.E.C. | Aandorenstraat - 3300 TIENEN-BELGIUM

Phone: 016/830.11 Telex: 22251

Precision Instruments

Announcing:-

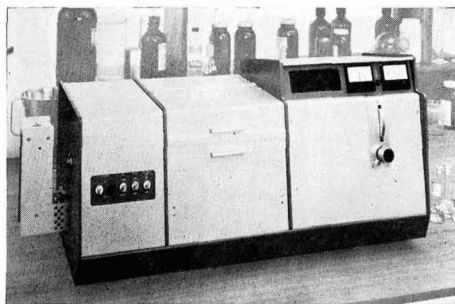
Polarimeter & Saccharimeter Model P 70

The instrument can be provided with any one of three scales to suit your requirements:-

- (a) Angular scale 90° - 0 - 90° angular, subdivided by vernier directly to 0.005°
- (b) International Sugar Scale, 26 grm, -130° to $+130^{\circ}$ subdivided by vernier directly to 0.05° I.S.S. for use with source at 589.3 nm.
- (c) International Sugar Scale, 26 grm, -130° to $+130^{\circ}$ subdivided by vernier directly to 0.05° I.S.S. for use with source at 546.1 nm.

The instrument accommodates standard sample tubes of up to 200 mm path length with provision for water jacketed, continuous flow or successional sampling types. A version can also be supplied with automatic compensation for sample rotation with a range of $\pm 2^{\circ}$ angular or $\pm 5^{\circ}$ I.S.S., with offset facility, enabling digital presentation of rotation with printout capability. Solid state electronics on plug in P.C. boards for ease of maintenance.

SOLE DISTRIBUTORS IN U.K. OF SCHOTT INTERFERENCE FILTERS

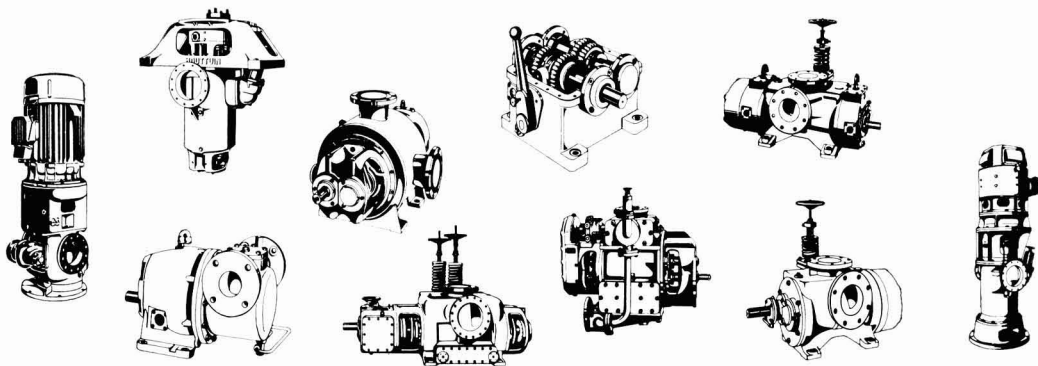


Have you received details of our new transmitting pan refractometer for supersaturation control?

BELLINGHAM & STANLEY LIMITED

61, MARKFIELD RD, LONDON N15. TEL. 01-808 2675

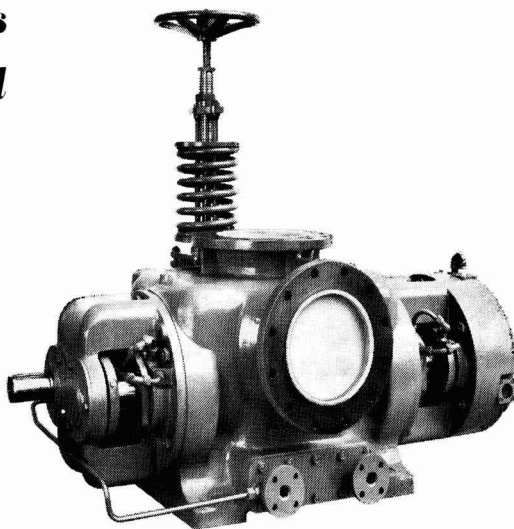
HOUTTUIN-HOUTTUIN-HOUTTUIN



HOUTTUIN-HOUTTUIN-HOUTTUIN

***Hundreds of references
from all over the world
are your guarantee
of foolproof operation***

Houttuin screw pumps perform a fine job in navigation, oil storage yards and oil refineries, the petro-chemical industry, margarine manufacturing plants, sugar mills, and many other industries. Houttuin screw pumps have a high selfpriming capacity, a uniform delivery (without pulsations), and are eminently suited for viscous, lubricating and non-lubricating liquids.



*10" horizontal pump for non-lubricating liquids.
Output: 330 cu.m/hr
Total head: 6kg/cm²
Speed: 1460 r.p.m.*



Horizontal and vertical Houttuin screw pumps which can be directly coupled to the prime mover - with the screws driven by gears fitted either inside or outside the pump housing - are available for all purposes, in many types, operating at high efficiency.

We shall be glad to send you our comprehensive catalogue.



When sugar is the subject

the DDS-Cane Diffuser very often
slips into the conversation of engineers discussing details of their trade...

- »Processing and throughput« says the mechanical expert »are elements of technical skill and smooth maintenance, combined with constant control«
- »Which« adds his chemical colleague »eventually must lead to increased extraction«
- »The DDS-Cane Diffuser, you mean?«
- »Obviously!«.

Wherever experts talk sugar, real appreciation is given to the DDS-SYSTEM.

A/S DE DANSKE SUKKERFABRIKKER · 5 Langebrogade · DK-1001 Copenhagen K
Denmark · Teleph.: ASTA 6130 · Telegr.: Sukkerfabrikker Copenhagen
Telex: 27030 DANSUK DK



Editor and Manager:

D. LEIGHTON, B.Sc., F.R.I.C.

Assistant Editor:

M. G. COPE, M.I.L.

Agricultural Editor:

F. N. HOWES, D.Sc., I.S.O.

* * *

Panel of Referees**A. CARRUTHERS,***Consultant and former Director of Research, British Sugar Corporation Ltd.***W. R. CRAWFORD,***Research and Development Engineer, Walkers Ltd.***K. DOUWES DEKKER,***Consultant and former Director, Sugar Milling Research Institute, South Africa.***M. MATIC,***Director, Sugar Milling Research Institute, South Africa.***G. PIDOUX,***Applied Research Dept., Générale Sucrière.***T. RODGERS,***Production Director, British Sugar Corporation Ltd.*

* * *

Advertisement Representatives**Australia:** Park Associates Pty. Ltd.Capitol Centre,
113 Swanston Street,
Melbourne, Victoria 3000.

Tel.: 639151.

Japan: Ikon Ltd.Showa Building,
23 Sakuragawa-cho,
Shibanishikubo, Minato-ku,
Tokyo.

Tel.: 591-0712/502-1594.

* * *

*Published by***The International Sugar Journal Ltd.**23a Easton Street, High Wycombe,
Bucks., England.

Telephone: High Wycombe 29408

Cable: Sugaphilos, High Wycombe

* * *

Annual Subscription: £3.00 or \$10.00 post free

Single Copies: 40p or \$1 post free

International Sugar Journal

November 1972

Contents

	PAGE
Notes and Comments	321
* * *	
Square box couplings in cane mill drives	323
By H. Okamura, H. Tanaka and M. Terao Part II	
Sugar cane mechanization and machine productivity	327
By Richard T. Symes	
ATAC 40	331
The 40th Conference of the Cuban Sugar Technologists' Association	
ICUMSA Cuban National Committee	334
* * *	
Sugar cane agriculture	336
Cane sugar manufacture	341
Beet sugar manufacture	344
Laboratory methods and Chemical reports	346
By-products	349
Trade notices	350
International Society of Sugar Cane Technologists	351
Brazil sugar statistics	352
Brevities	351-2
Index to Advertisers	xxviii

2038116 2038116
358

SOMMAIRES : ZUSAMMENFASSUNGEN : SUMARIOS

Manchons d'accouplement carrés dans les transmissions de moulins à canne. IIe Partie. H. OKAMURA, H. TANAKA et M. TERAQ.

p. 323-327

Les résultats d'expériences faites en vue de déterminer les effets d'un certain nombre de facteurs sur les forces supplémentaires engendrées dans les manchons d'accouplement carrés de transmissions de moulins à canne, sont donnés sous forme de graphique et discutés. Les directions prises par les valeurs de la force radiale et du moment de torsion supplémentaires (mesurés tous deux dans le sens vertical et horizontal) sont indiquées. La force axiale supplémentaire exercée sur le manchon d'accouplement est relativement faible et ne fut pas mesurée. On donne aussi les valeurs conseillées du coefficient de friction et la distance entre les points de contact en vue de leur introduction dans les équations permettant de calculer ces forces supplémentaires, ainsi qu'un avis sur la meilleure façon de réduire ces forces supplémentaires.

* * *

Mécanisation de la canne à sucre et productivité du matériel. R. T. SYMES.

p. 327-330

Les facteurs importants affectant la productivité des diverses machines mises en oeuvre sur les champs de canne à sucre sont leur vitesse, leur disponibilité et la surveillance de leur fonctionnement. Des facteurs secondaires importants pour l'obtention du meilleur rendement en "sucre bon-marché" sont la sélection de l'équipement approprié et l'assurance d'utiliser son potentiel au maximum, l'adoption de conditions sur les champs permettant de rentabiliser au maximum le matériel, l'entraînement et la motivation adéquates des opérateurs et l'organisation du travail en vue de coordonner différentes opérations. Le même soin doit être apporté à l'entretien préventif, au contrôle des pièces de rechange, etc., afin de réduire au minimum le temps de mise hors-service, tandis que les surveillants doivent être entraînés de façon approfondie et être capables d'assurer le fonctionnement du système mécanisé avec un rendement maximum.

* * *

ATAC 40: La 40e Conférence de l'Association de Technologistes Sucrères Cubains.

p. 331-334

On donne des détails sur la 40e Conférence de l'Association de Technologistes Sucrères Cubains qui eut lieu du 28 août au 3 septembre 1972 à La Havane. On décrit des travaux agricoles en canne à sucre, accompagnés d'illustrations des diverses pièces d'appareillage utilisées.

* * *

Comité national Cubain de l'ICUMSA.

p. 334-335

Les travaux effectués par le Comité National Cubain de l'International Commission for Uniform Methods of Sugar Analysis (ICUMSA) depuis la 15e Session en 1970 sont résumés en onze sujets.

Vierkantkupplungen für Rohrmühlenantriebe. Teil II. H. OKAMURA, H. TANAKA und M. TERAQ.

S. 323-327

Die Ergebnisse von Untersuchungen zur Bestimmung des Einflusses einer Zahl von Faktoren auf die in Vierkantkupplungen für Rohzuckermühlenantriebe auftretenden zusätzlichen Kräfte werden graphisch dargestellt und diskutiert. Der Trend für die Werte der zusätzlichen Radialkraft und des zusätzlichen Biegemoments—beide in vertikaler und horizontaler Richtung gemessen—wird aufgezeigt. Die zusätzlich auf die Kupplung wirkende Axialkraft ist im Vergleich dazu klein und wurde nicht gemessen. Die Autoren geben weiterhin Werte für den Reibungskoeffizienten und den Abstand zwischen den Berührungspunkten an, die sie zum Einsetzen in Gleichungen zur Berechnung der zusätzlichen Kräfte empfehlen, und machen Vorschläge für die beste Möglichkeit, diese Kräfte zu reduzieren.

* * *

Mechanisierung des Zuckerrohranbaus und maschinelle Leistung. R. T. SYMES.

S. 327-330

Die hauptsächlichsten Faktoren, welche die Leistung der Maschinen beeinflussen, die auf Zuckerrohrplantagen arbeiten, sind ihre Geschwindigkeit, ihre Verwendbarkeit und die Ueberwachung während des Betriebes. Als für die Erzeugung von "billigem Zucker" wichtige Faktoren kommen in zweiter Linie in Betracht: die Auswahl des geeigneten Geräts und die Gewissheit, dass seine Leistung voll ausgenutzt wird, Anbaubedingungen, die eine hohe Maschinenleistung garantieren, ausreichende Unterweisung des Bedienungspersonals sowie die Koordinierung der einzelnen Operationen durch Arbeitsplanung. Ausserdem muss für eine pflegliche Behandlung, ein ausreichendes Ersatzteillager usw. Sorge getragen werden. Schliesslich sollte das Aufsichtspersonal intensiv geschult werden und in der Lage sein zu gewährleisten, dass das Mechanisierungssystem mit der optimalen Leistung arbeitet.

* * *

ATAC 40: 40. Konferenz der Vereinigung der Kubanischen Zuckertechniker.

S. 331-334

Es wird über die 40. Konferenz der Vereinigung der Kubanischen Zuckertechniker berichtet, die vom 28. August bis zum 3. September in Havanna stattfand. In diesem Bericht sind die Arbeiten beim Zuckerrohranbau beschrieben und Bilder von den verschiedenen eingesetzten Maschinentypen wiedergegeben.

* * *

Kubanisches Nationalkomitee der ICUMSA.

S. 334-335

Die vom Kubanischen Nationalkomitee der Internationalen Kommission für einheitliche Methoden der Zuckeruntersuchung (ICUMSA) seit der im Jahre 1970 abgehaltenen 15. Sitzung durchgeführten Arbeiten sind unter 11 Referaten kurz abgehandelt.

Acoplamiento de ejes con collares cuadrados en el accionamiento de molinos de caña. Parte II. H. OKAMURA, H. TANAKA y M. TERAQ.

Pág. 323-327

Resultados de experiencias para determinar los efectos de varios factores sobre las fuerzas adicionales generado en los acoplamientos de ejes con collares cuadrados para el accionamiento de molinos de caña se presentan en forma gráfica y se discuten. Las tendencias en los valores de la fuerza adicional y momento adicional de flexión (ambos medido en sentidos vertical y horizontal) se indican. La fuerza adicional axial que afecta el acoplamiento es relativamente pequeña y no fue medido. También se dan valores recomendados del coeficiente de fricción y de la separación entre puntos de contacto para intercalar en ecuaciones para calcular las fuerzas adicionales, y consejo se brinda sobre los mejores medios para reducir las fuerzas adicionales.

* * *

Mecanización de la caña de azúcar y productividad de las máquinas. R. T. SYMES.

Pág. 327-330

Los factores mayores que afectan la productividad de máquinas que operan en campos cañeros son su velocidad, su disponibilidad y la supervisión de su operación. Sub-factores de importancia para acabar eficiencia en la producción de "azúcar barato" incluyen selección de equipos apropiados y aseguramiento que se usa su potencial completo, adopción de condiciones en el campo que permitirán alta productividad de las máquinas, apropiada educación y motivación de los operadores, y planificación de la obra para coordinar la diferentes operaciones. Cuidado similar debe darse a entretenimiento preventivo, control de piezas de repuesto, etc., para asegurar tiempo minimal fuera de servicio. Es necesario educar los supervisores minuciosamente y deben ser capaz de asegurar que la sistema de mecanización funciona a productividad maximal.

* * *

ATAC 40: La 40a Conferencia de la Asociación de Técnicos Azucareros de Cuba.

Pág. 331-334

Se presentan detalles de la 40a Conferencia de la ATAC celebrado el 28 agosto al 3 septiembre 1972 en La Habana. Se describen operaciones en el cultivo de caña, y también se ilustran varios tipos de maquinaria utilizada.

* * *

Comité Nacional Cubano de ICUMSA.

Pág. 334-335

Trabajo realizado por el Comité Nacional Cubano de la Comisión Internacional para Métodos Uniformes de Analisis de Azúcar (ICUMSA) desde la 15a Sesión en 1970 se resume debajo de once títulos.

THE INTERNATIONAL SUGAR JOURNAL

VOL. LXXIV

NOVEMBER 1972

No. 887

Notes & Comments

International Sugar Agreement supply commitment

The prevailing price exceeded 6.50 cents per pound in the stipulated period of 17 consecutive market days whereupon the provisions of the Agreement under which exporters must supply their traditional customers with sugar at prices no higher than the supply commitment price of 6.95 cents per pound came into force on the 12th September. When the prevailing price exceeds 6.50 cents/lb during the final four months of the quota year, importing members have the option, under Article 30 of the Agreement, and provided that the option is exercised within 30 days, of buying up to 100% of their base commitments for the following year, i.e. the average of their imports from the exporting members during the two preceding calendar years, at a price of 6.95 cents/lb irrespective of the world price. It is believed unlikely that importers would wish to commit themselves to as much as 100% of what would probably be most of their 1973 requirements, and options to buy about 25% of base requirements are considered more likely.

* * *

US sugar quotas, 1972¹

On the 13th September the US Department of Agriculture declared deficits totalling 7144 short tons, raw value, against the 1972 sugar quotas for Haiti and Honduras and has reallocated these amounts among other suppliers. Under the 1971 amendments to the Sugar Act the Secretary of Agriculture has to reassess the possibility of shortfalls among the various quota holders at regular intervals and it is interesting to note that, although the Philippines have refused further reallocations of shortfall from other suppliers, they have not declared a deficit against their present entitlement.

The changes in the quotas are as follows: Argentina (191 tons), Brazil (1378 tons), British Honduras (85 tons), Colombia (170 tons), Costa Rica (278 tons), Dominican Republic (1598 tons), Ecuador (204 tons), Guatemala (238 tons), Haiti (-6812 tons), Honduras (-332 tons), Mexico (1413 tons), Nicaragua (260 tons), Paraguay (16 tons), Peru (986 tons), Salvador (173 tons), Venezuela (154 tons).

Sugar production development symposium²

The Technical Committee of the Compagnie des Commissionnaires Agréés will hold a symposium on the development prospects of the sugar industry in Paris during the 20th-21st November 1972. A symposium held in Brussels last November by the Confederation of European Beet Growers and the European Committee of Sugar Producers, reached the unanimous conclusion that production will have to be increased by between 20 and 30 million tons during this decade³. The organizing committee believes it would be useful to go a step further and to study the means by which this increased consumption could be satisfied. The factors to be considered in order to achieve this aim can be grouped under the following general headings: agricultural production, construction of sugar factories, commercial circumstances, and finance.

* * *

UK Sugar Board

As forecast in our previous issue, the lower world prices of sugar on the London Market led to a reduction of the distribution payments on sugar made by the Sugar Board from £26 to £20 per ton on the 13th September. Subsequent improvement in the London price resulted in the distribution payments being increased to £22 per ton from the 29th September, to £26 from the 5th October and to £28 per ton from the 10th October 1972. This last change is the 22nd in the rate distribution payment since it was introduced on the 1st February.

The fall in world prices which occurred during the first half of September were largely recovered during the second half, when the London price was very steady at £71-£72 per ton. At the beginning of October the price climbed to £77 but it later fell back to £72.50 and at the time of writing has reached £78.50. It would seem that a large number of traders are awaiting more definite news of the European and particularly the USSR beet sugar crop; recent test results indicate that the West European sugar yields

¹ C. Czarnikow Ltd., *Sugar Review*, 1972, (1092), 161, 163.

² F. O. Licht, *International Sugar Rpt.*, 1972, 104, (26), 8.

³ *I.S.J.*, 1972, 74, 2.

are likely to be considerably poorer than last campaign so that a fall in production is likely in spite of the higher beet area.

Continuing publicity has been given to Soviet agricultural problems and there have been rumours of notifications that the USSR would not be able to meet export commitments in 1973 as in 1972. The important question remains, whether imports from the world market will be needed as in this year; should this be the case the sugar price is likely to increase considerably, while the present sentiment is indicated by the current level of over £70 per ton which compares with the £50 Negotiated Price of the Commonwealth Sugar Agreement—"sufficient to give a reasonable profit to an efficient producer".

* * *

UK sugar beet contract in 1973

In previous years it has been possible in about September to circulate the forms inviting farmers to offer to grow sugar beet in the following season. However the entry of the United Kingdom into the European Economic Community at the beginning of 1973 has entailed considerable revision of the sugar beet contract, which, in a number of respects, has to be in line with Community regulations.

The new contract has been the subject of negotiations between the National Farmers Union and the British Sugar Corporation. Agreement has been reached on all matters of major importance, and the Corporation expected that it would be possible to issue the beet offer form for the 1973 season during October 1972.

It is the Corporation's intention to issue contracts for 1973 for a total of not less than the existing prescribed acreage of 443,000, and the Ministry of Agriculture, Fisheries and Food has stated that a guarantee of price will be given for the produce of such an acreage. The Corporation anticipate that in the vast majority of cases they will be able to contract with sugar beet growers for the same acreage as in 1972.

* * *

US sugar quotas, 1973¹

The US Department of Agriculture announced its proposals for 1973 quotas at the beginning of October and, at 11·8 million short tons, raw value, the proposed Overall Supply Quota for next year is already as high as that currently in effect for 1972. It has become customary in past years to commence with quota levels below anticipated total demand and raise the amount in stages as each year progresses. It would appear that with the overall tightness in world sugar supplies the USDA are giving adequate notice to US quota holders of the likely extent of their deliveries next year.

As happened when quotas were proposed a year ago, a deficit has been declared against Puerto Rico's quota, this time amounting to 650,000 tons. A short-fall of 192,000 tons has also been declared against

the domestic beet area while no entitlements have been proposed for Uganda or Bolivia. At the beginning of this year Uganda held a quota of 15,252 tons and Bolivia 5,713 tons. All these amounts have been reallocated among other suppliers. Details of the proposals are given below; interested parties had until the 19th October to submit their comments.

	Proposed 1973 quotas <i>—(short tons, raw value)—</i>	1972 quotas in effect
Domestic Beet	3,500,000	3,400,000
Mainland Cane	1,643,000	1,643,000
Hawaii	1,175,000	1,218,238
Puerto Rico	205,000	175,000
Philippines	1,385,619	1,401,761
Argentina	82,229	85,689
Australia	211,394	210,797
Bahamas	29,021	61
Bolivia	0	54
Brazil	593,344	618,304
British Honduras	36,548	38,085
Colombia	73,093	76,168
Costa Rica	74,169	99,200
Dominican Republic	687,933	716,873
Ecuador	87,605	91,289
Fiji	46,321	46,190
Guatemala	63,418	84,128
Haiti	33,321	23,000
Honduras	12,900	17,495
India	84,641	84,403
Ireland	5,351	5,351
Malagasy Republic	12,633	12,597
Malawi	15,581	0
Mauritius	31,162	31,074
Mexico	608,392	633,985
Nicaragua	69,330	72,346
Panama	69,330	43,500
Paraguay	6,987	7,281
Peru	424,584	442,444
Salvador	46,220	48,231
South Africa	59,797	59,628
Swaziland	31,162	31,074
Taiwan	88,010	87,763
Thailand	19,370	19,316
Venezuela	66,107	68,887
West Indies	221,428	206,788
	<hr/> 11,800,000	<hr/> 11,800,000

* * *

Dutch sugar school closure².—The School voor Suikerindustrie in Amsterdam, Holland, has announced that its activities were to come to an end on the 31st August 1972.

