SHARKARA

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NATIONAL SUGAR INSTITUTE

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It contains……

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From Director's Desk.....

Due to pandemic, it has been a bitter year for the Indian economy, but sugar exports took a jump with many factors like better international prices, periodic review of export quota and opening of new markets helping in sugar exports to the extent of 5.8 million tonnes during the sugar season 2019-20 The ethanol supplies are also to all time high in terms of volume i.e. to the extent of 1800 million liters during the Ethanol Supply Year 2019-20 resulting in about 5% blending. With the onset of next crushing season 2020-21, the sugar factories have started conducting sugarcane surveys to assess basically the quality to decide on probable date of start of crushing operations. The next sugar season is also expected to be sugar surplus and thus balancing of demand-supply shall again be at the top of agenda.

With WTO restrictions, Brazil expected to prefer production of sugar over ethanol and probable curtailment in sugar consumption due to pandemic, exports are going to be challenging. Looking to the opening stocks of sugar for the sugar season 2020-21 and expected sugarcane availability during forthcoming sugar season, Indian sugar industry is required to look into diversion of sugar for ethanol which has assured market and price. The industry is also required to brainstorm on production of safe and healthier sugars with a close eye on market requirements including exports. As I stressed earlier also, we have to look for many more other value added items and particularly for converting "Waste to Resource". Sugar factories are required to take step forward for producing Bio-CNG from filter cake and potash rich fertilizer using ash of incineration boilers in molasses based distilleries.

I wish a very successful and healthier crushing season 2020-21.

(Narendra Mohan)
Director

OUR PROVISIONS:

WEBINARS ORGANIZED:

1. An International WEBINAR on **"Alternate Uses of Bagasse"** was organized by the institute on 2nd July, 2020. Inaugural address was delivered by Shri R. L. Tamak, Executive Director & CEO (Sugar Business), DCM Shri Ram Ltd. and concluding remarks were given by Dr. M.S. Sundaram, Managing Director, JPMA, Pune. Presentations were also given by the institute faculty members on Bio-plastic, Particle Board, Eco-Ware Crockery and Dietary fiber from sugarcane bagasse.

2. An International webinar was organized on 06th August, 2020 on the topic **"Sugar & Sweeteners-Quality and Consumption Patterns"** jointly by National Sugar Institute, Kanpur, National Sugar Development Council, Nigeria and Assiut University, Egypt, wherein large nos. of delegates from India, Sudan, Egypt, Nigeria, Sri Lanka, Saudi Arabia, Kenya and Nepal participated. Lectures were delivered by institute faculty and eminent experts from other countries.

ONLINE WORKSHOP ORGANIZED:

An online workshop was organized on 28th July, 2020 on the topic **"Good Laboratory Practices and Quality Control in Sugar Factories".** Beside the Indian participants, seven overseas candidates attended the programme. Informative lectures were delivered on Good Laboratory Practices such as calibration of equipments/ instruments and standard procedures for analysis of dextran, colour, starch and conductivity ash etc.

EXECUTIVE DEVELOPMENT PROGRAMME

Five days online **"Executive Development Programme"** was conducted by National Sugar Institute, Kanpur, on 24th - 28th August, 2020. The programme was inaugurated by Secretary (Food & Public Distribution), Government of India. Joint Secretary (Sugar & Administration) also graced the occasion. The programme was attended by about 100 senior executives from Indian & Overseas sugar industries. Lectures were delivered on the important topics relating to project management, raw material management, inventory management, human resource management, and on recent trends in processing.

VIRTUAL TRAINING PROGRAMME

1. Two days online training programme on **"Supply Chain Management in Sugar and Allied Industries"** was organized on by the institute from 9th to 10th September, 2020. About 200 trainees from all over the country, Kenya and Nigeria participated in the programme wherein they were trained on measures to be taken for ensuring safe food from "farm to fork."

2. Three days online virtual training programme on **"Operation & Effluent Analysis in Sugar Factories"** was conducted by National Sugar Institute, Kanpur, was held on 22nd to 24th September, 2020. The programme was inaugurated by Shri Subodh Kumar Singh (IAS), Joint Secretary, Department of Food & Public Distribution, Government of India. He stressed the need for a clean and green sugar industry through technological interventions, removing tag of a polluting industry. Training was imparted on recent technological interventions in effluent treatment and standard protocol for waste water analysis.

ONLINE LECTURE:

An online lecture was delivered on 10th August, 2020 by Director, National Sugar Institute, Kanpur on the topic of **"Bio-fuels towards Atmanirbhar Bharat"** during the interactive session organized by Ministry of Petroleum & Natural Gases. During the lecture, he highlighted the potential of ethanol production, need for alternate feed stocks and challenges in cane juice diversion.