* * *

Guyana expansion plans³.—The sugar industry in Guyana is to be expanded to produce about 500,000 tons of sugar by the end of 1980. An extra 40,000 acres of land are to put under cultivation to yield enough cane from which to produce more than 225,000 tons of sugar annually. The 1971 output stood at 368,000 tons.

* * *

European sugar refiners to merge⁴.—Société F. Beghin and Société des Raffineries et Sucreries Say have announced their intention to merge as from 1st January 1973. Tate & Lyle Ltd., the UK refiners, have now foregone an original option by which they might have acquired a majority holding in European Sugars (France) and therefore in Say alone.

¹ C. Czarnikow Ltd., *Sugar Review*, 1972, (1095), 176–177.

² F. O. Licht, *International Sugar Rpt.*, 1962, 104, (18), 5.

³ *W. Indies Chron.*, 1972, 87, 325.

⁴ *Tate & Lyle News*, August 1972.

Square box couplings in cane mill drives

By H. OKAMURA, H. TANAKA and M. TERAO

(Hitachi Shipbuilding & Engineering Co., Ltd., Osaka, Japan.)

PART II

EXPERIMENTAL RESULTS

The experiments to determine the extra forces were performed under various conditions. Many useful results were obtained; however the following seven cases have been picked from these as typical data which represent different characteristics for each individual condition.

- Case 1. Ratio of eccentricity λ : 0
(Without lubrication)
- Case 2. λ : -0.0051
(Without lubrication)
- Case 3. λ : -0.0086
(With lubrication)
- Case 4. λ : -0.0125
(Without lubrication)
- Case 5. λ : +0.0086
(Without lubrication)
- Case 6. λ : -0.0051
(With lubrication)
- Case 7. λ : -0.0086
(Without lubrication)

Note: The ratio of eccentricity λ is:
(difference between centres of the two shafts)/
(effective length of square shaft).

The values shown in the figures are the extra forces generated on the drive shaft end; the same magnitude of extra force is exerted on the driven shaft in the reverse direction.

Factors affecting the extra forces

The effects of the following five factors on the extra forces were investigated through many experiments under various conditions.

(i) Effect of transmitting torque

According to the theoretical equations, the extra force is proportional to the transmitting torque. This was proved by the experiments, though there was dispersion in the obtained values as shown in the figures.

The causes of this dispersion are considered to be:
(a) movements of contacting points of the square shaft and coupling box during revolution, and

(b) changes in the contacting conditions of the mating surfaces, i.e. change of coefficient of friction, change of direction of contacting force, etc.

Since there is a possibility that the contacting points move in cycles during one revolution, the data were analysed from this point of view. However, the expected cyclic movements were found fairly clearly in some data but not at all in other data. The cause of this phenomenon we supposed to be the difference of the initial mating condition of shaft and coupling box. In any case, the average values of the extra forces are proportional to the transmitting torque.

(ii) Effect of difference between drive and driven shaft centres

The mill final gear is installed so as to lessen the difference between centres of the mill top roller shaft and master gear shaft during operation.

In the theoretical equations, the effect of difference of centres is included in l_1 (distance between two contacting points). Theoretically it was supposed that the difference changes l_1 , thus affecting the extra forces. To confirm this supposition, experiments were carried out giving different values of lifts to

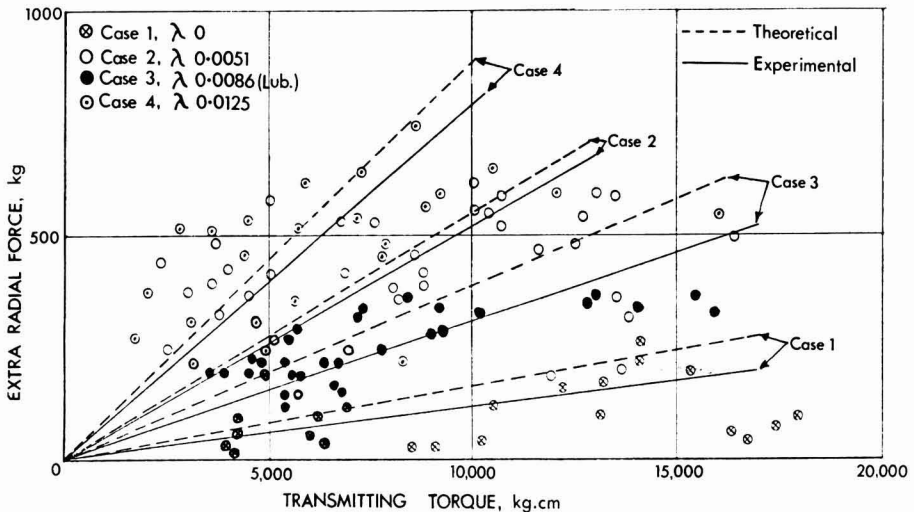


Fig. 8. Extra radial force

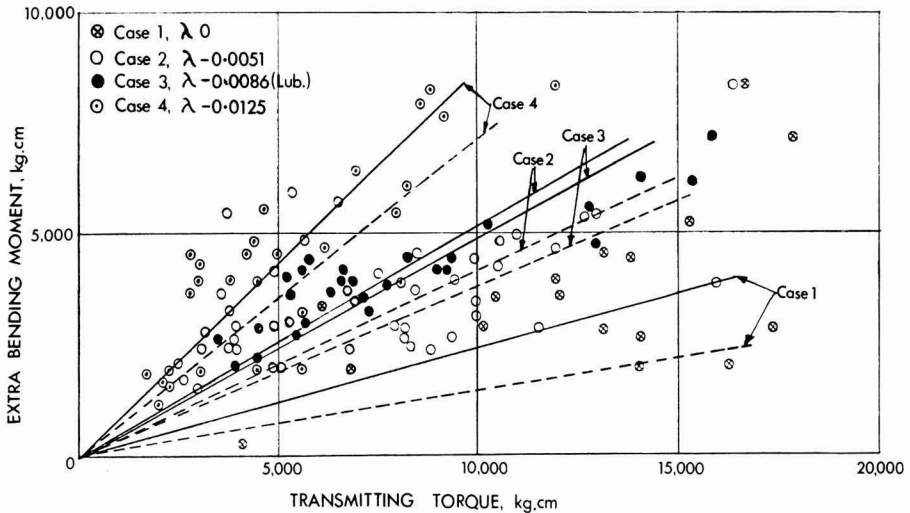


Fig. 9. Extra bending moment

the shaft. The results showed that the difference of centres has a large effect on the extra forces as is clearly shown in Figs. 8 and 9. A small difference generates smaller extra force and large difference generates greater extra force. In other words, the above distance l_1 decreases as the difference decreases, so that the extra force decreases accordingly.

The direction of the extra radial force varies with the relative position of the two shafts.

(iii) Effect of oil in the coupling box

According to the theoretical equation, if oil reduces the friction at the contacting surfaces, it is clear that it will reduce the extra forces. In the experiments, the effect of oil was investigated for the various lubricating conditions. The results were shown in Fig. 10.

From the graph, it can be seen that the oil reduces the magnitude and dispersion of extra bending moment in the experimental square box coupling. But the oil should make an oil film so as to lessen the friction and thus reduce the extra force. In the practical coupling it is very difficult to form an effective oil film between two mating surfaces, because the contacting pressure is very high, the surfaces are rough and other necessary conditions are difficult to meet.

(iv) Effect of the clearance between the square shaft and coupling box

According to the theoretical analysis, the clearance between the square shaft and coupling box will have little effect on the extra forces if it is large enough not to hinder the top roller lift. To confirm this supposition, various sizes of coupling box were prepared. From the experimental results it is concluded that the clearance does not have any effect on the extra forces as initially expected. The cause of the phenom-

enon is that the size of the clearance scarcely changes the contacting conditions from the point of view of the generation of extra force.

(v) Effect of the shape of the coupling boxes

The effect of various shapes of coupling boxes on the extra force is determined by the position and number of contacting points. However, it is rather difficult to make a theoretical analysis of various types of box coupling, so the effect was checked by measuring the extra forces generated at them. For this purpose a hexagonal coupling box and shaft, a rectangular coupling box and shaft, and other types of coupling were prepared. But no distinct difference was found in the value obtained for the individual couplings. From this it may be concluded that box couplings of different shapes have no effect on the extra forces unless they change the contacting conditions of the coupling.

VALUES OF EXTRA FORCES

(i) Extra radial force on coupling

The radial force was measured in both vertical and horizontal directions.

It was seen that the extra vertical force increases as the torque increases, though the increasing rates differ for each case. Another interesting fact is that the direction of the vertical force changes upwards or downwards according to the positions of the two shafts, i.e. if the drive shaft is lower than the driven shaft, the vertical force generated at the drive shaft end is in the upward direction and vice versa. In Fig. 11 this phenomenon is shown clearly.

The horizontal force seems to be comparatively small and almost independent of transmitting torque. This is because the horizontal force alternates direction and the value moves around zero in accordance with the positions of the contacting points.

The extra radial force calculated from the above vertical and horizontal force are shown in Fig. 8. In Fig. 8 the theoretical value calculated by equation (7) with assumed values of l_1 and μ are shown by broken lines. The measured radial force differs widely according to the running conditions of each case, and the theoretical values are a little larger than them. In the experiment the greatest radial force was generated when the difference between the drive and driven shaft centres was largest, and the least force was generated when the difference was smallest. This is because the distance between two contacting points differ for each case and, to put it more concretely, the distance l_1 increases as the difference in lifts increases and *vice versa*. From the values obtained it is found that the two contacting points separate furthest for case 4, and come nearest for case 1; thus the magnitude of the extra force is changed.

(iii) Extra bending moment on the coupling

The extra bending moment was also measured in both vertical and horizontal directions.

The vertical bending moment fluctuates widely about zero, and whether the value is positive or negative is determined by the contacting conditions of each case, especially by the direction of slip. But since the contacting condition changes irregularly, it is useless to determine the direction of moment beforehand. Compared with the horizontal bending moment, values of the vertical bending moment have large dispersion. This is because the vertical bending moment is affected by the contacting conditions to a greater extent than the horizontal bending moment.

The horizontal bending moment is proportional to the transmitting torque, and the direction varies

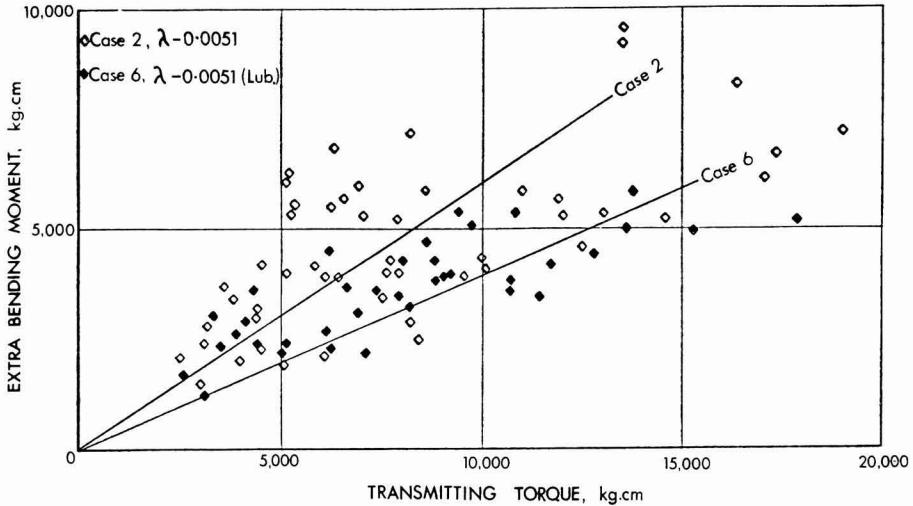


Fig. 10. Effect of oil on extra bending moment

From these results, it is concluded that the theoretical equation (7) can be well applied for calculating the extra radial force giving suitable values to l_1 and μ according to the various operating conditions.

(ii) Extra axial force (thrust) on the coupling

The extra axial force is also proportional to the transmitting torque. According to the theoretical analysis, the value is obtained by multiplying the extra radial force by the coefficient of friction.

In the experiment, the extra axial force was not measured since this force is comparatively small and the value is assumed from the measured value of extra radial force.

However, careful attention should be paid, as in an actual mill drive the axial force permissible is small since a greater force has a bad effect on the mill roller and gear box.

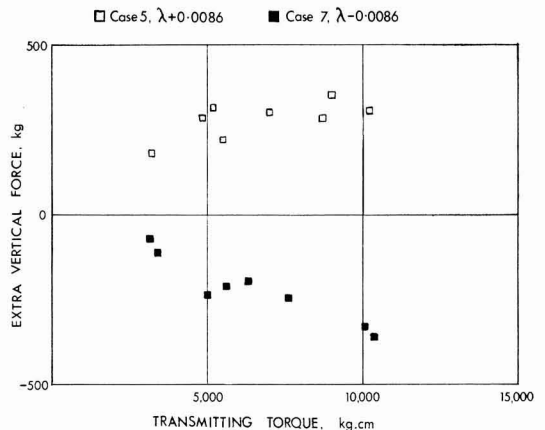


Fig. 11. Effect of relative position of two shafts

according to the difference in drive and driven shaft height, as mentioned before.

The value of extra bending moment calculated from the above vertical and horizontal bending moments are shown in Fig. 9. In this diagram the theoretical values calculated from equation (9), using assumed values of l_1 and μ , are shown with broken lines. The measured bending moments differ widely, in the same degree as the radial forces, according to the running condition of each case, while the theoretical values are a little smaller than the actual values.

In the experiment the greatest bending moment was generated when the difference between drive and driven shaft centres was greatest, and the smallest moment was generated when the difference was least, which is the same phenomenon as with the extra radial force.

CALCULATION OF EXTRA FORCES

As mentioned above, it is found that the extra forces can be calculated by equations (7), (8) and (9). In practice, it is necessary to determine suitable values of the coefficient of friction and the distance between contacting points for an individual coupling. Although the above factors change considerably according to the operating conditions even in the same coupling, average values can be determined and, in practice, the extra force may be calculated satisfactorily by putting these into the equations.

The following are the recommended value of the factors obtained from the experimental results:

(i) Coefficient of friction, μ

The coefficient of friction to be applied for calculation of extra forces generated on a practical square box coupling under operating conditions is around 0.3. This coefficient of friction may vary for individual operating conditions, but this value may be supposed to be the average. It may also be presumed from the result of analysis made of failure of the final gear box.

(ii) Distance between contacting points, l_1

The distance between contacting points changes according to the difference between drive and driven shaft centres. From experimental results the value of l_1 is given by the following equation:

$$l_1 = 6.5 \lambda l_{cb} \dots\dots\dots(10)$$

where l_{cb} is the length of coupling box.

Though the distance changes irregularly even during one revolution, the average may be supposed to be the value given by the above equation.

CONCLUSIONS

It has been demonstrated that it is possible to apply the theoretical equations (7), (8) and (9) to calculation of the extra forces generated at a square box coupling, and if the operating conditions are suitably taken into consideration the calculated values will approach the actual ones. The contacting conditions of coupling box and square shaft have been shown to be the most important factor to affect

the magnitude and direction of the extra forces. If the distance between two contacting points in the axial direction is small, the extra forces are also small. Therefore to reduce the extra forces, the first step should be to reduce this distance.

The relative positions of the drive and driven shaft are a significant factor affecting the extra force, because these determine the above-mentioned distance between the two contacting points. From the experimental results it has been found that the difference has a large effect on both extra radial force and bending moment, so that the final gear box should be installed in such a way that the difference during operation may be as small as possible.

It will be difficult to form an oil film between two mating surfaces in a square box coupling, and it may therefore be of little use to put the oil into a practical box coupling, though the oil had considerable effect on the extra force in the experiment. The other methods examined, such as use of different shapes of coupling box, use of a box with a loose hole, etc., will not be of great help in reducing the extra force unless they lessen the distance between contacting points.

The results of experiments suggest the following means to reduce the extra force:

- (a) The coupling box should be as short as possible to lessen the distance between contacting points.
- (b) The square shaft should be made as long as possible.

To increase the length of the square shaft effectively reduces the extra radial force, but the extra bending moment is not decreased at all in this way. Moreover from the viewpoint of layout it is often difficult to lengthen the square shaft, so the engineers are obliged to make an effort to decrease the distance between the contacting points.

From the results of investigation into various problems which we have experienced and which are considered to be caused by large extra forces, we think that sufficient consideration should be taken in both designing and operating the square box coupling for sugar mill drive. However it still might be necessary to confirm the above results by measuring the extra force and coefficient of friction on the coupling in practical use.

SUMMARY

The paper explains the cause of extra forces generated at a square box coupling for mill drive and describes how these forces can be reduced. A detailed explanation is given to the theoretical approach to the calculation of the extra forces and the results have been examined carefully by laboratory experiments.

The experiments were carried out under various operating conditions and measurements were made of the effect of the extra radial force and extra bending moment at each base frame of the bearing box for the drive gear shaft. Measurements were

also made of the torque at the drive and driven shaft to examine the correlation between transmitting torque and extra forces. It was found from the experimental results that the conditions of the contacting points of the square box and shaft are a significant factor affecting the magnitude of the extra forces. The length of the square shaft is also closely related to the extra radial and axial forces.

It is concluded that, for reducing the extra forces, it is effective to decrease the axial distance between two contacting points at each coupling box, and to increase the length of the square shaft. Oil in the coupling box was a good help in the experimental coupling but will be of only limited use in reducing the extra forces generated at a practical square box coupling.

Sugar cane mechanization and machine productivity

By RICHARD T. SYMES

(SHS Associates, 225 Wright Avenue, Apt. G, Gretna, La., 70053 USA)

Measuring Productivity

IN the sugar cane industry, land preparation, planting and cultivating operations are usually described in terms of units of land area processed. It follows that by relating the units of land area processed to the time required for the operation, a measurement of productivity is established for the machine or machine system used in the operation. But for some reason the harvesting operation is most often described in terms of cane weight handled during a given time interval and, in my opinion, this measure of harvesting productivity can lead to false conclusions.

The weight of cane on a given unit of land area has no effect on land preparation, planting or cultivating. And in a correctly selected mechanical harvesting system, the weight of cane has only a minor effect on the productivity of the system. The other factors discussed in the following have a major impact on all machine and machine system productivity capabilities.

Major Factors

It is submitted that the major factors affecting machine productivity are: machine speed, machine availability and operation supervision.

In this paper, machine speed is considered to be the units of land area covered by the machine or machine system in a given time interval.

Factors which affect, and indeed control, machine speed are as follows:

- (1) Machine selection
- (2) Field conditions
- (3) Operator skill and motivation
- (4) Machine interfaces

(1) *Machine selection*—Productivity can often be improved through careful investigation of equipment specifications and through assuring that the full potential of the machine is being utilized.

The following two examples will help to illustrate this.

One organization sought to improve the productivity of the heavy disc operation used in land preparation. A large all-wheel-drive rubber-tyred tractor was obtained and tested. The productivity was much better than that obtained by the equipment used previously. Another all-wheel-drive tractor of nearly identical specifications to the first was acquired. This tractor, however, since it was scheduled to perform a different task, had a different transmission. It was tried on the heavy disc operation and out-performed the first wheel tractor! Of interest here is that if the second tractor had not been tried on the disc operation, maximum productivity would not have been realized.

In the second case, a large crawler tractor was being used for heavy ploughing. The using organization was convinced that a smaller machine could not do the work. An investigation of the fuel usage reports showed that the tractor fuel consumption was less than half of its rated usage at varying loads. Plough width was added to the machine and its productivity increased.

One of the most useful tools to use in tractor selection is the curve of drawbar pull *versus* travel speed. Unfortunately this curve is not always available and therefore it must be calculated or trial-and-error selection must be used. It is always profitable to evaluate machines thoroughly before standardizing on a particular unit.

(2) *Field conditions*—Field conditions are a major factor in machine speed and thus in machine productivity.

On one cane plantation, a team of combine harvesters, in-field transport and a transfer station was operated in one field section for half the crop. The entire team, including operators and supervisors, was then moved to another section about 6 kilometers away.

The harvesting cost in the second section was \$1.00 US per ton of cane less than in the first section!

The weight of cane per unit of land area and the basic cultural pattern was the same in both areas.

However, the first section contained many fields with poor or non-existent turn-roads at the field ends, the ditches were considerably deeper and many fields contained trees and even old building foundations! In some of the fields the cane rows converged and at times met at field centre and the standard row spacing of 1.5 metres was seldom encountered!

Obviously, field conditions were solely responsible for the cost differential, limiting the system speed in terms of units of land area covered per unit of time.

Mechanical cutters often uncover field conditions which had previously remained unnoticed. I have actually seen a plough abandoned in a field and all land preparation, planting and cultivation done around it. It was "found" by a mechanical harvester and considerable damage to the machine resulted!

Ample turn-road width, precision cultivation and planting, well-planned ditches, long rows, and the elimination of in-field obstacles are required if the efforts expended in acquiring the best machinery are to result in high productivity.

Turn-roads are usually a part of the road network used on the plantation for cane transport. The reasons often given for a lack of turn-road width or the lack of the turn-roads themselves, is that the area so used is lost to cane production. A recent plantation-wide study, directed toward improved operations, showed that turn-roads could be widened. At the same time, the elimination of some narrow, crooked roads and the improvement of field length resulted in 10% more land becoming available for cultivation!

In-field ditches, especially those crosswise to the row direction, should be avoided. Where necessary for irrigation, such ditches should be no deeper than the furrow bottom. Mole drainage can often be substituted for open drains and this can improve machine operations considerably.

Money used to remove infield obstacles, is spent to improve machine productivity throughout the life of the sugar industry and yet is often recouped in a couple of years through improved machine speed.

There is a theory that cane harvesters can achieve a steady state productivity, measured in terms of weight of cane cut per unit of time, by speeding up in light cane and slowing down in heavy cane. This is true only in identical field conditions. One large operation found that the productivity of the machines was lower each crop than it had been the previous one. An investigation showed that the weight of cane was being reduced, for cane quality reasons, and that the machines were being operated at the maximum speed allowed by field conditions; the result was less cane processed per machine per crop!

(3) *Operator skill and motivation*—It is doubtful that there are any "born operators". However, there is no doubt that some men are more apt. to become good operators than others. The difference is in the man's motivation. Skills may be taught but unless the man is properly motivated, he will not make full use of the skills.

There are self-motivated men and these are the ones usually called "born operators", but seldom are there enough of these men to staff the operator roster of a sugar cane plantation.

The socio-economic climate in the particular operational area is basic to the problem of motivation. There are areas of high unemployment where the basic motivation is, simply, work or starve. But there are other areas of high unemployment where the governing structure is such that one can subsist without working!

Rewarding a man's productivity is a method of motivating him; however, in mechanized systems there is a problem, since each system element is dependent on the other elements for its productivity. If each member of the group is rewarded equally for the productivity of the group, some members who are not really producing may be getting a "free ride". Conversely, efforts to reward only certain members of the system may be thwarted by low productivity on the part of other members of the system. The reward system of motivation must be very carefully engineered if it is to succeed!

The value of a trained operator is often not fully realized by management, yet he may represent an investment of considerable money! Money may have been spent on training programmes, his productivity as he "polishes" his skills is not as high as that of others, the machines which he operates will require more than routine adjustment and maintenance and the time spent supervising him will be greater than normal!

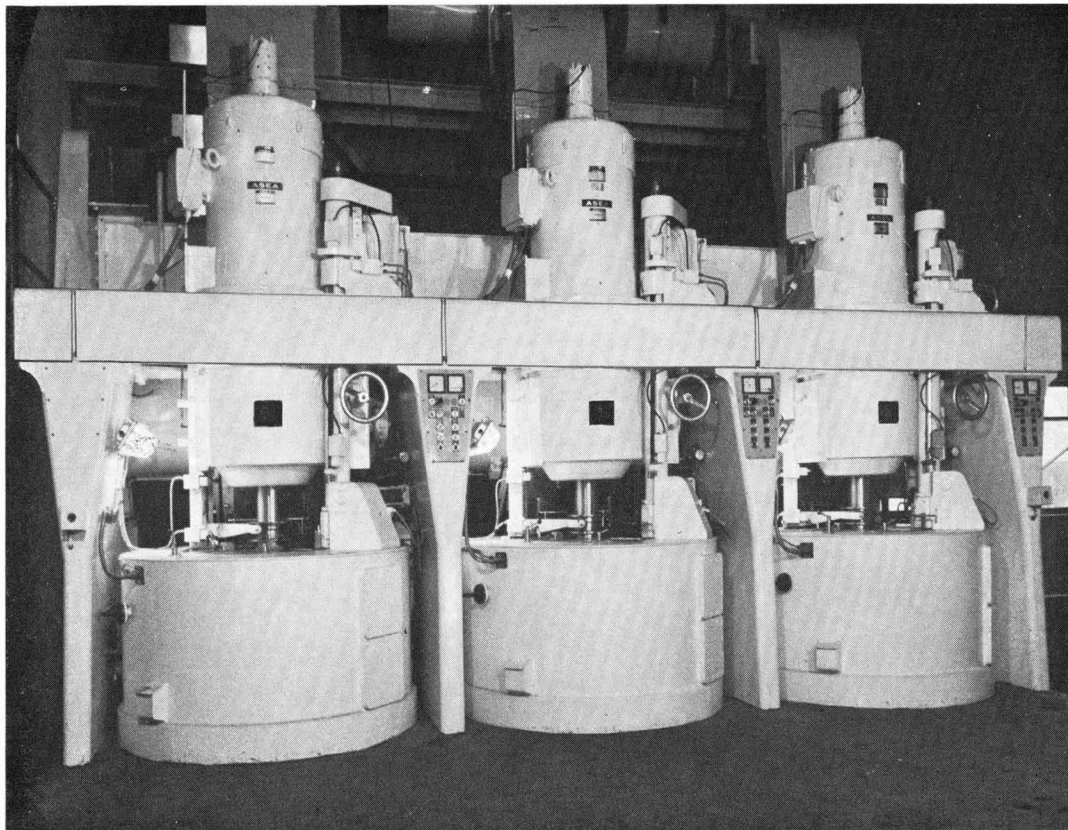
(4) *Interfaces*—The mechanical loading of sugar cane is an operation which always shows interface effects. The loader cannot load the cane unless the transport units are available, the transport units will not be available unless they are unloaded and the unloading cannot proceed unless there is a place to put the cane. This seems so obvious that it has not been worth mentioning; however, there are many operations in which the mechanical loading productivity is 30% of true capability owing to the interface effects!

Assuming that the planning effort has resulted in the correct machine mix, in the loading or any other machine system, it has been found that supervision of the interface points will assure high productivity.

Machine Availability

No matter how much machine speed or machine system speed can be achieved; if the machines are not available, production will suffer!

Sugar cane is not as time-critical as some other agricultural pursuits, but it still is a fact that each operation follows a preceding one and cannot be accomplished until the other has been completed. It also must be pointed out that mechanization of sugar cane quite often accompanies the intensification of the operation and timing is always more critical in intensive agriculture.



ASEA-WEIBULL

Fully automatic centrifugals with thyristor controlled DC motor drives fulfil the following requirements:

- High capacity
- Flexibility
- Reliability
- Low operating costs
- Low maintenance costs

Available in two sizes, 48"×42" and 48"×30" for any centrifuging speed between 1000 and 1700 rpm.

If you want to know more – Ask us!
Chemical Industry Department, ASEA
S-721 83 VÄSTERÅS, Sweden

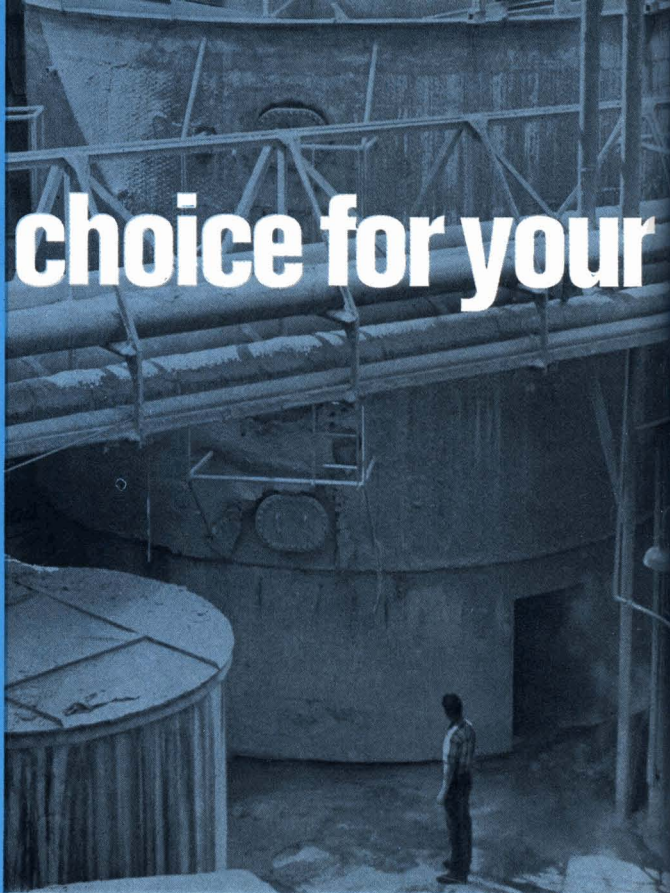
ASEA

Represented in more than 70 countries

For beet sugar factories
throughout the world...

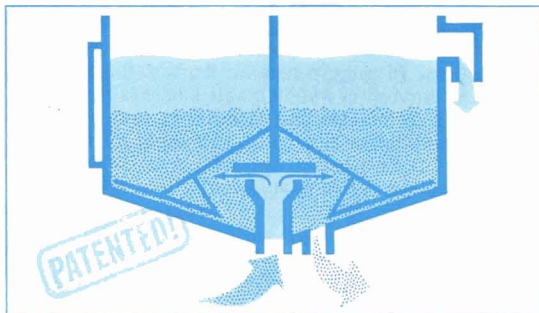
You have a choice for your

This →



Which will it be?

THE PRINCIPLE: a factory proved breakthrough for clarification of first carbonation effluent!



Introducing the feed into a previously formed active sludge drastically reduces the distance the settled products must travel. Incoming feed juice, treated with a few ppm. of synthetic polymer, enters the unit and is deflected horizontally within the previously formed active sludge bed by a baffle plate. The resulting flow pattern is a rolling one, with juice percolating and filtering upward as particles agglomerate and settle. As juice continues to enter the unit, the clarified effluent is taken off the top. The line of demarcation between sludge blanket and clear effluent is quite sharp; thus it can be used for control of sludge withdrawal. A sludge rake aids further compaction.

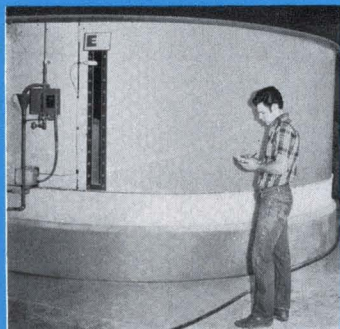
**THE ENVIRO-CLEAR SYSTEM
IS LESS COSTLY TO PURCHASE ...
TO INSTALL ... TO OPERATE ... TO MAINTAIN
THAN DIRECT-FILTRATION UNITS!**

THE OPPORTUNITY: Phone, cable, write our authorized licensees and inquire about our RENTAL TEST PROVING UNIT for your factory!

**FOR COMPLETE INFORMATION ON THE
NEW GENERATION OF SETTLER-CLARIFIERS
FOR BEET SUGAR FACTORIES:**

liquid/solids separation:

or This →



ENVIRO-CLEAR Clarifier

THE PERFORMANCE: faster, smaller, simpler, better!

COMPARATIVE SIZE DATA (NOMINAL VALUES) APPLICATION, 1st CARBONATION		
	ENVIRO-CLEAR SETTLER	CONVENTIONAL SETTLER
Diameter, feet	14	26
Height, ft., liquid straight side	4.5	17.75
Number of trays	1	4
Settling area, sq. ft.	154	2100
Volume, cu. ft.	777	9400
Retention time, minutes	7.2	88
Flow rate, U.S. GPM/sq. ft.	5.2	0.38

This comparison also can be applied to
(1) heated cold Steffen filtrate or (2) beet flume water.

SEPARATION IN MINUTES!

- eliminates storage of high-volume dilute sucrose at elevated temperatures and alkalinity
- avoids undesirable side-reactions
- speeds start-up and shut-down
- immediate response to corrections
- less stock in process

SMALLER, SIMPLER, BETTER!

- reduces losses
- saves valuable plant space
- produces separation as good as or better than conventional units
- slashes maintenance costs through simplicity of design and operation

FRANCE-ITALY-SPAIN-BELGIUM
Fives Lille-Cail
7, Rue Montalivet
Paris 8^e, France
PHONE: 265.22.01-742.21.19
TELEX: FIVCAIL65328
CABLE: FIVCAIL PARIS

**AUSTRIA-FEDERAL REPUBLIC OF
GERMANY-IRAN-NETHERLANDS**
Stork-Werkspoor Sugar N.V.
Steenbakkersweg 25
Hengelo (0), The Netherlands
PHONE: (05400) 5 43 21
TELEX: 44485 CABLE: STOWESUGAR

U.S.-CANADA-U.K.
ENVIRO-CLEAR COMPANY, INC.
1251 Avenue of the Americas
New York, New York 10020
212 489-9060
Cable: ENCLEAR



ENVIRO-CLEAR COMPANY, INC.

A SUBSIDIARY OF

Amstar
CORPORATION

OTHER COUNTRIES OF THE WORLD: CABLE OR CALL ANY OF THE ABOVE.

FONTAINE

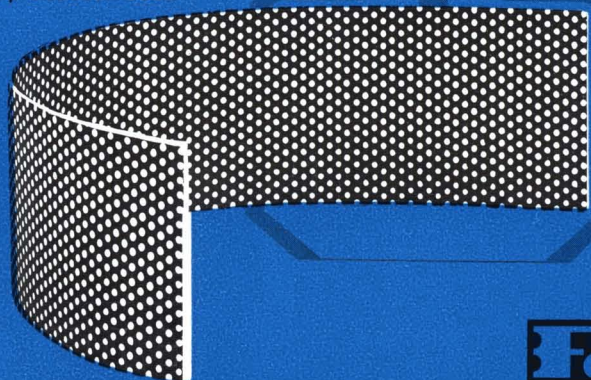
**Solve your filtration problems
the expert way —
with FONTAINE Screens.**

FONTAINE Screens have conical holes or slots that prevent clogging. Less clogging means less replacement. Less replacement means less production cost.

FONTAINE Screens are available in stainless steel, copper, brass, and chrome-plated nickel for batch and continuous machines of all makes and sizes.

When you are thinking of screens, think of FONTAINE.

For full details contact
FONTAINE & Co. GMBH.

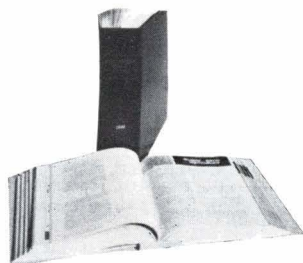


Fontaine & Co. GmbH · 51 Aachen/W.-Germany · Tel. 0241/21233 · Telex 832558

I.S.J. BINDING CASES

Fixed in an Instant

Practical and Durable



Price: £1.25

or U.S. \$3.50
per annual binding
(plus postage)

Bind your loose issues of the *I.S.J.* month by month as received. In this case they will open flat to any page. Maroon covers, gold lettering "*International Sugar Journal*" and the year if desired.

Please state in your order whether the year is to be included.

THE INTERNATIONAL SUGAR JOURNAL, LTD.

23a, Easton Street, High Wycombe, Bucks., England.

Factors affecting machine availability are as follows:

- (1) Support group skill and motivation
- (2) Operator skill and motivation
- (3) Spares availability
- (4) Machine design
- (5) Communications

(1) *Support group skill and motivation*—The support group avoids machine down-time through preventive maintenance and returns out-of-service machines to productive status through prompt and efficient repairs.

Since the men in this group are usually drawn from the same manpower pool as the operators, it follows that the methods of motivating them should be the same.

The efficiency of a support group can be increased if management will plan machinery acquisitions to assure "sameness".

It is possible, for example, to equip all machines with an engine from a single manufacturing source. Even though the engines will vary in horsepower and possibly in configuration, a great many parts may be interchangeable and since the design theory will be the same, mechanic skill and productivity will be enhanced.

Even if the above cannot be accomplished, it is usually possible to keep many of the machines in the same "family", thus also simplifying the work of the support group.

Dual-usage machines, for instance a tractor used in crop to transport cane and used in the off-season as a ploughing unit, will reduce the number of machines on the equipment roster. There is a direct relationship between the number of men needed for the support group and the number of machines on the roster. Reducing the number of men required will allow emphasis on quality rather than quantity!

(2) *Operator skill and motivation*—A good operator does not damage his machine—enough said!!

(3) *Spares availability*—One large operation found that their loader productivity decreased as crop went on. It was found that not enough spares were being stocked and that as a result, machine availability decreased as crop went on. The solution was obvious!

We often find that insufficient parts are stocked because there is a fear that too much capital investment may be tied up in spares and also that the parts may become obsolete.

We also find machines with an hourly depreciation rate of, for instance, \$10.00 US, waiting for days and even weeks for parts. It may be argued that depreciation charges are "just bookkeeping", but since the machine is not in production, it follows that there is either an investment in spare machines or a loss in productivity. Neither of these costs is "bookkeeping"!

A large inventory in obsolete parts indicates a management failure, most often in the area of communication. Management makes policy, and equipment replacement should be a matter of policy. As equipment is scheduled for replacement, those res-

ponsible for spares acquisition should be advised so that they can reduce purchases accordingly.

While on the subject of spares, it might be well to discuss spare machines. Spare machines are an assurance that a specific task will be accomplished within a specific time limit, and are very valuable in time-critical operations or in systems. An example of the value of spare machines is shown in Table I.

Table I

Spare or standby machines

Given a case of two mechanical cutters with a single capacity of 275 tons each and a combined capacity of 550 tons. The planned delivery from the team is therefore 550 tons.

In this display a unit in brackets () will be assumed to be out of service and a unit in inverted brackets) (will be assumed to be standing by as a spare.

Two units with no spare	Two units with one spare
A, B 550 tons	A, B,)C(550 tons
A, (B) 275 tons	A, (B), C 550 tons
(A), B 275 tons	(A), B, C 550 tons
(A), (B) 0 tons	A, (B), (C) 550 tons
	(A), (B), C 275 tons
	(A), B, (C) 275 tons
	(A), (B), (C) 0 tons
100% task achievement 1	4
50% task achievement 2	3
0 task achievement 1	1

Consideration must be given toward having spare units for the most critical operations. For example, the breakdown of a unit of infield cane transport will reduce cane delivery from that particular group; however, the breakdown of the loader itself will stop delivery. Thus spare units of transport are seldom assigned.

(4) *Machine design*—It is prudent to work on a basis that "If something can go wrong, it will" and to note that more complex machines are more apt to break down. For this reason design simplicity should always be sought in machinery.

In the search for design simplicity, judgment must be exercised or work quality may suffer. The push rake, for example, is the simplest mechanical cane harvesting machine. However the work quality leaves something to be desired and its productivity is less than many other harvesters.

(5) *Communications*—Obviously, the speed with which the support group can be advised of a machine failure is directly related to the time during which the machine will be out of service. Many times machine problems can be corrected in just a few minutes but unless a good communication network exists, it often takes longer to advise the support group of a problem than it does to correct the problem.

Supervision

The best machine productivity is obtained by the owner-operator working his own land. His motivation is superb, he sees directly the benefits of machine

speed and machine availability, and he is well supervised!

However, since a very high proportion of the world's sugar is produced by enterprises which must use hired employees whose motivation is not the same as is that of the owner-operator, supervision becomes a key item.

One enterprise spent several years developing a cut-load harvesting system. Since, at the time of this development there were no commercial machines on the market which were suitable, a machine was designed and constructed. At the start of the fourth crop, the team responsible for the development felt that their job had been accomplished. During crop, management pointed out that the system productivity was only 60% of the target goals and inquired as to what was wrong with the machines.

A study was made and it was determined that the machine availability was higher than the target goals, but that during the machine and system development time, one item had been overlooked. The supervisors had not been trained and this was the basic reason for the productivity gap.

There is often a tendency to blame the machine for something which really is caused by the man!!

In one cane area, I was told that the operators were of low calibre. I was forced to make the statement that in reality, the operators were poorly trained, poorly motivated and poorly supervised by supervisors who were poorly trained, poorly motivated and poorly supervised.

We often find that a direct field supervisor is nothing but a timekeeper and yet this man, since he is at the scene of the action, can do a great deal towards assuring productivity.

Each supervisor must be thoroughly trained in both the objectives of his performance area and the methods of attaining the objectives. He must understand the interfaces between his performance area and those of the other supervisors. For instance, a cultivation supervisor must know that his work is not only relevant to producing a good crop of cane but that high quality cultivation helps to assure high quality harvesting.

Motivation of mechanics and operators has been mentioned, and it would be well to point out that the immediate supervisor can do more to motivate his men than can anyone else. If he succeeds in establishing a climate of mutual respect between himself and his men, he creates a type of motivation.

Under some organizational modes, a mechanical supervisor can be trained and equipped to make minor repairs and adjustments to the machines in his responsibility area; this can be very effective in assuring maximum productivity.

Basically, it can be said that the immediate supervision makes or breaks a mechanized system. It follows that considerable care must be taken in the selection and training of this key man!

Harvest system productivity

The cost of harvesting the crop and moving it to the mill is often equal to or exceeds the cost of bringing the crop to the harvesting stage!

As mentioned earlier, there is a tendency to rate and judge harvesting system productivity by the weight of material handled during a given time period.

It has been shown many times that both cutting and loading productivity, measured in weight of cane processed per time interval, increases as does the weight of cane per unit of land area. It is noted that this is not a straight line relationship and that the harvesting machinery must be capable of handling the heavier weight of cane.

In most sugar cane areas, crop is a finite length of time and the total land area to be harvested is known. It follows then, that the land area which must be harvested per crop day is known and that this figure can be used as a criterion for harvest system productivity measurement.

In one case, the cost of combine harvesting of a particular field was five times the projected cost per ton of cane. The system cost projections had been based on 40 tons per acre cane, but owing to a drought the field in question yielded 10 tons per acre. If the performance of the harvesting system had been judged on cost per ton, the only conclusion which could have been drawn would have been that the system was a failure. However, based on land area coverage, the system was excellent.

Care must also be taken when comparing the productivity of harvesting systems to be sure that systems are being compared and not the individual system elements.

In one sugar cane area a harvester which could and did cut 100 tons of cane an hour caused great excitement and a cut-load combine which was also in operation in the area was down-rated because it was cutting only 23 tons of cane per hour. Everyone wanted the 100 ton an hour machine.

A comparison of the two systems however showed that the cane loading following the 100 ton an hour machine was at a rate of 20 tons per hour. Thus cutting and loading was proceeding at a rate of 16.5 tons of cane per machine hour. The combine system was cutting only 23 tons of cane per hour but since it was a combine, it was also loading the 23 tons for a cutting and loading rate of 23 tons of cane per machine hour.

Conclusion

It is submitted that a key factor in the sugar industry's struggle to produce "Cheap Sugar" is the attainment of the best possible productivity.

Further, it is submitted that there are several key factors and many sub-factors which affect the productivity potential of machines and machine systems.

It is felt that a thorough knowledge of the factors will allow better management of the machines and systems and thus improve control over productivity.

ATAC 40

The 40th Conference of the Cuban Sugar Technologists' Association

THE 1972 Conference of the Asociación de Técnicos Azucareros de Cuba was held in the Havana Libre Hotel, Havana, from the 28th August to the 3rd September. More than 1000 technologists took part, including over 70 guests invited from 21 other countries. The foreign visitors assembled in Havana during the week prior to the Conference proper and were able to attend meetings where certain of them presented papers which were outside the Conference programme.



Fig. 1. View of Havana from the Havana Libre Hotel

These papers included those on comparative studies on the growth models for micro-organisms (Prof. S. AIBA, Japan), modern methods of sugar factory control calculations using a system of sugar technology dimensions (Dr. H. J. DELAVIER, Germany), new ideas on interchange of matter in the solid-liquid extraction of sucrose from vegetable matter (Dr. H. J. DELAVIER, Germany), bagasse derivatives (P. LENGYEL, Hungary), present and future of alcohol production from cane molasses (Dr. V. GREGR, Czechoslovakia), digital computer simulation of sugar cane mills (Dr. G. E. RUSSELL, Australia), history, structure and current programmes of investigation at the West Berlin Sugar Institute (Dr. H. HIRSCHMÜLLER, Germany), invert sugar determination in sugar cane products (Dr. H. J. DELAVIER, Germany), different decolorization methods in the Japanese sugar refining industry, and comparative performance of Cuban and other raws (Dr. S. IWASHINA, Japan), fungus diseases, ratoon stunting symptoms and control, and cane mosaic in

India (Dr. K. SINGH, India), red spot, ratoon stunting and mosaic in India (Dr. K. V. SRINIVASAN, India), the sugar industry of Japan, including beet and cane sugar manufacture and sugar refining (Dr. M. KOMOTO, Japan), sugar investigations at the University of Ferrara (Dr. G. MANTOVANI, Italy), unconventional sources for protein production (Dr. V. GREGR, Czechoslovakia), cane ripening (W. L. N. DAVIES, England), corrosion investigations (Dr. G. MANTOVANI, Italy) and the application of research to special chemical products and instruments for the sugar industry (Dr. M. C. BENNETT, England).