ONLINE MEETING:

1. Online of meeting of FAD-2, Bureau of Indian Standards, New Delhi was held on 22th July, 2020 under the Chairmanship of Director, NSI, Kanpur for revising existing standards and framing of new ones. The revised standards for raw sugar, refined sugar and icing sugar were finalized. New standards are to be framed for low Sulphur Sugar, Brown Sugar and Organic Sugar.

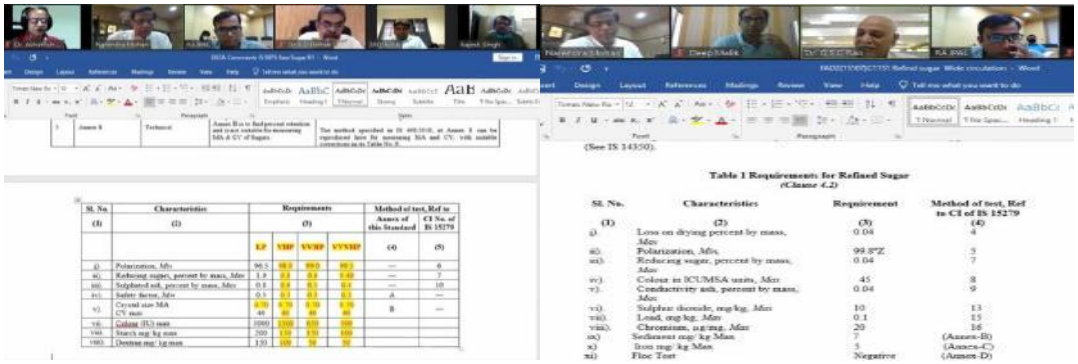

Table 1 Requirements for Refined Sugar (Clause 4.2)

Sl. No.	Characteristics	Requirement	Method of test, Ref to Cl of IS 15279
(1)	(2)	(3)	(4)
i)	Loss on drying percent by mass, Max	0.04	4
ii)	Polarization, Min	99.8°Z	5
iii)	Reducing sugar, percent by mass, Max	0.04	7
iv)	Colour in ICUMSA units, Max	45	8
v)	Conductivity ash, percent by mass, Max	0.04	9
vi)	Sulphur dioxide, mg/kg, Max	10	13
vii)	Lead, mg/kg, Max	0.1	15
viii)	Chromium, µg/mg, Max	20	16
ix)	Sediment mg/ kg Max	7	(Annex-B)
x)	Iron mg/ kg Max	5	(Annex-C)
xi)	Floc Test	Negative	(Annex-D)

2. Online meeting of 53rd Advisory Board of the Institute was held on 24th July, 2020 under the Chairmanship of Joint Secretary (Sugar & Administration), Government of India. The board, while expressing satisfaction on the working of the institute, stressed for undertaking more collaborative research projects for developing technologies for value addition through better by-product utilization.

3. Meeting Co-chaired by Secretary (Food & Public Distribution), Secretary (Ministry of Petroleum & Natural Gas), Secretary (DFS), Government of India was held with the stakeholders of sugar & allied industry to discuss measures for boosting ethanol supplies. Director, NSI also participated in the meet & expressed his views.

4. An online meeting was held on 4th September, 2020 between National Sugar Institute, Kanpur and Haryana Sugar Federation officials for seeking institute's help in producing good quality fortified jaggery and adoption of bio-gas production technology from filter cake in its existing sugar units.

OUR RESEARCH AREAS:

1. Studies on isolation of Lignin from sugar industry-based biomass and development of the process for the conversion of derived lignin and fermentable sugar to Value-added Product-

Sugarcane bagasse (SB) derived lignin has broad scope for valorization to aromatics, phenolic polymers, and other value-added materials. Vanillin is the major flavour constituent of vanilla. It has a wide range of applications in food industry, in the synthesis of several pharmaceutical chemicals and in perfumery. Vanillin can be obtained from SB derived Lignin. The study has been taken up with a view to implement an efficient strategy to depolymerised the SB derived Lignin to access vanillin along with the other fermentable sugars. The preliminary experiments were carried out to obtain the SB lignin involving biorefinery approach. The work related to isolation, purification and identification of the SB lignin is under process.

2. Studies on access of bioplastic as polyethylene substitute from sugarcane bagasse-

Volatility in sugar prices is leading sugarcane industries worldwide to broaden their revenue base by moving from a single commodity manufacturer to one of renewable biomass for production of a broad range of value-added products. Of the numerous potential pathways for producing biofuels and biochemicals based on the sugarcane crop, the bioplastics such as poly-(3-hydroxyalkanoate) (PHA), poly lactic acid (PLA) or cellulose based bioplastic have attracted great interest due to its intrinsic biodegradability and biocompatibility.