The opening ceremony of the Conference itself took place in the theatre of the CTC building (Cuban Workers' Centre) in Havana on the morning of the 28th August. Cuban delegates and foreign visitors were welcomed by the Secretary-General of the Sugar Workers' Union who described a new film to be presented "No tenemos el derecho de esperar" (We do not have the right to wait). The President of the ATAC, Ing. M. A. URRUTIA, Vice-Minister for Technical Development of the Ministry of the Sugar Industry, then spoke of

the programme for the conference including the large number of papers to be presented and a day devoted to the demonstration of cane mechanization equipment.



Fig. 2

The film which followed illustrated the great efforts being made in the provision of complexes with new apartment blocks, schools, etc. for re-housing of Cuban people, development of new farms and processing installations for cattle, pigs, etc., rice and other food crops, as well as application of modern industrial technology.

Subsequent meetings were in the various sections: agricultural (with subsections for agronomy, plant protection and for genetics, varieties, physiology and herbicides), agricultural engineering, bagasse derivatives, economy and organization, laboratory, fermentation derivatives, instrumentation and control, engineering, and manufacturing. The last was provided with simultaneous translation from Spanish to English available through headphones to foreign visitors who also received summaries in English of the papers for each section, assembled in a book. In addition, each visitor was assisted by an interpreter and a "host" from the Cuban sugar industry having a common interest with the visitor and charged with ensuring that he was able to obtain the maximum



Fig. 3



Fig. 4



Fig. 5

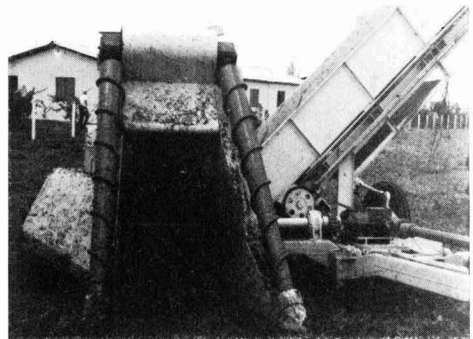


Fig. 6



Fig. 7

benefit from the meetings during the five days of which a total of 246 papers were presented to the various sections.

The work of the day contrasted, however, with evening entertainment which included a visit on the 1st September to the amphitheatre of the recently constructed Lenin Park, where, on a large platform floating on a lake, an assembly of musicians, singers and dancers presented a colourful and spectacular history of the music of Cuba from the time of the Spanish conquest of the island to the present day. In



Fig. 8

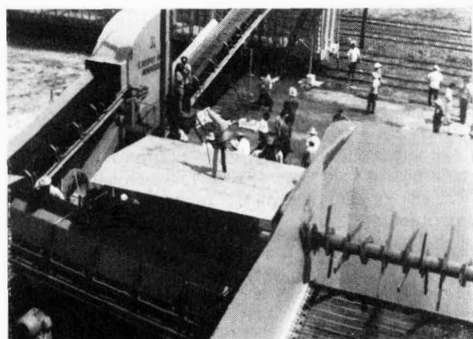


Fig. 9

addition, the final dinner of the Conference was held at the Tropicana club and featured a very elaborate cabaret at least equivalent to a major theatre presentation in Europe.

The 2nd September was devoted to cane mechanization and participants in the Conference were taken to part of the irrigated cane area (Fig. 2) of Central Rubén Martínez Villena (formerly Rosario) in Havana Province. Here, the cane harvesting ability of four machines was demonstrated, i.e. the KTP-1 combine built in the USSR to a Cuban design (Fig. 3), the Massey-Ferguson 201 "Cane Commander" (Fig. 4), the Libertadora 1400, built in West Germany to a Cuban design (Fig. 5), and the "Mini-Henderson" (Figs. 6, 7), a tractor-drawn and powered unit producing chopped cane but, unlike the others, without any separation of the trash and tops since the cane passes to the factory by way of a "centro de acopio" or cleaning unit.

During a symposium on cane mechanization, held at the CTC theatre on the 30th August, in addition to films on mechanization in Cuba it had been men-

tioned that mechanical harvesting had been used for about 6% of the 1971/72 cane crop and that, with the acquisition of more of the new machines, it was hoped to reach 10% in the 1972/73 crop, with full mechanization a target for 1980. Part of the system in Cuba involves the in-field cleaning at the centros de acopio. These are basically transfer stations where cane falls through air-blasts to remove the lighter trash and tops while allowing the cane billets to continue to the rail cars which take them to the mill. The cane



Fig. 10

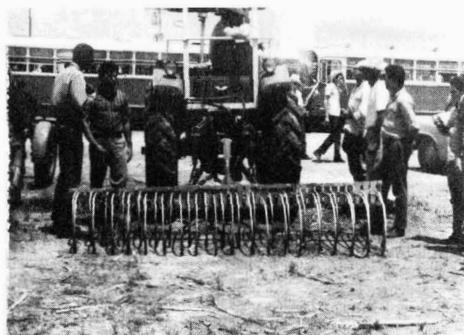


Fig. 11



Fig. 12

is unloaded from carts by a chain net system (Fig. 8) onto a feeder table where it passes beneath kickers to a transverse conveyor feeding a pair of belt conveyors in series (Fig. 9). The trash is blown out of ducting at the transfers between the conveyors (Fig. 10).

In addition, a demonstration was arranged of cane cultivation equipment being studied for use in conjunction with mechanical harvesting; this included a stubble shaver (not demonstrated), a trash rake for gathering field trash into rows for burning (Fig. 11), disc harrow, and a combined sub-soiler, cultivator and fertilizer distributor (Fig. 12). A cane planter was demonstrated separately on newly prepared land (Fig. 13), while an exhibition of static equipment and



Fig. 13

photographs illustrated the progress of mechanization in the Cuban industry.

On the next day the closing ceremony was held; Ing. EDUARDO DAVID, Vice-President of the Association and Director of Technology at the Ministry of the Sugar Industry, summarized the conference, referring to the reports of the various organizations which had taken part. The number of papers was double that of the 39th Congress and the number of participants 25% higher. The large proportion of papers presented by young technologists was indicative of the growing interest in ATAC and its strength.

Prof. HIRSCHMÜLLER spoke on behalf of the foreign guests to thank the Conference organizers and to congratulate them on the arrangements made in regard to translations, interpreters, guides, etc. Special diplomas were awarded to the representatives of the Association who had attempted to participate in the 14th Congress of the ISSCT in New Orleans in 1971 but who had been refused admittance.

The final speech was by President DORTICOS who spoke of the changes in the sugar industry since his opening of the 1960 ATAC Conference. He mentioned plans for the further development up to 1975 but pointed out their absolute dependence on the sugar industry because of its dominant position in Cuban trade with the rest of the world. He emphasized the importance of using foreign currency earnings for improving the efficiency and equipment of the sugar industry and gave examples of steps in this direction as well as the moves such as formation of ICIDCA and setting-up of the Pablo Noriega Experimental Unit. The 40th Congress of ATAC had helped appreciably in the industry's advance.

ICUMSA Cuban National Committee

THE Cuban National Committee of the International Commission for Uniform Methods of Sugar Analysis took the opportunity of the presence of its members in Havana for the ATAC Conference to hold a meeting to report on and discuss the progress of its work at the mid-point of the period between the 15th Session in 1970 and the 16th Session to be held in Turkey in 1974.

The President of ICUMSA, Dr. A. CARRUTHERS, was unable to attend the meeting but the General Secretary, Mr. D. HIBBERT, was present as were other non-Cuban ICUMSA workers, including Drs. H. J. DELAVIER, H. HIRSCHMÜLLER and G. MANTOVANI.

The Chairman of the Cuban National Committee, Prof. J. GONZÁLEZ MAÍZ, welcomed the members present and referred to the invitation to Dr. CARRUTHERS, which he had unfortunately been unable to accept,

to attend the meeting. He introduced Mr. HIBBERT who addressed the meeting and spoke of the nature of ICUMSA, emphasizing that it is a voluntary organization, depending on the goodwill of national bodies and the activity of individuals in the sugar industry all over the world. He had noted that of the 22 countries represented at the ATAC Conference, only 12 were represented in ICUMSA and he would welcome efforts to secure participation of the other 10, particularly those of South America where ICUMSA was sadly under-represented.

He referred to the forthcoming 16th Session and said that the Cuban invitation had had to be declined with great regret because political considerations would have meant that some active sugar analysts would not be able to attend. He hoped this situation would change in the future. Planning for the 1974 Session was under way but there were problems owing to the dilatoriness of some National Committees

which had provided no names for assembly of lists of Referees and Associate Referees. In addition there had been some resignations. The Cuban Committee's work had been exemplary in this respect; not only were the names and other information provided in time but preliminary reports had been made indicating the activity of the Committee in the various subjects which it had engaged to study.

Srta. D. M. MARTÍNEZ, First Vice-Chairman of the Cuban National Committee, then summarized the activities of the various organizations participating in the work of ICUMSA (Universities of Oriente and Las Villas, Academy of Science, ICIDCA, MINAZ, etc.), and introduced the referees for the subjects studied in Cuba.

Ing. R. PÉREZ LIMA, Secretary of the Committee, then presented the report of the Committee which marked the mid-point in the programme of work which was started after the 15th Session in London in 1970. Eleven subjects are under study and the work done is summarized below:

Subject No. 2. Laboratory apparatus. *Referee:* JULIÁN RODRÍGUEZ.

Statistical evaluation and practical testing were to be conducted for selected types of automatic samplers for mill juices and final boiling house products. The evaluation was to start with several types of each sampler for crusher juice, mixed juice, clarified juice, final molasses and sugar, installed at one sugar mill in each province. Analytical and practical information regarding the operation of the selected samplers has already been received. Data processing and statistical evaluation is to be carried out late this year as well as the corresponding reports issued.

Subject No. 3. Weighing, taring and sampling of sugars. *Referee:* JOSÉ M. TAMARGO TORRES.

Several types of bulk sugar samplers were to be tried in a sugar mill equipped for bulk sugar production in Camagüey province. Analytical data and practical information regarding the operation of "Durban", "Colonial Sugar Co. of Louisiana" and "water wheel" types of bulk sugar samplers have already been received. Statistical analysis has been partially carried out, while the rest of the analysis is to be completed and a report issued.

Subject No. 10. Sucrose in sugar cane. *Referee:* DULCE M. MARTÍNEZ.

The main work to be carried out during the period is the selection of sampling methods adequate for sampling cane fields and cane carts. In sugar factories sampling schemes using 10, 20 and 40 cane stalks are being evaluated for routine work, while the Institute of Sugar Cane Research of the Cuban Academy of Sciences has started preliminary work in sampling schemes for sugar cane using 2, 3, 6, 10, 12, 16 and 20 stalks. Las Villas University has also carried out work on sampling methods for sugar cane fields which will be made available to the referee later in 1972. Work on the subject will continue in the 1972/73 crop.

Subject No. 14. Reducing sugars. *Referee:* GLORIA SANTACRUZ ARGUDÍN.

Several comparisons of reducing sugar methods were to be carried out by collaborating laboratories; the MINAZ laboratory group has reported a modification to the KNIGHT & ALLEN method to increase its range of applicability as well as the feasibility of the OFNER method in Cuban sugar refineries. Also it was found that the reproducibility of the KNIGHT & ALLEN method was greater than that of the DE WHALLEY method.

Subject No. 15. Raffinose, other oligosaccharides, polysaccharides and glycosides. *Referee:* LUÍS BROSSARD.

The University of Oriente has conducted work in the determination of polysaccharides using a method devised by Dr. S. KARA-MURZA (National Centre for Scientific Research), to be reported at the 40th ATAC Conference, and have found the same reproducibility as Dr. KARA-MURZA himself has reported for his method.

Subject No. 16. Ash. *Referee:* LIBRADO CARRAZANA.

A paper from the University of Las Villas was to be presented at the coming ATAC Conference, reporting that:

(a) the optimum concentrations of raw and refined sugar for electrometric ash determination are 30 g/100 ml for raw sugars, 25 g/100 ml for refined sugars, (b) regarding the quality of water used for making sugar solutions, a 43% correction factor should be used for conductivity of water used in raw sugar solutions, (c) C-ratios of sugars of Las Villas province have been determined as 6.63×10^{-4} for raw sugar, and 7.69×10^{-4} for refined sugar, and (d) it is thought that conductivity readings should be taken at 28°C in Cuba because this temperature is nearer to the prevailing ambient temperature.

Subject No. 20. Deterioration of sugars. *Referee:* MARIO MURO.

Some research has been carried out at Las Villas University regarding possible temperature effects on the increase of colour in raw sugar stored in bulk. This University is also engaged in research work regarding mechanism of colour formation of sugar solutions, but completion of the work is not expected until the end of 1973 or perhaps later.

Subject No. 21. Microbiological tests. *Referee:* MARÍA T. HERNÁNDEZ.

A paper was to be presented at the ATAC Conference by the Microbiology Group of ICIDCA on the microflora of Cuban raw and refined sugars.

Subject No. 22. Colour and turbidity. *Referee:* JOSÉ FERNÁNDEZ BERTRÁN.

Research has been carried out at the MINAZ laboratory to correlate Horne colour units with photoelectric colorimetric determination of colour and the developed techniques tentatively established in the provincial control laboratories. Results of research conducted at Las Villas University were also to be reported at the forthcoming ATAC Congress.

Subject No. 23. Rheological properties. *Referee:* NELIA LUISA LUNA.

A paper to be read at the 40th ATAC Conference reports studies at Oriente University on: (a) determination of the flow curves, (b) correlation between viscosity and temperature, (c) effect of pH on viscosity, and (d) effect of chemical composition on viscosity.

Subject No. 27. Refining qualities of raw cane sugar. *Referee:* NIDIA ORTEGA.

Research has been carried out regarding grist and in order to obtain reproducible results the HSPA method had to be modified with respect to time and temperature, finally giving reproducibility. Regarding starch determination, comparative tests were carried out with the CSR method advocated by ICUMSA and the method of W. CHEN and M. H. CHEN. The results found tend to show that the CSR method is less accurate than the CHEN and CHEN method. Work has been continued in search of a more rapid and exact method. All work mentioned on this subject has been carried out at MINAZ Control Laboratories.

Mr. HIBBERT thanked the Committee for its report and commented on the evident amount of work done and the enthusiasm shown by the activities of the participants. Congratulations were then offered by the other foreign visitors attending the meeting.

Sugar cane agriculture



Morphological and physiological bases of differences in quality between sugar cane clones. D. MACCOLL. *Paper presented to the 14th Congr. I.S.S.C.T., 1971, 11 pp.*—The investigations described aim to increase understanding of the basis of clonal differences in Brix. One investigation followed the pattern of Brix and fibre accumulation in a range of clones and attempted to establish, by measuring density, the extent to which increases in Brix and fibre are due to real accumulation rather than to loss of water. The results indicated that in most cases increases in Brix and fibre were due to real accumulation rather than to loss of water. Only in the very early part of the dry season did mean density decrease over all clones while mean Brix and fibre increased. Small increases in Brix late in the dry season may also have been partly due to loss of water. It was concluded that to understand the basis of differences in Brix between clones, plants should be examined during the period of active growth when differences in Brix are at a maximum and before leaves have begun to dry off.

* * *

Associations among yield and quality components in sugar cane hybrid progenies. J. A. MARIOTTI. *Paper presented to the 14th Congr. I.S.S.C.T., 1971, 6 pp.* This paper reports results obtained in progenies involving phenotypic and genotypic correlations between cane yield and quality components. One hundred clones from each of 5 biparental progenies were randomly chosen at the single-stool stage and replanted along with replicated controls in 2-m long clonal plots. At the plant cane harvest, clonal plots were separately evaluated for several cane yield and quality components. An average genotypic correlation of 0.814 was estimated between number of stalks/plot and cane yield. No important correlations were found between cane yield and the components of quality, which indicated that there would be no special problem in obtaining the best combinations of these characteristics.

* * *

Flowering of sugar cane with reference to induction and inhibition. E. D. PALIATSEAS. *Paper presented to the 14th Congr. I.S.S.C.T., 1971, 11 pp.*—The minimum time required for flower initiation was studied in 9 hybrid varieties of sugar cane under Louisiana conditions. A minimum of 45–55 inductive days was required for initiation of easy flowering varieties. Comparable periods for flower initiation were obtained by the leaf count method as well as by direct examination. The duration of the other 3 stages of

flowering was calculated. Intercalation of minimal treatments totalling 45 days with 5 long days completely inhibited flower initiation. Intercalation of minimal treatments with 5 short days diminished but did not totally cancel flower initiation. Intercalation of minimal or longer photoperiod treatments with 5 low-temperature nights had no effect on flower initiation. Long days and low night temperatures adversely affected flower emergence.

* * *

The rôle of *Saccharum spontaneum* in sugar cane breeding. R. R. PANJE. *Paper presented to the 14th Congr. I.S.S.C.T., 1971, 7 pp.*—*S. spontaneum* is considered to be the best donor of desirable characters among the parents used in interspecific crossing with *S. officinarum*. Its progenies, primarily valued for their disease resistance, have also proved to be highly suitable for culture in the sub-tropics. Besides disease resistance, *S. spontaneum* is believed to have imparted vigour, hardiness, tillering power, drought resistance and frost tolerance to the progenies. The tillering capacity of *S. spontaneum* is important for it may change the very basis of crop formation.

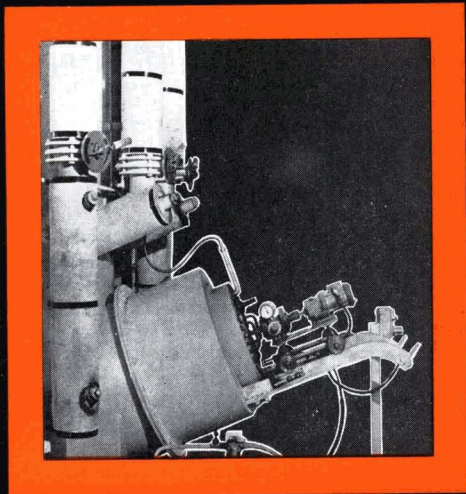
* * *

Radiosensitivity and non-flowering mutants in sugar cane. P. S. RAO. *Paper presented to the 14th Congr. I.S.S.C.T., 1971, 5 pp.*—In an attempt to induce mutations for non-flowering, buds of four heavy-flowering cane varieties were treated with X-rays and gamma-rays at 3 Kr and 5 Kr doses. Radiosensitivity was measured in terms of % emergence, days to emerge, % plants with dead growing point, height and % plants surviving to field planting stage. The plants arising from treated buds were propagated into sub-clones and flowering data were recorded. Varieties differed in their radiosensitivity. Among the varieties, the frequency of non-flowering mutants induced varied from 0 to 2% of treated buds. The frequency of visible mutations recorded was not correlated with the amount of radiation damage. In the production of non-flowering mutants 3 Kr and 5 Kr doses were similar in effectiveness but the 3 Kr dose was more efficient since it caused less radiation damage.

* * *

Nobilization of sugar cane. B. T. ROACH. *Paper presented to the 14th Congr. I.S.S.C.T., 1971, 11 pp.*—The description of clones of *Saccharum officinarum* as “noble” canes, commenced by Dutch sugar cane workers in Java about 1920, is an apt one. It provides a convenient description of clones of this species with their frequently thick stalks, bright colours and wide

The next generation of lime kilns for the sugar industry will be oil fired and built by West's



The oil carburetting unit, key to the West's lime kiln's well-proven Catagas oil firing system.

First, for the benefit of those who might be sceptical, we should support our claim by telling you that the beet sugar industry's first West's oil fired lime kiln is in production and has already proved a complete success. So, switch to a lime kiln that readily integrates with modern concepts of automated sugar production. A kiln that offers simplicity, reliability, consistency and high CO₂ generation. A kiln that genuinely cuts running costs—its fuel is cheaper and free from the headaches of unreliable supply. Just think. All that—plus simplicity itself in operation. And best of all, it's *proved*.

WEST'S (MANCHESTER) LIMITED
Manchester M10 8AB.
Telephone: 061-205 2351, Telex 668991
London: Columbia House, Aldwych, WC2B 4DX
Telephone: 01-405 4108

WEST'S MANCHESTER

A WGI Company

**There's this sugar mill
in the depths of Peru...**

With a problem...

**'Where to find a #16 bearing unit
for a 40-year-old
belt-driven centrifugal?'**

(With inch-dimensional shaft and housing)

We had it...in stock!

(But for how much longer?)

This customer bought four—as in future we're not going to keep stocks of these units for the old-type sugar centrifugals. Maybe you could have the same problem.

If so, we've still got some of these bearing units (complete with sleeve) in sizes 14, 16, 17 and 18 (for 1 3/4, 2 1/4, 2 1/2 and 2 3/4 inch shafts).

Call your nearest SKF office or distributor. Or write direct to SKF Group Headquarters, Dept. MPN, S-415 50 Gothenburg, Sweden.

World leaders in ball and roller bearings

SKF

leaves in comparison with the generally less impressive clones of other species of *Saccharum*. The term "nobilization" to describe the crossing of the wild cane *S. spontaneum* to the noble canes and further backcrossing of resultant hybrids to the nobles, is also due to the Dutch. The stimulus for hybridization of noble canes came largely from disease outbreaks. Data are presented which suggest that diploid chromosome transmission, as observed in certain *Saccharum* crosses, may be due to differences in a small number of genes between the parent forms crossed. Possible reasons for the marked decline in vigour which occurs when F_1 hybrids of *S. officinarum* \times *S. spontaneum* are backcrossed to *S. officinarum* are discussed. Prospects for further gains from nobilization are reviewed.

* * *

Starch inheritance in *Saccharum*. Enzyme polymorphism for β -amylase in interspecific and intergeneric hybrids. P. G. ROUGHAN, J. C. WALDRON and K. T. GLASZIOU. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 9 pp.—Isoenzyme techniques have aroused considerable interest as a tool for generic studies on higher organisms. The concept that high stalk starch in certain commercial hybrid populations may be a *Saccharum spontaneum* character, governed in its inheritance by a supergene, was investigated in *S. officinarum* (varieties Badila and Korpi) \times *S. spontaneum* (variety Tabongo) crosses. Stalk starch and β -amylase isoenzyme patterns showed no correlation with starch levels. Hence, in this particular cross, the *S. officinarum* genome appears to dominate for the expression of the starch character. Starch levels in F_1 populations with 3 other *S. spontaneum* varieties were also well below mid-parent value.

* * *

Rapid screening methods for sugar cane. IV. A pot method of growing and ripening sugar cane. N. D. STEVENSON and J. DANIELS. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 10 pp.—A method is described for rapidly growing large numbers of clones in pots for yield screening. In addition, cane can be adequately ripened and clones therefore screened for biochemical characters. The degree of correlation for yield and biochemical characters between pot- and field-grown cane is similar to that between early stages of traditional field selection programmes.

* * *

Growth and flowering of sugar cane in relation to photoperiod and air humidity. M. H. AMIN, E. S. KASSEM, N. M. BAYOUMI and Z. A. MENSRAWI. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 6 pp.—The investigation reported was carried out in Egypt in 1966–67 to study the effect of photoperiod and relative humidity on the growth and flowering of sugar cane. Thirty-four varieties, replicated 3 times, were potted on 1st August 1965. The first group was left, as control, to grow under natural conditions. The second was given the excess darkness treatment, whereas the third was treated with excess darkness plus application of water as a fine mist-

spray during the daytime. Results indicated that either excess darkness or excess darkness plus misting during daytime promoted growth and flowering of canes compared with the control, the latter treatment being more effective. It was also observed that varieties differed in their optimum photoperiod and moisture requirements.

* * *

Selection methods to increase mosaic resistance and sucrose content. L. ANZALONE. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 5 pp.—Recurrent selection is used to improve sugar cane varieties at the Louisiana Agricultural Experiment Station. Methods of selection for mosaic resistance and sucrose content practised at the station are described. A virus dilution technique is used for testing young cane seedlings for specific levels of resistance to the sugar cane mosaic virus (SCMV). Data on new varieties of sugar cane show that there has been an increase in the last 6 years in the number of early maturing varieties with high sucrose. The number of clones falling into the high extreme of the sucrose spectrum has also increased. It appears that a levelling stage has been reached in high sucrose development in the present genetic material.

* * *

Selection for erectness in sugar cane in Louisiana. R. D. BREAUX. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 11 pp.—A study of erectness was conducted in an unselected progeny of a biparental cross between CP 52-1 and CP 52-11, grown in unreplicated line tests and in a replicated yield trial. Selection for erectness, on the basis of subjective ratings in clonal line trials not severely lodged by wind or rain, would be moderately effective in increasing the frequency of clones that remain erect under these conditions. However, selection in these clonal trials was not as effective in sorting out varieties that remain erect after severe storm damage. Selection for erectness in clonal plots, not severely lodged by storms, would have little effect on yield or any of its major component characters, with the possible exception of stalk length and stalk weight. These two characters showed a significant negative association with erectness.

* * *

A mass reservoir approach to selection in sugar cane. A. H. D. BROWN, J. DANIELS, A. S. MASILACA, K. G. MILES, H. SINGH, N. D. STEVENSON and B. WILSON. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 9 pp.—The mass selection reservoir (MSR) commences with a base population of many clones planted as a mixed stand. The degree of representation of a clone in the subsequent asexual cycles depends upon the number of its stalks and tillering ability, which affects the number of harvested stalks per clone. The reservoir is terminated when superior individual clones or groups of clones are isolated. The MSR technique is a logical method for the mutual selection of clones able to grow together successfully in commercial mixtures. Evidence indicates that such mixtures display superior yield ability over pure

stands. In addition, geographic selection for general adaptability and specific adaptation of individual and groups of clones may be achieved by planting the same base population in several ecological regions.

* * *

Some current issues in population genetics in relation to sugar cane breeding. A. H. D. BROWN. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 10 pp. As a discipline today, population genetics finds its most rapid development in conjunction with all other aspects of population biology. A central issue in this synthesis is that of variability among the members of a population and among the species of a community. Four topics in modern population biology, namely, genetic architecture, stability, diversity, and allozyme flexibility, are discussed in relation to sugar cane breeding. Matters likely to improve sugar cane breeding are discussed under four headings.

* * *

The Louisiana varietal programmes and their impact on yields of cane and sugar. S. J. P. CHILTON. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 4 pp. Louisiana cane sugar yields over the period 1955-69 have increased by a little over 20%. Approximately one-half was due to increase in tonnage of cane and one-half to increase in sugar/ton recovered. Analysis of the varieties grown indicated the increase in tonnage was not due to varietal changes while the increase in sugar recovery was due to the use of varieties giving higher sucrose recoveries.

* * *

Louisiana sugar cane cultural practices and extension activities. C. A. MILLER and D. T. LOUPE. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 5 pp. In Louisiana sugar cane has been of commercial importance since 1795. In 1970 it ranked 4th among agricultural crops in Louisiana, valued at more than \$72 million at the grower level. Research has played an important rôle in the success of sugar cane production. Because the Louisiana industry is unique in that it involves production of sugar cane at the northernmost latitude of any commercial production in the world, research efforts have centred largely on the area of variety development. The Cooperative Extension Service, considered the educational arm of the USDA, has been effective in disseminating useful and practical information to Louisiana sugar cane producers.

* * *

The cooperative extension function of Louisiana. L. L. PESSON. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 6 pp.—In Louisiana a professional staff of about 425 persons forms the corps which conducts the extension programme. The Extension Service is an integral part of the College of Agriculture of the State University, working in close contact with research and teaching divisions. Within this framework, extension staff units in the 64 parishes (counties) of Louisiana and in specialist project groups at the state level determine the focus of their programmes, stipulating major objectives to guide their work.

Scope of extension education in the Indian sugar industry. A. C. RAHA. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 4 pp.—Training programmes for the sugar industry in India have increased in recent years. The National Sugar Institute at Kanpur offers post-graduate courses in sugar technology and engineering, provides generous research facilities, and conducts short-term training programmes. The Institute also offers industrial advisory and extension service programmes. A high proportion of technologists and engineers in sugar factories belong to sugar technologists' associations, which hold annual meetings, seminars and symposiums. There is need to establish more clearly a direct relationship between rural society and higher education to meet the needs of India's agricultural economy effectively.

* * *

Extension education in South Africa. C. WHITEHEAD and J. WILSON. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 7 pp.—In the South African sugar cane areas free professional advice is available to all sugar cane producers through regional extension officers of the South African Sugar Association Experiment Station, and from collaborating advisory staff members of the Economic Liaison Service of the South African Cane Growers' Association. The Experiment Station's extension organization, which provides a link between the growers and the research and technical services, operates on a regional basis. The emphasis for future extension activities in South Africa will be on (1) increased specialization directed at areas of management and cultural operations most amenable to quick and profitable change, (2) intensified promotion of beneficial improvements, and (3) further development of back-up facilities and services for the extension officer in the field.

* * *

Recent results of research on photosynthesis in sugar cane. D. GROSS, C. W. BALDRY, J. COOMBS, C. BUCKE and A. W. GORDON. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 14 pp.—Recent work on the first stable products of photosynthetic CO₂-fixation, which has aroused great interest, is discussed. Satisfactory separation of mesophyll (grana-type) chloroplasts from bundle sheath (non-grana type) chloroplasts has been achieved, but, owing to release of large quantities of phenolic compounds and their interaction with enzymes during the isolation procedure, the biological activity was greatly impaired. Attempts to reverse the inhibitory effects by various chemical additives were only partly successful. It could, however, be demonstrated that isolated chloroplasts carried out a light-dependent carboxylation of phospho-enol pyruvate, giving rise to malate and oxaloacetate as the first stable products.

* * *

Photosynthetic rate in sugar cane: effect of virus diseases, genetic disorders, and freezing. J. E. IRVINE. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 8 pp.—It is understandable that the virus infections

which cause mosaic patterns may reduce chlorophyll content, deform chloroplasts or impair normal functions. Photosynthesis per unit area and chlorophyll content were reduced by sugar cane mosaic virus, variegation, freezing and "red freckle". Chlorotic streak disease and ratoon stunting disease had no significant effect on the rate of photosynthesis.

* * *

Biochemical and physiological effects of boron in sugar cane. J. E. BOWEN. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 9 pp.—Although boron is regarded as an essential nutrient for sugar cane, little is known about its function. It was found that root elongation was reduced by 84% when boron was withheld, although dry weights of 10-mm tip sections of boron-deficient roots were greater than those of boron-sufficient roots. Boron deficiency did not induce qualitative changes in carbohydrates present in root apices, but, quantitatively, boron-deficient roots contained higher levels of glucose, fructose and galactose in the insoluble fraction than did boron-sufficient roots. Boron-deficient plants had somewhat higher protein concentrations in meristematic tissues than did boron-sufficient controls. Effects on enzymes are discussed.

* * *

Essentiality of chlorine for optimum growth of sugar cane. J. E. BOWEN. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 11 pp.—A sharp decrease in the growth of two sugar cane varieties was observed when chlorine concentration of the culture solution was decreased from 10 to 0.02 mg/litre. Two other varieties were less susceptible to chlorine deficiency and manifested no visible signs of distress when chlorine was withheld. Bromine, iodine and fluorine were ineffective in alleviating the deficiency. It was concluded that chlorine is essential for optimum growth of sugar cane.

* * *

Sugar cane anthocyanins as colour precursors and phytoalexins. P. SMITH and P. M. HALL. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 8 pp. The chemistry of anthocyanins in sugar cane is discussed. Cane tops, shoots and diseased cane may carry anthocyanins. The predominant anthocyanins in one variety (N:Co 310) are thought to be luteolinidin derivatives. Red rot infection raises the level of anthocyanins. The materials rapidly form polymers but these are mostly removed in clarification, although some residual polymeric anthocyanins remain. Degradation products from anthocyanins respond to iron contamination. Differences in anthocyanin content and composition are sufficiently great to provide a basis for a possible new method for variety identification and might be useful for screening for disease resistance.

* * *

Soluble polysaccharides as a quality indicator in sugar cane. J. E. IRVINE. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 8 pp.—In sugar cane an increase

in soluble polysaccharides is associated with lower quality. The soluble polysaccharides (gums) in fresh sugar cane did not change during the last three months of maturation before harvest. There were significant differences in gum content between varieties and between locations. Gum content increased slightly for burned cane or unburned, lightly frozen cane when milling was delayed. Gum content and acidity increased most when cane was severely frozen.

* * *

Weed control practices on a South African sugar estate. E. C. GILFILLAN. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 4 pp.—The weed problem and methods of control on a large sugar estate in South Africa are described. Aspects which receive particular attention are the control of nutgrass (*Cyperus* spp.) and the procedures required to contend with a weed population which penetrates through a trash blanket in ratoon crops. *Cyperus esculentus* is the most widespread species and is extremely troublesome in plant cane crops. Although its growth is limited to an extent by a trash blanket in ratoon crops, it does compete significantly with ratooning cane, particularly in the early summer period.

* * *

Chemical weed control for Hawaiian plantations. H. W. HILTON and R. V. OSGOOD. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 10 pp.—In Hawaii, chemicals are now the only practical means of weed control. As new, improved herbicides have appeared, especially the substituted ureas and triazines, the number of applications per crop has decreased, the total amounts of chemicals used having decreased, and safety has improved for the user and the public. Costs have remained fairly steady, or even decreased, in spite of the higher unit costs of chemicals and labour. Mechanization of herbicide spraying, begun as early as the 1940's, has increased and provides considerable impetus to the research programme to find herbicides that are non-phytotoxic enough to be applied over cane by aircraft. Selection and study of varietal tolerance of cane to herbicides has become more important, as has the effect of herbicides on yield of cane and sugar.

* * *

Pre-emergence and post-emergence herbicide treatments of sugar cane fields in Mauritius. J. C. MONGELARD. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 5 pp.—In Mauritius substituted ureas and triazines have been very successfully used as pre-emergence herbicides with cane in spite of their high cost. Pre-emergence and post-emergence herbicide treatments were compared in a series of trials in Mauritius. More efficient weed control was obtained with early post-emergence treatments. In the humid zone "Atrazine" at 4 lb/acre applied before emergence was less effective on weeds than a post-emergence application of 3 lb "Atrazine" + 1 lb "Atril-D" per acre applied 7

weeks after planting. Several other herbicides with both pre-emergence and post-emergence properties were applied after emergence and were found superior to the pre-emergence treatments.

* * *

Influence of winter weeds on growth and yield of sugar cane. R. W. MILLHOLLON. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 6 pp.—Two winter weeds, burclover (*Medicago hispida*) and chickweed (*Stellaria media*) were seeded over sugar cane after planting in the fall in an experiment. In Louisiana cold winter temperatures delay top-growth of sugar cane until the spring. Winter weeds make much growth from January to early March. A thick, heavy stand of weeds covered the sugar cane rows. Cane in this state was compared with cane kept weed-free with herbicide. The stand reduction caused by winter weeds was due more to a suppression of tillering than to a reduction in germination of buds on seed cane. Sugar cane infested with winter weeds recovered substantially during the summer, but sugar cane free of winter weeds still produced significantly more millable stalks per acre and yielded significantly more sugar per acre.

* * *

Johnson grass infestation in Louisiana sugar cane. E. R. STAMPER. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 3 pp.—This grass presents a 2-fold problem since it reproduces from both seed and rhizomes. It has seriously infected Louisiana sugar cane for more than 20 years, and herbicides have been used intensively during this period. Progress in reducing the population of Johnson grass seed was determined by sampling soil from six Louisiana sugar cane plantations that were originally sampled in 1948. Samples were taken in 1969 from the upper 2.5 inches of soil from sugar cane fields that had been fallow ploughed in preparation for planting, a similar sampling method having been followed in 1948. Data showed that the population of seed had decreased by about 94% during the 21 years, but several thousand seeds/acre still remained in the upper 2.5 inches of soil.

* * *

Optimum economical use of fertilizers for sugar cane based on leaf analysis. B. G. CAPÓ. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 6 pp.—A procedure is proposed to estimate the optimum economic quantity of a fertilizer material to use in the production of a sugar cane crop. The proposed procedure requires the performance of a fertilizer test to determine the influence of the level in the soil of the respective fertilizer material on leaf composition and crop yield. A fertilizer-yield curve fitted to the crop-yield data of the experiment should likewise enable the estimation of the crop yield to be obtained from any given level of fertilizer in the soil. By taking into consideration the price of the crop ready for harvest, and the cost of fertilizer material, including the cost of application, the optimum economical level of the fertilizer material in the soil may be determined.

The difference between this optimum economical level and the actual content of the material in the soil, as previously estimated, is the quantity of fertilizer required to be used.

* * *

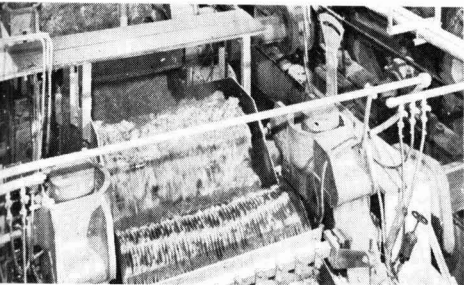
Relationship between yield components in infield and outfield trials. A. I. ALLAM, P. E. SCHILLING and K. L. KOONCE. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 7 pp.—The two most important characteristics to be combined in any sugar cane breeding programme are high-yielding capacity and disease resistance. In Louisiana selection for disease-resistant varieties is made at early stages in the breeding programme. Selection for yield components is made at later stages in the infield and outfield tests. This is to remove the worthless clones and to select the best and highest yielding clones for commercial usage. Relationships between tons of cane per acre, lb sugar per ton and lb sugar per acre were evaluated using 110 test clones at 2 in field stations and 14 outfield stations over an 8-year period.

* * *

Design and statistical analysis of field trials of insecticides for sugar cane froghopper control. D. W. FEWKES. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 3 pp.—Cultural and biological control of froghoppers, particularly *Aeoneolamia* spp., not having been attained, a continual search for new insecticides and control measures is needed to cope with resistant strains which develop. The trials of insecticides must be designed to conform with the pests' ecology and behaviour. With adult control trials, for instance, the area must be large enough to minimize the influence of migration. Frequency distribution of froghopper counts can vary widely from the normal but may be corrected by using the logarithmic transformation which also stabilizes the variance. The statistics of field plot experimentation are adequate for exploratory trials (of new control methods) and improvement trials (to compare cost-effectiveness of new insecticides with established control measures), but the statistical techniques of the population ecologist are required by extension trials for wide-scale assessment of a new technique of insecticide use.

* * *

Effect of irrigation intervals on sugar cane yield in UAR. M. H. AMEEN, M. BAYOUMI and Z. A. MENSRAWI. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 3 pp.—This study was carried out at the Hawamdieh Sugar Refinery Research Plantation and was planned to ascertain the effect of irrigation interval changes on cane and sugar yields. Two treatments concerning irrigation intervals, at 10- and 20-day periods, were carried out on three commercial cane varieties, N:Co 310, 54 C9 and Co 413. The results obtained showed the following trends: (1) better yields of millable cane and sugar were produced by shortening the period between successive irrigations, and (2) varieties differed in their response to the intervals of irrigation changes, depending mainly on their root system distribution.



Cane sugar manufacture

Improvement in evaporator operation using a new antiscalent. R. SCHAEER. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 7 pp.—See *I.S.J.*, 1972, 74, 61.

* * *

The disposal of sugar mill effluents in Queensland. D. BEVAN. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 13 pp.—See *I.S.J.*, 1970, 72, 53; 1972, 74, 115.

* * *

Treatment of effluent from raw sugar factories. J. R. MILLER. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 8 pp.—Details are given of pilot-scale experiments conducted at Victoria sugar factory in Queensland in which factory effluent having a suspended solids concentration ranging from 500 to 1500 ppm was treated by the aerated activated sludge process in one of two ponds (according to whether it was weekend or week day waste) provided with electrically-operated aerators. The treated effluent was passed to a clarifier for separation of sludge which was returned to the second, larger pond handling the week-day waste and intended to operate aerobically in its upper part and anaerobically in its lower part, while the first pond operated completely aerobically. Nutrients were added in the proportion IP:15N:100 BOD influent; pH adjustment was unnecessary, since it usually remained in the range pH 6–7. Results indicated that, provided the suspended solids concentration was no greater than 800 ppm, the BOD of the filtered effluent from the clarifier was 10–20 ppm (20–40 ppm when unfiltered).

* * *

Handling of sugar factory waste streams. J. C. P. CHEN, C. O. WALTERS, F. J. BLANCHARD, M. P. CABALLERO and R. PICOU. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 7 pp.—Treatment and disposal of effluent from the Houma sugar factory and refinery of Southdown Sugar Factories and Refinery Inc. are described. The waste water passes via a primary lagoon provided with aerators to an impounding lagoon and after a given retention period (depending on the quantity but not less than 30 days in conformity with a Louisiana regulation) is fed into the public stream. Some of the condenser water is fed directly to a spray pond for cooling, after which a 3½-mile journey takes it to the public stream, where its temperature is about that of the water in the stream. Aeration removes any noticeable odour and reduces the BOD of the cane wash-filter cake sludge mixture from 315–1140 ppm to 190–1015 ppm while impounding reduces it to 10–45 ppm.

Raw sugar factory wastes and their control. E. R. HENDRICKSON and F. A. GRILLOT. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 8 pp.—Results of investigations into the problem of airborne waste from bagasse boilers and cane burning made as part of an extensive air quality improvement programme set up by the Florida Sugar Cane League are reported, followed by less detailed discussions on solid and waterborne waste treatment and disposal in Louisiana. Amongst solid wastes are included cane stalks which fall from transport and from which the sucrose may be washed by rain into roadside ditches, thereby raising the BOD level of the groundwater. Filter mud will have to be treated by methods other than discharge to streams or waterbodies, in contrast to waste water which can be treated and released into public streams while conforming to regulations, although a balance between ecology and economy is of importance.

* * *

Pollution and pollution abatement in the Natal sugar industry. P. H. KEMP and S. M. H. COX. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 12 pp. The problems of water pollution by cane sugar factory effluent are discussed in the light of investigations conducted at Doornkop¹ and Umfolozi. While earthen dams at the latter factory failed, the use of Kestner brush-type aerators mounted on pontoons in a pond did improve the water quality, but still not sufficiently to conform with the requirements laid down by the Water Act. A pilot-scale biofilter and aerated pond system at Darnall is briefly mentioned; operation of this had only just started when the article was written.

* * *

The control of boiler fly ash emission in Queensland sugar mills. R. N. CULLEN and P. C. IVIN. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 8 pp. In investigations of bagasse furnace emissions and collector efficiencies in Queensland, typical solids concentrations of 2–4 grains/standard ft³ were obtained for four representative suspension-fired furnaces and 1–3 grains/standard ft³ for Dutch oven-type furnaces, a noticeable relationship being found between operator skill and emission level, particularly with the former type of furnace. Collector efficiencies were quite low as a result of air leaks and mechanical damage. A number of collectors (dry multi-cyclones and wet scrubbers) were tested in pilot-scale experiments where average efficiencies ranged from 90–4%

¹ *I.S.J.*, 1971, 73, 51.

to over 99%. The wet scrubbers had the highest efficiencies. Details are given of a full-scale three-scrubber system installed for Dutch-oven furnaces at Racecourse where measured efficiencies of 98.7% and 99.6% have been obtained.

* * *

Plantation white sugar by carbonatation-phosphatation. S. L. SANG, Z. H. HSU and H. T. CHENG. *Paper presented to the 14th Congr. I.S.S.C.T.*, 1971, 4 pp. In pilot-scale studies, three carbonatation processes involving phosphoric acid addition gave sugar of lower ash content but somewhat higher colour than did carbonatation-sulphitation, the usual process for white sugar manufacture in Taiwan. Of the phosphatation methods tested, the most suitable as regards costs and sugar quality was that in which the phosphoric acid was added to filtered 2nd carbonatation juice to pH 6.8-7.0 and the juice then evaporated, without further filtration, to 60-65°Bx at a temperature of 85°C with addition of 3 ppm "Separan AP-30" and 0.15% "Hyflo Supercel". The syrup was then filtered before pan boiling. Costs of the phosphatation scheme were higher than those of carbonatation-sulphitation but lower than those of conventional raw sugar melt refining.

* * *

Hinged-type mud scrapers in continuous clarifier. K. S. SHAH. *Sugar News (India)*, 1971, 3, (3), 24-26. Improvements in the performance of two clarifiers at the author's sugar factory as a result of installing hinged mud scrapers¹ included higher clear juice quality, a more compact mud and hence increased throughput of filters handling the mud with a reduction in filter cloth consumption, a 1 unit fall in molasses purity and an improvement in sugar colour (mostly I.S.S. 30).