Although industrial scale production of some of these macromolecules is beginning in some countries, they still currently remain niche materials within certain high value markets, due mainly to the high cost of production, particularly the high cost of feedstock that constitutes 50% of the total production cost. The objective of this research is to use low cost biomass such as sugarcane trash or bagasse that have low value as feedstock for synthesis of such type of bioplastics with a view to reduce production cost. The literature survey on this research study has been completed and the related required material/chemicals etc are in progress.

3. Studies on the feasibility of utilization of sugarcane bagasse as a potential feedstock to access cosmetic ingredients-

With aim to convert sugarcane bagasse to value added platform molecule implementing biorefinery concept, we have been devoted to develop a method for the conversions of bagasse based xylose to C-glycosides. C-glycosides are sugar derived compounds and have gained a huge interest in recent years due to their application as anti-tumor agents, surfactants, antibiotics, anti-aging molecules, anti-diabetics and anti-inflammatory compounds. In this line, we have recently developed a chemical method for producing β-C-xylosylic ketones, a class of C-glycosides, using sugarcane bagasse as starting material at 10 g batch reaction. The work related to scale up studies on the developed method and studies to validate the economics of the production is in progress.

4. Studies on pot-efficient synthesis of alkyl levulinates (ALs) using sugarcane bagasse derived cellulose.

Alkyl levulinates are biobased chemicals having a strong potential to be used in various applications, substituting current chemicals produced from Petro-chemical routes and are obtained in high yields and selectivities from simple biomass-derived products like Levulinic acid, hydroxymethyl furfural or furfuryl alcohol. They can also be obtained directly from real biomass such as sugarcane bagasse (SB). The SB cellulose is majorly used in paper and pulp industries and the development of viable biorefinery routes for its valorization into usable products & platform chemicals remains a challenge. In this context, two stage pretreatment strategy was implemented on SB to obtain SB cellulose, which was subsequently employed as a cheap cellulose-rich feedstock in the direct alcoholysis to give methyl levulinate a class of alkyl levulinates, adopting methanol as reagent/reaction medium, very dilute sulfuric acid as a homogeneous catalyst. We will take up scale up and further studies to validate the economics of the production.

5. Standardization of method for determination of Preparatory Index –

The study has been taken up with a view to accurate determination of Preparation Index of prepared cane on lab scale by different methods which are applied in sugar industry. After analysis of results obtained from various methods applied for determination of Preparation Index, we can standardize any one method among them, which may give better and accurate result about cane preparation.

Cane preparation contributes substantially towards improving the mill efficiency, mill capacity, bagasse moisture etc. Its assessment is a regular practice in the cane sugar industry. For measuring the degree of cane preparation, some of the methods that are in practice are based either on measurement of bulk density or extent of cell breakage etc. Literature survey has already carried out on the different methods to determine the cane Preparation Index recommended by various laboratory manuals to carry out the research work. The desired equipment is being procured for conducting lab trials during sugar season 2020-21.

The cane samples of different varieties shall be collected from NSI cane farms for lab trials during December to March -2021.

6. Role of Hydroxyapatite (HAp) in cane juice clarification –

Further experiments on lab scale were carried out at different pH (9.0 -10) and temperature (98-100℃) to form the precipitate after applying the different doses of lime and phosphoric acid. The structure of Hydroxyapatite precipitate was studied and further experiments shall be carried out on auto clave at higher pH & temperature.

7. Studies on deterioration patterns of different sugars –

Physical Chemistry Division has under taken a project entitled 'Study on deterioration of Sugar quality during storage' the motive of the project is to develop the mechanistic model regarding the deterioration of different sugars during the storage. Data for the period of more than 6 months has already been collected and the study will continue for the period of about a year to draw some regular pattern.

8. Studies to covert waste water to resource in sugar factories-

Physical Chemistry division is working on another project regarding the conversion of 'Sugar factory condensate to potable grade water' is also going in the department in collaboration with UY Trienviro Pvt. Ltd. Pilot level trail of conversion of condensate to potable grade / Good quality water at two different Sugar Factories is proposed in the first week of December 2020. The aim of the said project is to minimize the use of fresh water in sugar factories and to recycle the water for potable use.

8. Comparative study of Nine varieties of sweet sorghum for production of ethanol yield -

This study has been taken up with a view to evaluate potential sweet sorghum yield along with potential bioethanol production. We have already carried out first set of trial and report had been

submitted. The second set of trial on cultivation of nine sweet sorghum varieties (CSH-22SS, SSV-74, ICSV-93046, IS-18542, CSV-19SS, CSV-24SS, Phule Vasundhara and RIVCSH-28) is in progress and under consultation with Indian Institute of Millets Research, Hyderabad.