* * *

Effect of temperature and level of P₂O₅ on clarification of sugar cane juice. C. M. MAGPANTAY and R. SAMANIEGO. *Sugar News (Philippines)*, 1971, 47, 349-353.—Of three clarification factors examined with a view to determining possible effects of quantity of phosphoric acid used and temperature, only clarity was significantly affected by the amount of P₂O₅. It rose to a maximum at 350 ppm P₂O₅, after which it fell, and was not affected by temperature. Both purity and settling rate were unaffected by temperature and phosphoric acid quantity.

* * *

Analysis of heat balance in sugar production. C. J. LU, T. W. HUNG and C. M. HUANG. *Taiwan Sugar*, 1971, 18, 21-31, 63-75, 111-118, 161.—See *I.S.J.*, 1969, 71, 51.

* * *

Controlling sugar house waste streams. J. C. P. CHEN, F. J. BLANCHARD and R. W. PICOUL. *Sugar J.*, 1971, 34, (4), 9-11.—The main items in the regulations on waste streams imposed by the Louisiana State Stream Control Commission are listed, and the subject of waste water control considered from various aspects.

These include stream diagnosis, details being given of the methods used to determine dissolved oxygen, BOD and COD. Means of waste water treatment are then briefly described. (See also *I.S.J.*, 1972, 74, 341).

* * *

Colour in (the) raw sugar industry. R. A. CATALA. *Sugar J.*, 1971, 34, (4), 20.—Advice is given on how best to avoid coloration of stored raw sugar with resultant drop in pH and pol, which in turn would incur a penalty when the sugar was supplied to the American Sugar Co. under Contract No. 10. A lower raw sugar temperature than the 130°F usually found in US factories after the centrifugals is the major recommendation.

* * *

How long can chopped cane be stored? ANON. *Sugar J.*, 1971, 34, (4), 21.—See *I.S.J.*, 1972, 74, 56.

* * *

Problems in processing deteriorated cane. ANON. *Sugar J.*, 1971, 34, (4), 22-23.—See *I.S.J.*, 1972, 74, 56.

* * *

Central La Carlota—modernization and expansion. ANON. *Sugar y Azúcar*, 1971, 66, (9), 17-20.—Details are given of new equipment installed at Central La Carlota, in the Philippines, to expand its daily crushing capacity to 10,000 tons of cane.

* * *

Deterioration of burnt cane. A. AMARAL and R. DE ARMAS. *Bol. Ofic. A.T.A.C.*, 1971, (2), 3-17.—See *I.S.J.*, 1971, 73, 271.

* * *

Importance of adequate selection of pumping equipment. D. PÉREZ F. *Bol. Ofic. A.T.A.C.*, 1971, (2), 18-24. See *I.S.J.*, 1971, 73, 180.

* * *

Lime application to cane juice. B. R. MATH. *Sugar News (India)*, 1971, 3, (4), 13-14.—The advantages of lime for cane juice purification are discussed and information given on reactions between juice and lime during clarification.

* * *

Results obtained on reversal of a cane cutter. G. RANGASWAMY. *Sugar News (India)*, 1971, 3, (4), 18-19.—Experimental reversal of cane cutter knives at the author's sugar factory for brief periods during three seasons was found to provide fine preparation, but this caused considerable slip at the mills where the rollers were worn. Motor power at the knives increased and bagasse pol (2-3) was not reduced. Pump chokes were reduced because of the finer preparation.

* * *

Treatment of mill effluent and sewage with aerators at Umfolozi mill. G. G. ASHE. *S. African Sugar J.*, 1971, 55, 523-529.—Details are given of the scheme for effluent treatment at Umfolozi, where the waste

¹ RAO *et al.*: *I.S.J.*, 1971, 73, 277.

water is discharged from the sugar factory into a 90 million-litre anaerobic pond and thence to an oxidation (Pasveer) ditch provided with six aerators operating at 70 rpm. The effluent flows from the ditch to a final settling tank, from which the sludge is returned to the oxidation ditch while the clear overflow is chlorinated and fed into the Umfolozi River. The system has been designed to meet the requirements laid down by the South African authorities for Umfolozi factory, viz. COD not exceeding 120 mg/litre, a suspended solids content no greater than 25 mg/litre, and a maximum permissible oil content of 5 mg/litre.

* * *

The performance of (Mauritius) sugar factories in 1970. J. DUPONT DE R. DE ST. ANTOINE. *Ann. Rpt. Mauritius Sugar Ind. Research Inst.*, 1970, 159-163. Aspects of the 1970 season in Mauritius which are discussed include: cane sucrose content, which while slightly higher at 12.86% than the 1965-69 average is considered still too low, although an increase is expected with the release of a new, high-sucrose variety, S 17; deterioration in mill performances, with an average extraction of only 95.8% compared with 96.1% for previous years, for which reasons are suggested, include inadequate cane preparation; clarification and filtration; boiling house work, particularly the higher than average losses, tests on boiling at high Brix to reduce final molasses losses and increasing C-masseccuite crystallizer capacities to improve molasses exhaustion; and finally enzymatic removal of juice starch, which has led to a reduction of starch in exported raw sugar to 86 ppm compared with 124 ppm and 198 ppm in 1969 and 1968, respectively.

* * *

Further experiments with bacterial amylase for reducing the starch content of sugar products. E. VIGNES and M. RANDABEL. *Ann. Rpt. Mauritius Sugar Ind. Research Inst.*, 1970, 167-170.—While addition of "Bactamyl" bacterial amylase to syrup entering the 3rd effect of a quadruple-effect evaporator at a rate equivalent to 10 ppm on clarified juice did not noticeably reduce the starch content compared with a control, the starch content in syrup to which the amylase was added before the final vessel fell by 17.5% compared with 4.4% in the control. The contact time was too short at 3 min, and a retention tank between the 3rd and 4th effects is recommended. The amylase did not affect the reducing sugars content or reducing sugars:sucrose ratio.

* * *

The use of crystallizers in series for the cooling of C-masseccuites. J. F. R. RIVALLAND and A. BÉRENGER. *Ann. Rpt. Mauritius Sugar Ind. Research Inst.*, 1970, 170-175.—Details are given of modifications to four Fletcher-Blanchard low-grade batch crystallizers to convert them to a continuous system at Médine sugar factory. In tests the masseccuite temperature was reduced from 66°C to 38°C in 24 hr, i.e. an hourly drop of 1.2°C compared with 1.3°C/hr obtained in 1959 with batch Fletcher-Blanchard crystallizers.

The fall was limited, however, by lack of cooling water. Purity fall was 6 units (equivalent to 0.2 units per °C fall in temperature compared with 0.3 units/°C obtained by JAMES & LAWRENCE¹ and 0.35 units/°C obtained by MORITSUGU²). The total purity drop was the same as was obtained before converting the crystallizers to a continuous system; however, the gain in capacity was equivalent to an extra two batch crystallizers. Disadvantages of continuous crystallizers briefly mentioned include the longer filling time and the possibility of serious delays and shutdowns if leaks develop in the cooling coils.

* * *

Curing of C-masseccuites in a Buckau-Wolf C-1100 continuous centrifugal. J. TURSAN D'ESPAIGNET and M. ABEL. *Ann. Rpt. Mauritius Sugar Ind. Research Inst.*, 1970, 177-182.—Tests on a Buckau-Wolf C-1100 continuous centrifugal at Constance sugar factory are described and the results compared with those obtained using a Broadbent batch machine, indicating a C-masseccuite throughput of 63 ft³/hr in the continuous machine and 16 ft³/hr in the batch centrifugal at respective molasses purities averaging 35.6 and 36.4 (magma purity was 83.5). The major advantage of the continuous machine was the ability to handle "medium-heavy" masseccuites at fairly high throughputs, where the batch centrifugal could not handle such masseccuites easily without reheating, which (together with time) had a marked increasing effect on mother liquor purity.

* * *

Deterioration of harvested sugar cane on storage—a method for its prevention. S. BOSE, K. C. GUPTA, S. MUKHERJEE and L. SINGH. *Proc. 37th Conf. Sugar Tech. Assoc. India*, 1970, 11-20.—Treating the cut ends of chopped cane with formalin before storage reduced purity loss for up to 192 hours but had no effect with further increase in storage time. A 20% suspension of bleaching powder in water had no inhibiting effect on purity loss.

* * *

Kieselguhr as settling aid in cane juice clarification. D. L. N. RAO, M. R. RAO and K. S. RAO. *Proc. 37th Conv. Sugar Tech. Assoc. India*, 1970, 95-102.—While addition of 10 ppm kieselguhr gave little improvement in juice settling compared with its absence, 20 ppm kieselguhr raised the settling rate noticeably. No increased benefits were obtained by raising the amounts used beyond this level.

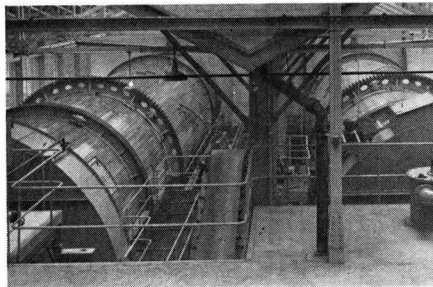
* * *

Use of magnesia preparation for cane juice clarification. L. G. CHABBI. *Proc. 37th Conv. Sugar Tech. Assoc. India*, 1970, 103-106.—Use of magnesium oxide with lime for juice clarification reduced the juice CaO content and resulted in softer evaporator scale which was easily removed. MgO quantities used were 25% and 33% on lime during the two periods considered.

¹ *I.S.J.*, 1965, 67, 271-274, 298-300.

² *Proc. 13th Congr. I.S.S.C.T.*, 1968, 1801-1807.

Beet sugar manufacture



Use of vibrations to reduce formation of scale and incrustation on a heat transfer surface. I. M. FEDOTKIN and A. S. ZAETS. *Izv. Vuzov, Pishch. Tekh.*, 1971, (3), 131–134.—Tests showed that vibrations at a frequency of 1.2–1.3 Hz in the amplitude range $A = 1$ –16 m were effective in reducing scaling of tubes in an experimental multi-pass heat exchanger at a sugar factory. At a given temperature the amount of incrustation fell with increasing frequency and amplitude, but temperature rise necessitated raising these two vibration factors. Ideal conditions can be found experimentally.

* * *

Hydrodynamics of evaporators with forced circulation. M. A. GEISHTOVT *et al.* *Izv. Vuzov, Pishch. Tekh.*, 1971, (3), 135–138.—Experimental investigations of hydraulic resistance in a test unit showed that boiling affects the resistance in the heated section of an evaporator where forced circulation is used and that the resistance should be determined by taking account of circulation rate, heat flow and latent heat of evaporation. The hydraulic losses are made up of loss due to sudden constriction of solution flow on entering the heating tube, friction loss throughout the tube, and sudden velocity change when the solution leaves the tube. Requisite formulae are presented.

* * *

Summary evaluation of temperature effects during prolonged storage of sugar beet. K. VUKOV. *Zucker*, 1971, 24, 626–631.—See *I.S.J.*, 1972, 74, 117.

* * *

The Austrian sugar industry. I. TÓTH-ZSIGA. *Cukoripar*, 1971, 24, 125–129.—A survey is presented of the Austrian sugar industry with details of beet sugar factory equipment and processes.

* * *

Sugar beet storage and minimum sugar losses and changes in technological quality. P. STATICESCU. *Ind. Alimentara*, 1970, 21, 579–583; through *Abs. Rom. Sci. Tech. Lit.*, 1971, 7, 610.—Daily sugar losses were halved and the MZ factor (molasses sugar) decreased from 5.2 to 2.5 units in beet stored for 120 days in piles containing 1500–2100 tons subjected to forced ventilation through transverse pipes compared with unventilated control piles containing only 100–170 tons of beet. The only drawback with the scheme, used in Rumanian experiments in 1965–1968, was the large number of fans required and the resultant high power consumption, which was, however, balanced by the loss reductions.

Theory and practice of juice boiling. V. MAURANDI. *Ind. Sacc. Ital.*, 1971, 64, 77–93, 107–126.—The article comprises the text of lectures on the subject presented by the author at the Serafino Cevasco sugar school of the University of Ferrara. Topics covered by the lectures include the kinetic aspect of crystallization, vacuum pans, the effect of non-sucrose, the viscosity of saturated sugar syrup, the kinetics of crystal growth, kinetics according to the diffusion theory and according to the activation energy theory, the influence of the analytical system (based on densimetric, refractometric and true solids before and after crystallization) execution and phases of boiling, continuous crystallization by cooling, formation of the footing, massecuite feeding, high- and low-grade strikes, viscosity and supersaturation, the saturation coefficient as a function of purity, interference in the progress of a high-grade and low-grade strike of boiling point elevation and change of purity, total crystallization time on the basis of crystallization velocity at constant supersaturation and of water evaporation rate, production of raw and white sugar, carrying out of low-grade boiling, ripening of low-grade massecuite, desugaring of molasses by chemical and chemico-physical means, automatic control of boiling, measurement of electrolytic conductivity, boiling point elevation and of the power consumption of a constant-speed agitator within the pan, and inconveniences and irregularities in boiling.

* * *

The “Reggiane 3D” process for the simultaneous deliming, decolorization and partial demineralization of beet sugar juices. III. A new production technology. P. BALDASSARI. *Ind. Sacc. Ital.*, 1971, 64, 127–130. Juice purified by the “Reggiane 3D” process¹ is characterized by low mineral ash content and colour; it can thus be used for boiling of high-purity refined sugar and of lower purity granulated white sugar. Flow diagrams show such production schemes; the refined sugar system employs four strikes and the granulated sugar three. The same number of pans and centrifugals may be used in each case, so that the factory can easily change its production programme without great expense on equipment. This is in contrast to factories operating at present which are required to produce both kinds of sugar but which employ conventional juice purification and need additional plant.

¹ *I.S.J.*, 1971, 73, 279.

reader inquiry service

Please arrange for me to receive without obligation further details of the products referred to below which are advertised in your 19..... issue.

Advertiser	Product	Page

reader inquiry service

If you wish to receive further information on the products and services mentioned in the advertisements please fill in the inquiry section of this card and post it to us.

Signature.....

Block Letters { NAME Date.....
 { Position.....
 { Firm.....
 { Address

photocopy service

Please submit your pro-forma invoice for the supply of one photocopy of each of the following original papers, abstracts of which appeared in your 19..... issue.

Page	Author(s)	Title

photocopy service

We are able to supply one photocopy, for research or private study purposes, of most of the original papers abstracted in this journal. It should be noted that these are not translations but are in the original language of publication, which may not be English. Please ask us to quote you the cost of your requirements, indicating whether surface or air mail delivery is to be provided.

Air Mail/Sea Mail Signature.....

Block Letters { NAME Date.....
 { Position.....
 { Firm.....
 { Address

additional subscription order

Please send a further copy of your journal each month to the address below, starting with the issue 19.....

additional subscriptions

To receive additional copies of *The International Sugar Journal* all you need do is to complete the card with details of the subscription required, and return it with your remittance of £3.00 or U.S. \$10.00 for supply by surface mail.

Block Letters {
 {
 {
 {
 {

Signature.....

Date.....

Sugar beet processing in India. S. C. GUPTA and R. K. JAIN. *Sugar News* (India), 1971, 3, (1), 29-31.—Advice is offered regarding the processing of beet in a cane sugar factory. Separate processing of beet and cane and subsequent mixing of their juices is considered practical, but diffusion of beet and cane together is not recommended. Since carbonatation cannot be replaced by sulphitation for beet juice treatment, the growing of beet in areas such as Maharashtra, where cheap limestone is not available, is thought to be inadvisable, particularly since the cane sugar yields in the state are higher than would be beet sugar yields, in contrast to the position in Northern India, and it would not be possible to grow sufficient cane and beet to meet the requirements of a cane-cum-beet factory. The point is also made that beets do not yield a fuel as does cane.

* * *

Comparison of the quantities of lime produced by calcination of limestone with different fuels. H. SCHNEIDT. *Zucker*, 1971, 24, 604-607.—The different fuels compared are coke, oil (containing 1.5% and 3.5% sulphur) and natural gas (containing 6% and 14% nitrogen). While the CaO yields were practically the same for all fuels, the waste gas CO₂ content was highest with coke, followed by oil and lastly natural gas (excess absolute CO₂ of 56%, 43% and 33%, respectively). The calculations of these and other factors are given in detail and cost factors to be considered are mentioned.

* * *

Grinding and assembling beet knives in beet slicer frames. E. SZYMAŃSKI. *Gaz. Cukr.*, 1971, 79, 214-217. Workshop equipment for beet slicer knife sharpening and the techniques used in knife grinding are described, and reassembly of the knives in their frame explained.

* * *

Temperature distribution in a continuous trough-type diffuser. S. GAWRYCH and W. KRUPA. *Gaz. Cukr.*, 1971, 79, 219-223.—Measurement of cossette-juice temperature in a DDS beet diffuser showed considerable fluctuations across each section, vertically and horizontally, as well as from section to section throughout the diffuser, the temperature at the top being some 10°C lower than in the same inclined plane at the bottom end. The difficulty of regulating the heating system in the diffuser, either manually or automatically, is mentioned.

* * *

Experimental results obtained in decolorizing and desalting dilute molasses solutions with "Permasep" ultra-filtration modules. S. E. BICHSEL and J. A. LEVAD. *J. Amer. Soc. Sugar Beet Tech.*, 1970, 16, 16, 197-206.—Details are given of laboratory-scale experiments involving the use of "Permasep" ultra-filtration (reverse osmosis) modules of 19% salt passage for dilute molasses decolorization and of low salt passage (3, 7 and 8%) for non-sugars removed

from the decolorized permeate. At a flow rate of 2.5 gal/min the colour was reduced from 11,145 to 3,206 units (as measured at 560 nm), while 3-stage treatment at a 2.42 gal/min flow rate through a 7% salt passage module reduced the non-sugars by 54.9% at a sugar loss of 23.2%, the apparent purities of the feeds per stage being 63.68, 67.26 and 71.26. First-stage non-sugars removal totalled 23.2%, including 22% total nitrogen, 11.9% amino-acid + pyrrolidone carboxylic acid N, 13.8% betaine, 46.2% nitrate, 39% chloride, 15.8% calcium, 29.6% sodium, 20.1% potassium and 17.4% invert. Difficulties were experienced in reduction of flow rates after a given period, and possible causes and means of eliminating the trouble are discussed. The conclusion is that under these conditions ultra-filtration is not economically competitive with other purification processes.

* * *

Evaluation of effects of controlled atmosphere storage on roots of sugar beets grown at various levels of nitrogen fertilizer. V. V. KARNIK, L. E. OLSON, D. K. SALUNKHE and B. SINGH. *J. Amer. Soc. Sugar Beet Tech.*, 1970, 16, 225-234.—Observations of changes in beet stored for up to 200 days under conditions of controlled refrigeration at 40°F and in a controlled atmosphere of 6% CO₂ and 5% O₂ at 40°F are discussed. The advantage of controlled atmosphere storage, as expressed by sucrose, raffinose, total-N, amino-N, organic acids, sprouting and micro-organisms, over storage under conventional controlled refrigeration was demonstrated. Differences were also noted as a result of nitrogen fertilizer application during growth, although neither application (150 vs. 300 lb/acre) was optimum in all cases. However, better results were achieved with nitrogen application than without it.

* * *

New purification process in the sugar industry. P. DEVILLERS, M. LOILIER and J. C. CHARTIER. *Ind. Alim. Agric.*, 1971, 88, 947-955.—See *I.S.J.*, 1972, 74, 84.

* * *

Development of the use of ion exchangers in the French sugar industry. J. GUÉRIN. *Ind. Alim. Agric.*, 1971, 88, 957-963.—A survey is presented of processes involving ion exchange resin application in beet and cane sugar factories and refineries, including juice, syrup and waste water treatment. Descriptions are given of some well-known patented processes, and future prospects are considered, as well as problems created by the use of ion exchangers.

* * *

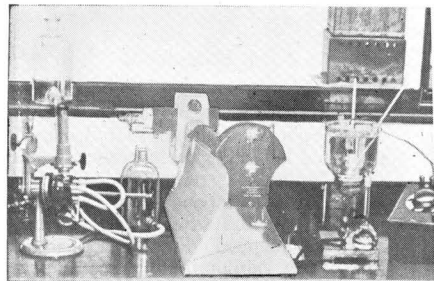
Suspension for massecuite seeding. V. VALTER. *Ind. Alim. Agric.*, 1971, 88, 985-988.—Details are given of a method using ball mills which gives a sucrose suspension in ethanol, 125 ml of which contains 10⁹ particles measuring 1-10 μ (mostly 2-4 μ). Means used to determine factors affecting the slurry quality (granulation and number of particles) are described.

**Reader Inquiry Service,
The International Sugar Journal Ltd.,
23a Easton Street,
High Wycombe, Bucks.
England.**

**Photocopies Dept.,
The International Sugar Journal Ltd.,
23a Easton Street,
High Wycombe, Bucks,
England.**

**Subscriptions Dept.,
The International Sugar Journal Ltd.,
23a Easton Street,
High Wycombe, Bucks.,
England.**

Laboratory methods & Chemical reports



The evaluation of sugar cane in South Africa. A. C. BARNES. *S. African Sugar J.*, 1971, 55, 345-349. The author, Chairman of the Cane Testing Committee set up in South Africa in 1966 to investigate and report on methods of cane sampling and testing in relation to total sucrose distribution in the cane, explains the situation created by increased factory crushing rates, the introduction of the multi-pile carrier system and the large number of small consignments of cane delivered by road transport, and describes the steps taken to find a solution to the problem. As a result of the investigations, it is recommended that the Java Ratio method be replaced by direct sampling and analysis, since the former method does not permit representative sampling and the Java Ratio cannot be determined for individual cane deliveries.

* * *

Cane pol vs. cane sucrose. J. C. P. CHEN, C. O. WALTERS and F. J. BLANCHARD. *Sugar J.*, 1971, 34, (2), 13-15.—The authors criticise the use of pol in place of sucrose content when the latter is intended, and point out that the pol value of an impure sugar solution can be distorted by the presence of optically-active non-sugars and sugars other than sucrose. Moreover, the dextrose:levulose ratio quite often deviates from 1.0. Analysis of juice from two cane varieties indicated differences between them in dextrose:levulose ratios, reducing matter and, hence, pol, which in the juice from one variety was higher than the sucrose content while in the other it was lower. Further analyses of samples from the cane after a sharp frost indicated certain changes in the factors affecting pol and particularly in the sucrose-pol difference.

* * *

Core sampling cane deliveries in Louisiana. W. J. LANDRY. *Sugar J.*, 1971, 34, (2), 27-29.—Details are given of the X-2000 and X-4000 cane core samplers made by J & L Engineering Co. Inc. The sampling method approved by the USDA and used in Hawaii is explained and determination of cane trash content using the core sampler described.

* * *

Methodology of sugar beet analysis. P. A. KEARNEY. *J. Sci. Food Agric.*, 1971, 22, 342-348.—Experiments are reported in which various methods employed in beet quality assessment were evaluated. Difficulties in obtaining representative brei samples from beets are caused by non-uniform distribution of sugar and dry matter, while further problems arise as a result

of differences between the sugar contents of brei prepared by means of a rasp and a saw¹, although the differences (0.60 units) were fairly constant. No significant differences were found between the dry matter contents with both methods. The SACHS-LE DOCTE cold digestion method used for press juice preparation is considered unlikely to be replaced as it is simple and adaptable to automation. The CARRUTHERS & OLDFIELD method² proved the most suitable for juice treatment. Orthophosphoric acid, as used in this method, was found to be preferable to CO₂ as used in conventional carbonation, since the former removed more excess calcium; 15 ml of lime gave the same juice purity as did 20 ml but higher than did 10 ml. A regression equation was derived relating 2nd carbonation juice purity to laboratory-clarified juice purity. As an alternative to determining clarified juice purity, measurement of the major impurities in the lead subacetate extract can be used to determine the sugar content. The summation value, SUM_J, of CARRUTHERS & OLDFIELD (given by 2.5K + 3.5Na + 10 amino-N + betaine), but ignoring betaine (because it is difficult to determine in routine analysis) is a suitable criterion, while for lead subacetate extract SUM_L = 1.9K + 2.3Na + 10 amino-N is a suitable expression. Impurities can be expressed in terms of SUM_J and SUM_L, and all the equations have highly significant correlation coefficients. Calculation of SUM_J is particularly attractive since it involves use of the extract already prepared for sugar content determination.

* * *

Investigations on the precipitation behaviour of raw juice components. F. SCHNEIDER, E. REINEFELD and K. M. BLIESENER. *Zucker*, 1971, 24, 493-499.—See *I.S.J.*, 1972, 74, 87.

* * *

The behaviour of pyrazone and its metabolites during sugar beet growth and processing. N. DRESCHER and H. SCHIWECK. *Zucker*, 1971, 24, 500-503.—Pyrazone (1-phenyl-4-amino-5-chloropyridazone-6), the active ingredient of "Pyramin" herbicide, undergoes metabolism in the soil or plant to N-glucoside (metabolite A) and its dephenylated form (metabolite B). Quantitative studies on pyrazone and its metabolites in growing beet are reported. Metabolite B, the only form identified in harvest-ripe beet, was found in sugar factory products but passed entirely to molasses without any co-crystallization in sugar being estab-

¹ *I.S.J.*, 1958, 60, 102-105.

² *ibid.*, 1961, 63, 72-74.

lished. The quantities in molasses and dry pulp are so small as to be harmless toxicologically.

* * *

Beet molasses formation and composition. XII. Italian molasses with exchanged ions. G. VAVRINECZ, C. A. ACCORSI and G. MANTOVANI. *Zeitsch. Zuckerind.*, 1971, **96**, 380-385.—See *I.S.J.*, 1972, **74**, 219.

* * *

Quality criteria for cane sugars. K. DOUWES DEKKER. *Zeitsch. Zuckerind.*, 1971, **96**, 386-390.—The quality and quality criteria of direct consumption cane sugars (ranging from products having a pol as low as 85 to white sugar having a purity approaching that of refined sugar) is discussed. Sugar analyses for Java sugar in 1939 are tabulated and reference is made to the Codex Alimentarius standard for mill white sugar. Cane raw sugar quality is then discussed and seven requirements set out which the sugar should satisfy for refining purposes. The bonus/penalty system of the American Sugar Company is described.

* * *

The decomposition of raffinose by α -galactosidase. T. YAMANE. *Sucr. Belge*, 1971, **90**, 345-348.—See *I.S.J.*, 1972, **74**, 85.

* * *

Evaluation of three analytical methods for determination of dry matter in cane final molasses. M. L. RODRÍGUEZ M. and M. MURO M. *CubaAzúcar*, 1970, (April/June), 9-15, 31-37.—The three methods studied were: hydrometric measurement of a 1:1 dilution of molasses without centrifuging, measurement by refractometer of a 1:1 dilution, and vacuum drying (for 5 hr at 50 mm Hg and 65°C) of a molasses sample diluted 1:1 and supported on rolled-up strips of filter paper. Preliminary experiments had previously eliminated methods in which the 1:1 dilution was centrifuged before hydrometry, the refractive index of undiluted molasses was measured, and where acid-washed quartz sand was used as support medium for molasses to be vacuum-dried. With molasses containing 81-84% dry solids, the vacuum drying method, considered to be the standard, gives lower values (by 1.77-2.03 units) than the refractometric method which itself gives lower values (by 2.97-3.23 units) than hydrometry.

* * *

The chemical laboratory in sugar factories. R. VELÁZQUEZ R. *Bol. Azuc. Mex.*, 1971, (256), 5-6.—The function of a chemical control laboratory is briefly discussed and the need for integrity and respect for the figures it produces. The Government-promoted interest in chemical complexes involving by-product utilization in Mexico has brought more attention to the importance of the laboratory and its work. The layout of a two-storey laboratory and technical department is illustrated.

* * *

Method of calculating the quantity of decomposed sugar. R. A. KOLCHEVA and A. R. SAPRONOV. *Sakhar. Prom.*, 1971, **45**, (8), 12-14.—Equations are

developed for calculating the rate constant for decomposition of sucrose, fructose and glucose as well as invert sugar in acid and alkaline solutions at pH 2-13 and 20-140°C. Further equations are then derived whereby substitution of the rate constant value will give the amount of sugar decomposed.

* * *

Indirect method of measuring the moisture content of wet refined sugar. L. I. KON, V. A. DEMCHENKO, YU. P. RADZIEVSKII and A. V. YAKOVLEV. *Sakhar. Prom.*, 1971, **45**, (8), 28-30.—The moisture content of wet refined sugar from the centrifugals is normally determined by measuring the change in air moisture between the entrance to the dryer and the end of the first drying section. The effects of various factors, e.g. initial air R.H. and temperature, are discussed and experiments described in which the change of air moisture was measured when drying sugar of known moisture content. An approximately linear relationship has been established whereby, by means of a balanced bridge instrument calibrated from 0.80% to 2% refined sugar moisture, the latter factor can be found from air moisture change to within an accuracy of $\pm 0.1\%$ moisture.

* * *

Theory of sucrose activity in aqueous solution. F. HEITZ. *Sucr. Belge*, 1971, **90**, 383-396, 441-451. The theory is based on the assumption that, having a volume one-tenth that of the sucrose molecule, in pure sucrose solution the water molecule will form a continuous medium, having a dielectric constant and viscosity, in which the sucrose molecules will move in the same way as gas molecules, so that their behaviour can be described by gas theories provided the osmotic pressure of the solution is considered as an equivalent to the pressure of a gas, or, in very dilute solutions, the mean kinetic transfer energy is considered, in which case the kinetic theory of perfect gases can be applied. If the solution is concentrated, the mean potential interaction energy of the molecules must also be taken into account, this being equivalent to introduction of a compressibility factor. Models of the sucrose molecule and crystal have been used to calculate constants a and b in an expression for calculation of the activity coefficient in terms of sucrose molar concentration and absolute temperature. Characteristic temperatures for the sucrose molecule are given as 1000°K for electronic vibrations, 1048°K for atomic vibrations and 8°K for molecular vibrations. Change in specific molar heat of the crystal C with absolute temperature T is given by $C = 0.34T$ cal/mole. Sucrose molecule hydration is assumed to be temperature- and concentration-independent, so that the refractive index, specific gravity, specific heat, osmotic pressure and vapour pressure can be calculated at varying temperatures and concentrations, a simple relationship being established between vapour pressure and the activity coefficient, surface tension and viscosity. Calculated and experimental values in the literature agreed for all factors, except surface tension and viscosity, in the temperature range 0-100°C and concentrations up to supersaturation.

Device for dry matter determination in thick products by the 1:1 (by weight) dilution method. I. A. PRIKHOD'KO. *Sakhar. Prom.*, 1971, **45**, (9), 32-34.—For rapid and thorough crystal dissolution and mixing, a device has been developed in which the sample (40-100 g of massecuite, molasses or syrup) is placed in one of two hermetically-sealed vessels mounted diametrically opposite on a horizontally rotating disc housed in a chamber surrounded by a thermostatically-controlled jacket. After addition of distilled water for the required dilution, the disc is set in motion, while the two vessels also rotate about their own axes and simultaneously the whole unit oscillates about a horizontal axis.

* * *

Determination of the induction period in autocatalytic decomposition of sucrose. KH. KH. FAT and S. Z. IVANOV. *Izv. Vuzov, Pishch. Tekh.*, 1971, (3), 30-32. Studies of sucrose inversion in different solutions adjusted to pH 7-7.5 and heated at 70-100°C for varying periods showed extremely close parallels between the curves for sucrose reduction and increase in H⁺ ion concentration with time at the same temperature. Determination of the induction period, during which sucrose decomposition is slight but after which it rises sharply, by potentiometric measurement of pH gave values in very close agreement with results given by iodometric determination of sucrose decomposition. The potentiometric method, which is more rapid and consumes less reagent than does the iodometric method, is recommended.

* * *

Effect of sucrose concentration in a solution on colorant formation. I. F. BUGAENKO and M. MUKHAMED. *Izv. Vuzov, Pishch. Tekh.*, 1971, (3), 33-35.—Sucrose added in varying quantities to buffered solutions of pH 8 containing 0.05 mole/litre invert sugar and 0.025 mole/litre amino-acid or ammonium chloride reduced the rate of colour formation (which fell with increase in sucrose and with time of heating) as determined from colour measurements every ½ hour during 8 hours' heating on a boiling water bath. In the absence of an amino-acid or NH₄Cl, the colour formation was lower than in its presence, while the extent of colour formation varied according to the amino-acid involved, following the order glycine > NH₄Cl > aspartic acid > glutamic acid. The effect of sucrose was reduced by the presence of an amino-acid. In all cases the fall in pH was about the same.

* * *

Thermal stability of sugar solutions treated with ion exchange resins. V. A. LOSEVA, G. A. CHIKIN and S. Z. IVANOV. *Izv. Vuzov, Pishch. Tekh.*, 1971, (3), 87-89.—Tests with two anion and one cation exchange resins showed that ion exchange treatment of syrup reduced its thermal stability by an amount which depended on the form of resin used. It was found impossible to determine thermal stability from the buffering capacity of the syrup since the ion exchange

treatment destroyed the linear relationship between these two factors.

* * *

Growth rate of different faces of the sucrose crystal. C. A. ACCORSI and G. MANTOVANI. *Zeitsch. Zuckerind.*, 1971, **96**, 440-445.—After a survey of the literature on differences in the growth rate of the different faces of the sucrose crystal, experiments were carried out in an attempt to grow single crystals weighing 50-70 g and having a total surface area of 60-80 cm². The best method proved to be one in which all the crystal faces other than the one under investigation were coated with synthetic resin, sufficiently thinly to avoid affecting the crystal density; the crystal was grown from an unstirred solution of 1.10 supersaturation at 25°C. During the 10 hr growth period the crystal was weighed every 60 min. While faces *a* and *c* and, within certain limits, *p* and *p'* were of satisfactory size (10-20 cm²), some difficulties were encountered in the growth of faces *d* and *r*. For measurements of the *r* face, crystals were grown in raffinose-containing solutions and then grown in pure sucrose solutions to avoid problems caused by adsorbed raffinose molecules. With the relative growth rate of face *a* taken as 1 (actual rate = 146 mg.m⁻²min⁻¹), the values for other faces were: *c* = 1, *d* = 1.7, *p* = 2.5, *r* = 2.8 and *p'* = 3.4. The mean growth rate was calculated (using DEVILLERS' equation) as 212 mg.m⁻²min⁻¹, which is in close agreement with a value of 220 mg.m⁻²min⁻¹ found by the authors in previous experiments.

* * *

Sugar cane examined by direct analysis. M. BESSON-GUYARD. *Bol. Azuc. Mex.*, 1971, (257), 7-11.—See *I.S.J.*, 1972, **74**, 152.

* * *

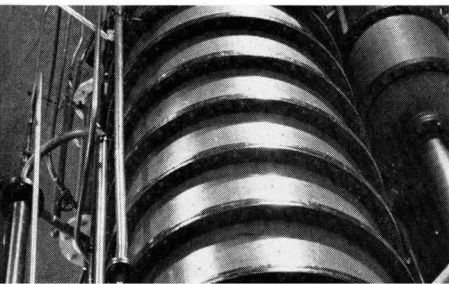
Technical diffusion—chemical control. R. VELÁZQUEZ R. *Bol. Azuc. Mex.*, 1971, (257), 13-15.—Aspects of chemical control which are discussed include the collection of samples (of various juices, syrup, massecuites, molasses, bagasse, cachaza, etc.) and their preservation, as well as general recommendations for the laboratory, such as provision for cleanliness of equipment, adequate sizing of the oven, filtration procedure, the need for checking the polarimeter, etc.

* * *

Estimation of the microbial population of cane juices by means of resazurine. M. T. HERNÁNDEZ N. *Bol. Azuc. Mex.*, 1971, (257), 17-21.—See *I.S.J.*, 1971, **73**, 186.

* * *

Relationships between beet analyses and the technological value of sugar beet. L. WIENINGER and N. KUBADINOW. *Zucker*, 1971, **24**, 599-604.—See *I.S.J.*, 1972, **74**, 88.



By-products

Study on the influence of the new cane varieties on the Cuban pulp and paper industry. E. BATLLE and J. A. ESPINOSA. *CubaAzúcar*, 1970, (April/June), 19-25, 40-44.—New varieties of cane have been adopted in Cuba for high yield, pest and drought resistance, etc., and their characteristics in regard to paper pulp manufacture from the bagasse have been compared with those of POJ 2878 as the standard. Cane of the five new varieties MY 53108, B 42231, PR 980, C 236-51 and C 8751 as well as the standard was cut at 14 months and the bagasse air-dried and depithed in the dry using feed and hammer mills. The product, containing some 20% pith, was digested and the pulp washed to neutral pH and its yield and characteristics determined; these included density, tear strength and burst strength, etc. and are tabulated as are the composition and characteristics of the bagasse. The varieties C 236-51 and C 8751 gave the best pulp characteristics while there were some operative difficulties with the continuous digester when using bagasse from B 42231 which gave poorest pulp characteristics.

* * *

Use of microphotography (sic) in the investigation of the derivatives of sugar cane. D. DUBROČ S. *Bol. Azuc. Mex.*, 1971, (256), 29-32.—Applications of photomicrography are briefly mentioned with illustrations; they include examination of the effect of mechanical treatment on bagasse for paper-making, the structure of cane leaves, fibre density and bonding in artificial wood from bagasse, the nature of decolorizing carbons prepared from bagasse and wood, sugar crystal formation under different conditions, etc.

* * *

Economy and perspectives on the utilization of bagasse in the manufacture of particle boards. R. HESCH. *Bol. Ofic. A.T.A.C.*, 1971, 69-85.—See *I.S.J.*, 1971, 73, 93.

* * *

Strength and bulk density of pulp briquettes under varying pressing conditions. V. P. BORODYANSKII, N. N. DOVGAL' and G. A. PETRIK. *Sakhar. Prom.*, 1971, 45, (9), 27-29.—The effects of pressure, temperature and moisture on bending resistance and bulk density of beet pulp briquettes have been determined. Empirical formulae are given for calculation of the resistance to bending and bulk density in terms of moisture content and pressure at 80°C, pressures in the range 500-2000 kg/cm² and 0-15% moisture content. Calculated values obtained with these

expressions agreed with experimental data to within less than 10% deviation. Although 130°C was found to be the maximum permissible temperature at which strength and bulk density were greatest (at 20-25% moisture content), 80°C is considered a more suitable maximum in terms of energy requirements.

* * *

Raising the efficiency of pulp drying units. N. M. TKACHENKO. *Sakhar. Prom.*, 1971, 45, (9), 30-32. Of more than 300 sugar factories in the USSR, only 121 are equipped with beet pulp dryers and their capacity is only half of the possible output of dried pulp. Both situations are deplored by the author in view of the cheapness and high quality of this form of cattle fodder.

* * *

The use of sugar beet products and urea in cattle fattening. J. KOSAR and M. DVORACEK. *Rev. Cubana Cienc. Agric.*, 1971, 5, 161-166.—Experiments in Czechoslovakia are reported in which fattening bulls were fed rations containing beet or beet pulp and molasses as basic energy sources plus urea as nitrogen source. Addition of the urea increased the daily weight gains compared with cattle in the control sample which received no urea. The results obtained with the urea-enriched rations were comparable to those achieved with cereal-based diets, 4 kg of raw beet being approximately equivalent to 1 kg of cereal.

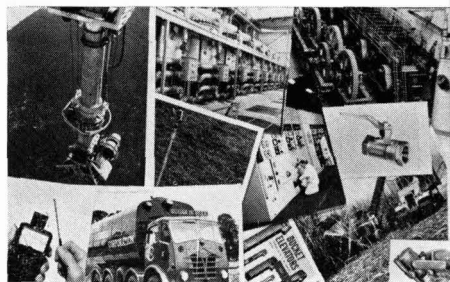
* * *

Intensive beef production from sugar cane. XII. Comparison of final and integral molasses, fish meal and torula yeast. T. R. PRESTON, J. L. MARTIN, M. B. WILLIS and J. GARCÍA. *Rev. Cubana Cienc. Agric.*, 1971, 5, 167-170.—In 200-day trials in which bulls were fed on rations containing integral molasses (concentrated unclarified cane juice) and final molasses, respectively, the integral molasses gave significantly heavier carcasses, which contained less bone and had a higher meat:bone ratio, while the daily ME intake was higher, than with the use of final molasses. The form of protein used (fish meal or torula yeast) had no effect.

* * *

Elephant grass and rice straw as forage sources for cattle fattened on molasses-based diets. I. Growth and feed conversion. J. L. VEITÍA, C. ESQUIVEL and L. SIMÓN. *Rev. Cubana Cienc. Agric.*, 1971, 5, 171-174. Results are given of comparative trials involving Brahman bulls fed on rations containing molasses and urea as energy sources and elephant grass or rice straw as forage sources.

Trade notices



Statements published under this heading are based on information supplied by the firm or individual concerned. Literature can generally be obtained on request from the address given.

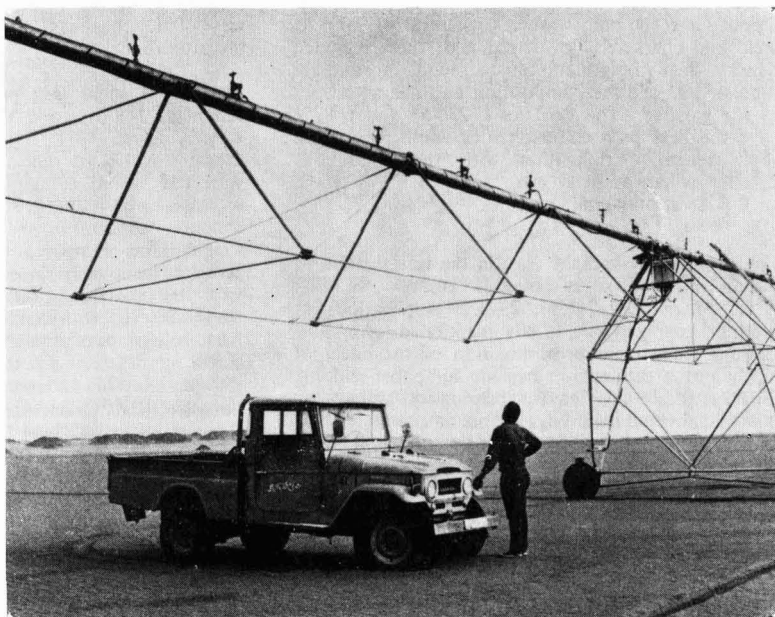
Automatic irrigation system. SPP Agricultural Services, Oxford Rd., Reading, Berks., England.

The "Rainger 7" is a new fully-automatic irrigation system launched by SPP Agricultural Services for finely-controlled precipitation of water and plant nutrients over an area of up to 100 ha (247 acres) with the minimum of supervision and maintenance. The system incorporates a water pipeline operating from a central pivot point and stretching out to a distance of up to 550 m. Provided with sprinklers along its entire length, the pipeline rotates continuously at a required speed in a clockwise or anti-clockwise direction. It is supported by a series of wheeled structures which keep it well clear of growing crops and farm machinery and permit operation over rough and undulating terrain. Possessing many advantages over conventional "hand move" portable tubeline sprinkler systems, the "Rainger 7" is no more expensive to install while its simplicity of 24-hour automatic operation permits considerable savings in manpower and other operating costs, including those of water distribution.

Although the system will provide medium to high water precipitation rates, it can also be set to make frequent small applications of water automatically as often as every day, if required. The system is in contrast to most other irrigation systems where large and infrequent applications of water of several hours' duration are made, so that the "Rainger 7" can take

advantage of the high initial infiltration rate of dry soil and irrigate faster than the terminal rate to which other systems are limited. Computer selection of the sprinkler spacings to suit the crop and land requirements, plus the fact that the machine moves while irrigating, ensures a high uniformity of water distribution. Sugar cane is among the crops for which the "Rainger 7" system is considered suitable.

* * *



PUBLICATIONS RECEIVED

"MILLIPORE TECHNOLOGY IN FOOD AND BEVERAGE PROCESSING". Millipore Corp., Bedford, Mass., 01730 U.S.A.

The title given above is that of a regularly-produced booklet published by Millipore Corp. which describes various applications of Millipore equipment and techniques. Applications in the sugar industry which are described in recent issues include determination of the coliform content of water using the "Coli-Count" water tested, and a new computer programme, the "Micronomic", which permits the design of micro-filtration systems for the removal of bacteria and fine particles from water and liquid sugar.

International Society of Sugar Cane Technologists

15th Congress, 1974

The Organizing Committee of the 15th Congress, to be held in South Africa between the 13th and 29th June 1974, have issued their first Newsletter. This discloses that the month of June has been chosen for the Congress because it is the best time of the year in Natal, with warm and sunny days and cool nights. In addition, since the season starts on the 1st May, the sugar factories will have been in operation for about six weeks when the Congress begins.

Registration will be in Johannesburg where the main international airport of entry into the country is located. On Friday, 14th June, tours include a visit to a goldmine and, after an official reception, delegates will travel overnight by train to the Transvaalse Suikerkorporasie factory and estates at Malelane. This visit will be followed by a week-end in the Kruger National Park—the largest wild life park in the world. On Monday delegates will return to Johannesburg by coach and travel by air on Monday evening to Durban where the Congress will be officially opened on the morning of Tuesday 18th June.

The Newsletter gives information on actions taken on the resolutions passed at the 14th Congress in Louisiana, on the Sectional Chairmen and Vice-Chairmen appointed, and a list of countries and zones represented by Regional Vice-Chairmen on the Administrative Committee of the I.S.S.C.T. It also indicates that the official travel agents for the Congress are Thomas Cook & Sons, while the official travel agents for the Post-Congress Tour of Mauritius are the Mauritian Travel and Tourist Bureau.

With the newsletter is issued a Circular No. 1 which sets out the rules for preparing manuscripts which must be received no later than 30th September 1973. Copies of the circular are obtainable from Mr. J. L. DU TOIT, General Secretary/Treasurer of the 15th Congress, I.S.S.C.T. at the following address:

P.O. Box 507,
Durban, Natal,
South Africa.

St. Vincent sugar industry study¹.—The sugar factory at Mount Bentinck on St. Vincent closed down ten years ago after a labour dispute had followed dwindling production and declining profits. Since then the Government of the island has had to subsidize sugar imports which, along with other factors, led Mr. MILTON CATO, the former Premier, to carry out an examination of the feasibility of resuscitating the industry. However, Mr. J. F. MITCHELL, the present Premier, recently gave four reasons why it would not be feasible to re-introduce sugar production: the land required would compete with bananas and arrowroot, the financial rewards likely to be afforded by a new industry may be insufficient to attract labour, the production cost may exceed revenue, and the new industry is unlikely to be viable in commercial terms.

* * *

National Sugar Institute, India.—Shri S. L. SAXENA has been appointed as the Director of the National Sugar Institute, Kanpur, India, succeeding Dr. S. C. GUPTA, who has retired.

Brevities

International Conference on the Chemistry and Technology of Sugar.—The second of these international conferences, held at Lodz, Poland, as was the first in 1962, is to take place on the 14th and 15th June 1973 under the auspices of the Polish Academy of Sciences. Intending participants should write before the 15th January 1973 to the Organizing Committee, Institute of Technology IS-3, Lodz 40, Poland, while the titles of contributions should have been submitted by the 30th October 1972. Short summaries, of not more than 20 lines, in the three congress languages (English, French and German) are expected by the 15th January while 200 copies of the papers must be sent by the 30th April 1973.

* * *

Tate & Lyle Research Laboratory.—The Philip Lyle Memorial Research Laboratory at Reading University was opened on the 22nd September by the Chancellor of the University, who unveiled a plaque to the late Philip Lyle, in the presence of University officials and members of the Tate & Lyle Board. Mr. Lyle, a main board director of T & L Ltd. until his death in 1955, was the director responsible for the setting up of the first separate research department in the Company. Recently occupied, the new building houses the industrial research laboratories of Tate & Lyle Ltd. with a staff of around 60 which, until summer 1972, was situated at Keston, Kent. It is sited next to the University Plant Sciences Laboratories, and its location within the University campus is expected to show advantages to both organizations; for the university, in the contact with industrial counterparts and access to certain analytical equipment; for the industrial researcher, the sharing of common services and the stimulus of academic surroundings. Tate & Lyle's Research Centre was recognised two years ago as an associated institution of the University and there has been for some time close cooperation, especially with the University's Faculty of Agriculture and Food. Dr. A. J. VLIROS, Chief Executive, Tate & Lyle Group Research and Development, is a Visiting Professor of the University.

* * *

Uruguay sugar production.—The Comisión Honoraria del Azúcar, the official organ of the Uruguayan Ministry of Industry and Trade concerned with sugar, has published its latest figures for 1971/72 sugar production and estimates for 1972/73. In 1971/72 167,213 tons of cane were grown on 5,300 ha and yielded 14,917 tons of sugar, 96% raw value basis. In 1972/73, 5,700 ha are expected to yield 200,000 tons of cane and 17,400 tons of sugar. The beet crop in 1971/72 amounted to 341,603 tons, grown on 15,800 ha, and yielded 43,610 tons of 96% sugar; in 1972/73, a crop of 400,000 tons of beet from 16,000 ha is expected to give 48,000 tons of sugar. Thus, total production was 58,527 tons in 1971/72 while 33,052 tons of raws were imported (from Argentina and Brazil) for refining. In 1972/73, production is estimated at 65,400 tons and it is expected that 42,000 tons of raws will be imported. Consumption is estimated at about 116,000 tons for both years.

* * *

Indian sugar stocks.—Sugar statistics published by C. Czarnikow Ltd.² indicate a fall in production from 3,706,300 to 3,067,500 metric tons, tel quel, while consumption has fallen only slightly. Stocks at the end of July 1972 were 1,140,000 tons, compared with 2,233,000 a year earlier and, at the then rate of consumption of 300,000 tons per month, this would have reduced stocks to about 500,000 tons by the end of September, when the new crop was due to start. There is no chance that India will import sugar, and measures have been taken to decrease consumption and increase production. A target of five million tons has been set for sugar production in the 1973/74 season.

¹ *W. Indies Chron.*, 1972, 87, 367.

² *Sugar Review*, 1972, (1092), 160-161.

Brazil sugar statistics¹

	1971	1970 (metric tons, raw value)	1969
Initial stocks	2,805,385*	2,247,106	2,537,969*
Production	5,297,747	5,019,219†	4,173,850
	8,103,132	7,266,325	6,711,819
Consumption	3,796,001	3,495,185†	3,403,510
Exports			
Algeria	19,670	0	11,250
Canada	0	9,550	0
Chile	7,993	0	97,649
Finland	39,600	0	41,902
France	34,915	57,188	25,000
Germany, West	14,385	0	999
Ghana	0	25,321	0
Iraq	47,254	0	12,289
Japan	26,935	158,934	38,100
Korea, South	0	20,000	0
Lebanon	0	4,988	0
Malaysia	34,748	0	36,983
Morocco	69,116	10,115	0
Rumania	64,887	0	0
Senegal	25,171	12,150	0
Spain	0	16,315	0
Sweden	0	0	13,122
Syria	25,000	0	0
Tunisia	45,200	26,046	0
UK	0	0	11,700
USA	597,549	607,036	651,373
Uruguay	14,886	48,590	44,000
Vietnam, South	152,505	133,615	76,836
	1,230,467	1,129,848	1,061,203
Final Stocks	3,076,664	2,805,385*	2,247,106

* Calculated
† Tel quel

Brevities

International Sugar Agreement membership applications. Singapore has applied to the I.S.O. for membership of the Agreement², as will Malaysia in 1973³. The Singapore decision may have been influenced by experience earlier in 1972 when importing its sugar at high world market prices while ISA members were able to import specified quantities related to historical imports at the lower supply commitment price. The Malaysian Minister of Trade and Industry announced that his country's application is to ensure a continuous supply in times of shortage. Malaysia imports about 350,000 tons a year.

* * *

Pease Progress—The story of Tate & Lyle road transport. A new small booklet of this title has recently been published by Tate & Lyle Transport Ltd. It traces the history from its beginnings as Robert Pease & Son, bone merchants and general deliverymen in the early 19th century, who became delivery contractors to both Henry Tate & Son and Abram Lyle & Son in London, and were eventually bought by Tate & Lyle Ltd. in 1936. From general carriage, the Pease & Sons fleet became carriers only of Tate & Lyle sugar but with the development of the company as Tate & Lyle Transport Ltd., it is now again a general carrier, through its subsidiary Silver Roadways, while the present fleet includes 1200 vehicles, carrying over 3,000,000 tons of goods a year. Copies of the book are available at a price of 30 pence from Tate & Lyle Transport Ltd., Leon House, High Street, Croydon, CR9 3NH England.

* * *

West Indies—EEC sugar trade study⁴.—The West Indies Sugar Association has set up a committee to inform the governments of the area and the secretariat of the Caribbean Free Trade Association on the problems of the association between the European Economic Community and the West Indies.

St. Kitts (Basse Terre) Sugar Factory Ltd. 1971 report.—The 1971 crop ran from 3rd February to the 17th July with an outturn of 24,991 tons of commercial sugar, equivalent to 25,371 tons 96⁵ sugar. Sugar for export amounted to 22,907 tons all of which was sold at the Negotiated Price to the UK Sugar Board. The sugar was produced from 21,517 tons of cane, compared with 324,662 tons crushed in 1970 which yielded 27,163 tons of sugar. The low cane tonnage was again mainly due to the late end of the previous crop, further hindered by dry weather in 1971. In common with other territories in the West Indies, juice quality was low so that the tons cane/ton sugar figure was high as in the previous two years (10.70 in 1971 compared with 8.38 in 1967 and 9.08 in 1968). The 1972 crop finished on 28th July with 25,931 tons of sugar produced; the juice quality was considerably better but the cane tonnage was too small. A new scheme for consolidating the estates has been designed to increase the crop⁶, the factory having the capacity to process the expected increase in cane tonnage. Work on by-products is continuing, the two fields being in animal fodder production and also core panelling for housing construction.

* * *

New Thailand sugar factory⁶.—According to press reports, the National Executive Council has approved an application to set up a sugar factory in Kui Buri, Prachuap Khiri Khan. About 60 million baht will be invested in the project and it is expected that it will be two years before the new mill, of 3000 t.c.d. capacity, goes into operation.

¹ I.S.O. Stat. Bull., 1972, 31, (7), 20–21.

² Australian Sugar J., 1972, 64, 145.

³ Public Ledger, 16th September 1972.

⁴ F. O. Licht, International Sugar Rpt., 1972, 104, (26), 11.

⁵ See I.S.J., 1972, 74, 290.

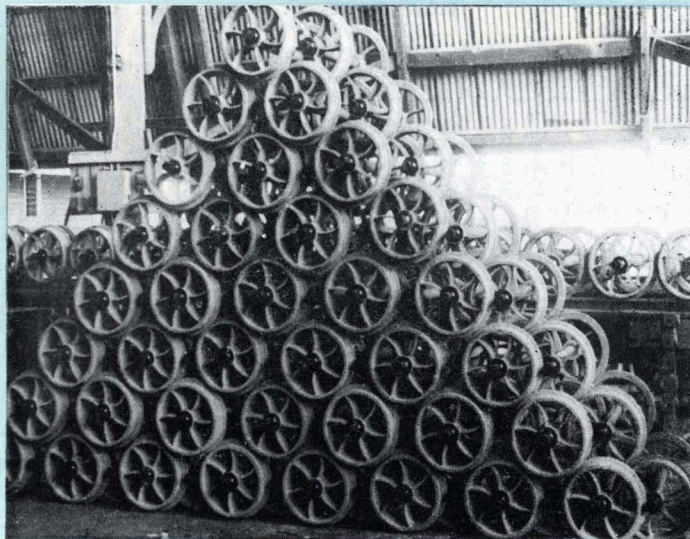
⁶ F. O. Licht, International Sugar Rpt., 1970, 104, (27), 6.

WE HAVE A BRANCH FACTORY IN MACKAY



MACKAY IS ON THE COAST OF THE CENTRAL QUEENSLAND SUGAR BELT 500 MILES NORTH OF OUR MARYBOROUGH FACTORY AND CARRIES OUT MUCH WORK FOR THE MILLS AROUND AND NORTH OF MACKAY.

HERE ARE A FEW OF ITS PRODUCTS



A BATCH OF 2 ft. GAUGE WHEEL AND AXLE ASSEMBLIES FOR MILL TRAMWAYS.

THE STEEL WHEEL CASTINGS ARE MADE IN MARYBOROUGH AND FINISHED AND ASSEMBLED ON AXLES IN MACKAY.



TOP CONE OF A 24,000 SQ.FT. EVAPORATOR LEAVING MACKAY FOR PROSERPINE MILL, 90 MILES FURTHER NORTH.



BOXES FOR TRANSPORT OF RAW SUGAR, BY ROAD OR RAIL, TO THE BULK SUGAR EXPORT TERMINAL. THEY HAVE AN OPENING TOP FOR FILLING, AND, AS SHOWN, HAVE AN OPENING SIDE FOR TIPPING ON TO A BELT CONVEYOR. EACH HOLDS 6 METRIC TONS OF RAW SUGAR.

WALKERS LIMITED

CONSULTANTS
DESIGNERS
ENGINEERS

MARYBOROUGH QUEENSLAND AUSTRALIA

Senior Technical Management Appointments

New sugar factory-Kenya

Bookers Agricultural and Technical Services manage sugar estates and provide agricultural and technical consultancy services for sugar and other projects around the world. The Booker Group has assets exceeding £60 million and employs some 30,000 people.

The Company is currently developing a new £7 million sugar scheme at Mumias, Western Kenya. Cane will be supplied by a 10,000 acre estate and a large Outgrowers' Organisation. The factory, with an ultimate capacity of 70,000 tons of mill white sugar per annum, is scheduled for commissioning in mid-1973.

The following staff are now required. Each appointment can lead to an international career in line management, technical services or consultancy.

Production Manager (£4500-£5200 to start)

To be responsible to the Factory Manager for all operations from cane receipt through milling to sugar bagging plus related utilities.

Candidates, ideally 33-45, will have a degree or professional qualification in chemical engineering or chemistry or a diploma in a process technology with a minimum of three years experience as Production Manager/Chief Chemist in a raw sugar factory.

Engineering Manager (£4500-£5200 to start)

To be responsible to the Factory Manager for provision of mechanical and electrical maintenance services, including related planning functions and future plant installation and modification.

Candidates, 35-50, will have a degree, HND or equivalent qualification in mechanical engineering with, ideally, membership of a professional institution. Substantial experience of heavy continuous process plant maintenance at a senior level and knowledge of steam and electrical power generation are required. A minimum of three years successful experience as Engineering Manager/Chief Engineer in a cane sugar factory is desirable.

Shift Production Superintendents (£2500-£3125 to start)

Responsible to the Production Manager for the supervision of all factory operations on a rotating eight-hour shift basis.

Candidates, 25-35, will have a degree or HNC in chemical engineering, chemistry or a process technology with at least two years experience of shift supervision in a continuous process industry. Previous experience of sugar processing is desirable.

Maintenance Superintendents (£2500-£3125 to start)

Responsible to the Maintenance Engineer for the inspection, repair and scheduled maintenance of process plant.

Candidates, 25-35, will have at least an OND in mechanical and/or electrical engineering with not less than two years experience of heavy continuous process plant maintenance. Previous employment in the sugar industry would be valuable.

The starting emoluments indicated comprise a basic salary plus overseas allowance. Other terms of service include disturbance and tropical clothing allowances, rent-free accommodation with heavy furniture, car allowance, medical scheme, children's education allowances, generous superannuation benefits, family passages and regular home leave.

Please send brief career and personal details to: V. Mortensen, Bookers Agricultural and Technical Services Limited, Bucklersbury House, 83 Cannon Street, London EC4N 8EJ.



**BOOKER
McCONNELL**

BRASIL AÇUCAREIRO

OFFICIAL ORGAN OF THE
INSTITUTO DO AÇÚCAR E DO
ALCOOL

(Sugar and Alcohol Institute)

A MONTHLY MAGAZINE containing
complete news and specialized
contributions on Brazilian and
international sugar agriculture
and industry.

Annual Subscription:

Brazil Cr\$ 100.00
Foreign Countries .. US\$ 17.00
Single copies (Foreign).. US\$ 2.00
Back copies US\$ 3.00

Remittances must be made in
the name of

BRASIL AÇUCAREIRO

Rua 1° de Março, 6 — 1° andar
POB 420
Rio de Janeiro — GB
BRASIL

SUGAR NEWS

A MONTHLY JOURNAL DEVOTED TO
THE INTERESTS OF THE PHILIPPINE
SUGAR INDUSTRY

FEATURES

Results of research and experiments in fields and mills, and other important developments in the Philippine sugar industry of interest both to technical men and laymen; sugar production, prices, and market news and statistics; write-ups on other important and allied industries in the Philippines, etc.

Annual Subscription U.S. \$10.00
post free (12 monthly issues)

*Write for a free specimen copy
and for advertising rates.*

Also Available:

PHILIPPINE SUGAR HANDBOOK
Editions: 1961, 1964, 1966, 1968 and 1970
at \$15.00 each

Published by:

THE SUGAR NEWS PRESS, INC.
P.O. Box 514, Manila, Philippines

The Australian Sugar Journal

A MONTHLY JOURNAL issued by the
AUSTRALIAN SUGAR PRODUCERS
ASSOCIATION LTD.

Circulates throughout the sugar-producing
districts of Australia.

*It has in addition a substantial
international subscription list.*

Subscription Rates :

Six dollars fifty cents (Australian)
(\$A6.50) per annum

For advertising rates, write :

G.P.O. Box 608. Brisbane, Queensland.

THE GILMORE SUGAR MANUALS

Reference works containing factory and field data, personnel and production figures on the Sugar Industry in the areas included in each volume.

THE
GILMORE PUERTO RICO-DOMINICAN
REPUBLIC SUGAR MANUAL
(Including Haiti)
1970 Edition Available

THE GILMORE CENTRAL AMERICA—
WEST INDIES SUGAR MANUAL
1970 Edition Available

THE GILMORE U.S. BEET INDUSTRY
SUGAR MANUAL
1970 Edition Available

THE GILMORE LOUISIANA-FLORIDA-
HAWAII SUGAR MANUAL
1971 Edition Available

ALL MANUALS PUBLISHED BIENNIALLY
Each \$10.00 per copy (Surface Post Paid)

Advertising Rates and Brochure available
on request

THE GILMORE SUGAR MANUALS
112, N. University Drive
Fargo, North Dakota, 58102, U.S.A.

I.S.J.

SUGAR BOOK DEPARTMENT

Most books reviewed in this *Journal* may be obtained through our Sugar Book Department. Where no inclusive price is quoted in our review, 30p should be added to cover the cost of packing and postage.

★ Check your personal library against
the list of basic books given below :

	POST PAID
HANDBOOK OF CANE SUGAR ENGINEERING:	
<i>Hugot</i> transl. <i>Jenkins</i> (1972)	£38.50
BET SUGAR TECHNOLOGY (2nd ed.): <i>McGinnis</i> (1971)	£9.45
LICHT'S INTERNATIONAL SUGAR ECONOMIC YEAR-BOOK & DIRECTORY (1972)	£7.30
ANALYTICAL METHODS USED IN SUGAR REFINING: <i>Plews</i> (1970)	£5.80
LABORATORY MANUAL FOR QUEENSLAND SUGAR MILLS (5th ed.): <i>Bureau of Sugar Experiment Stations</i> (1970)	£2.80
BY-PRODUCTS OF THE CANE SUGAR INDUSTRY: <i>Paturau</i> (1969)	£11.40
THE GROWING OF SUGAR CANE: <i>Humbert</i> (1968)	£16.60
THE MECHANICS OF CRUSHING SUGAR CANE: <i>Murry and Holt</i> (1967)	£6.00
MANUFACTURE AND REFINING OF RAW CANE SUGAR: <i>Baikow</i> (1967)	£9.60
INTRODUCTION TO SUGAR CANE TECHNOLOGY: <i>Jenkins</i> (1966)	£8.75
GENETICS AND BREEDING OF SUGAR CANE: <i>Stevenson</i> (1965)	£4.30
MANUAL OF CANE GROWING: <i>King, Mungomery and Hughes</i> (1965)	£6.20
ICUMSA METHODS OF SUGAR ANALYSIS: <i>de Whalley...</i> (1964)	£4.40
CANE SUGAR HANDBOOK (9th ed.): <i>Meade</i> (1963)	£13.45
SUGAR CANE DISEASES OF THE WORLD (Vol. I): <i>Martin, Abbott and Hughes</i> (1962)	£10.80
(Vol. II): <i>Hughes, Abbott and Wismer</i> (1964)	£8.30
BASIC CALCULATIONS FOR THE CANE SUGAR FACTORY: <i>Eisner</i> (1958)	£0.50
PRINCIPLES OF SUGAR TECHNOLOGY (Vol. III): <i>Honig</i> (1963)	£9.30
SUCRERIE DE BETTERAVES: <i>Dubourg</i> (1952)	£3.80
SYSTEM OF CANE SUGAR FACTORY CONTROL (3rd ed.) <i>International Society of Sugar Cane Technologists</i> (1971)	£1.55
PROCEEDINGS 15TH SESSION ICUMSA (1970)	£4.30

The above prices include postage and packing.

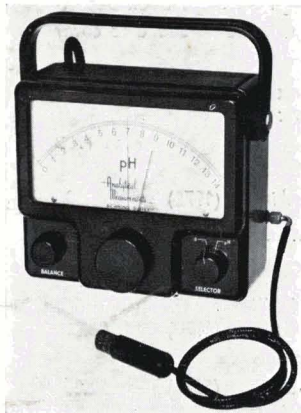
Terms are strictly cash in advance.

Our Bankers are: Barclays Bank Ltd., 3 Great Tower Street, London, E.C.3.

SUGAR BOOK DEPARTMENT, International Sugar Journal Ltd.

23a Easton Street, High Wycombe, Bucks., England

INSTRUMENTS FOR JUICE EXAMINATION



pH

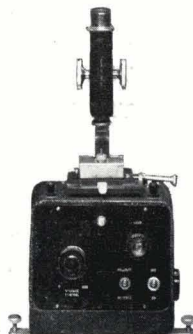
The illustrated model 700 has a scale length of 7 in from 0 to 14 pH with a readability of 0.02. This instrument is supplied with the exclusive polythene shielded pH probe unit. The amplifier is a printed circuit high output electronically modulated unit with a single operating control giving an accuracy and overall stability of better than 0.05 of a pH Unit. Operating the instrument is so simple that untrained personnel can make pH determinations with no danger of damaging sensitive components. The instrument is plugged into the mains supply, standardized with the buffer solution and is then ready to operate. An adjustable index pointer is provided so that frequent buffer checks are eliminated.

Other models available.

Colloids

Colloids in juices retard boiling, increase viscosity, hamper efficient work in the centrifugals, and generally reduce the capacity of the factory. They should be removed during the clarification stage to prevent these difficulties in the sugar house.

The **COLLIMETER** is the first instrument to permit comparison of the colloid-removing efficiency of alternative clarification procedures. This is done on the basis of the quantity of a standard dyestuff required to bring a sample in a cataphoresis cell to the iso-electric point as observed through the microscope.



Ash

The Type H **SALOMETER** for electronic determination of the ash content of sugar products retains the well-known characteristics of previous models, such as knife-edge accuracy, simple magic-eye tuning, and also is provided with temperature compensation (2% per °C), a main dial calibrated in micromhos for simplified calculation, a new power factor system to extend its range, and a special quick-action electrode system,

The Sugar Manufacturers' Supply Co. Ltd.

196-204 BERMONDSEY STREET, LONDON, SE1 3TP, ENGLAND

Telephone: 01 - 407 5422

Cables: "Sumasuco, London S.E.1"