9.Utilization of Potash Rich ash for production of valuable bio fertilizer –

A study was carried out on "Utilization of ashes of sugar factory and distillery incineration boiler as carriers for production of valuable bio fertilizer and their assessment on *Urad crop*. The field trials on urad crop were done consecutively for two years using 8 different treatments. The datas were recorded on various growth and yield attributing parameters. Data indicates that the process of bio-fertilizers may be better option for seed growers and also for utilizing waste ashes for biofertilizers to achieve better seed yield and yield components in urad. As per the result obtained on application of bio-fertilizer in Urad crop were promising, The study of effect of azatobacter and PSB bio-fertilizers will be taken up in sugar cane crop. Preparation to produce bio-fertilizers by using both sugar factory and distillery incineration boiler ashes as carriers is in progress.

10. Study of nine varieties of sweet sorghum for production of ethanol yield -

A study on sweet sorghum was conducted in collaboration with Millet Research Institute, Hyderabad. Nine different varieties were provided which were grown at National Sugar Institute farm on 17/02/2020 and harvested. The sweet sorghum juice were tested to evaluate for ethanol yield as and when harvested. It was observed that fermentation process was quite slow with the yeast strain used (saccharomyces cerevisiae) which resulted in less ethanol yield for the given TRS. There is need of further standardization of the fermentation process required with different strains with different timings. As reported that sweet sorghum juice has different sugar profile and it also contain 1-5% starch. This may require further enzymatic treatment for hydrolysis to achieve better ethanol yield. The trials will be repeated this year again.

11. Boiler RO/DM Water Heating by Concentrated Solar Thermal (CST) System -

Keeping in view of boosting the use of renewable energy which also replaces carbon intensive energy sources and significantly reduce global warming emission, efforts have been initiated to utilize thermal based solar energy for heating the boiler make-up water (RO/ DM water) in the Experimental Sugar Factory (ESF) of the Institute.

Solar energy is not only carbon negative, but also a freely available source. Use of this energy for heating of makeup feed water will save the fuel, which otherwise was being used for the same. Surplus power shall be generated from this surplus bagasse. The ROI of the proposed system comes within 10-11 years. Apart from being green & clean source of energy, the system is maintenance free and durable. Its implementation in sugar factories all over India may add about 260 million units to the national grid. In order to access the suitability and sustainability of the system for the purpose, it has been proposed to install a small prototype unit in ESF.

12. To study the impact on performance of mechanically coupled twin induction motor drives for Shredder/Fibrizer having unequal sharing of load and to design & develop dedicated drive for the application. –

The general set-up kept for the cane preparation is two set of cutters, generally known as chopper/leveler, followed by shredder or fibrizer. Conventionally, the prime mover for these machines is invariably a slip ring induction motor (SRIM). Though the conventional system is appreciably inefficient as a lot of electrical power is dissipated and wasted (to the tune of 8-10% of the actual load) in slip resistance throughout the operation, but this set-up is being running in the industry due to its simplicity and as the other better methods were not in practice when this kind of arrangement was introduced in the industry.

The present project is to study the effects of differently rated mechanically coupled induction motors for cane preparation and to design and develop a prototype to validate the study practically through the prototype. The drive shall be Multilevel (3 or 4 level) inverter based Open End Winding Induction Motor type drive resulting in the following main advantages –

In general, the following advantage shall be there –

1) Saving of power to the tune of 10-15% of the power used for cane preparation.
2) Reduction in size of the motors.
3) Smooth operation of electrical installation due to reduced harmonics.
4) Improvement in power factor.

RESEARCH PAPERS/BOOK CHAPTERS:

1. A research paper on **"Rationalization of Potassium Salt of Active Phosphorus (PSAP) dose for maximum economic yield, quality of sugarcane and soil sustainability"** by Narendra Mohan, Dr. Ashok Kumar, Dr. Lokesh Babar & Tej Pal Verma published in Green Farming Journal (International Journal of Applied Agricultural & Horticultural Sciences).

2. A research paper on **"Environmental Sustainability for Indian Sugar Industry"** by Narendra Mohan & Abhijeet Patil, published in International Journal for Scientific Research & Development in June, 2020, Vol. -8, No. -4.

3. A research paper on **"Water and Effluent Management in Indian Sugar Factories a Novel Approach"** by Narendra Mohan sent for publication in International Sugar Journal.

4. A research paper on **"Trials of a New Stirrerless Juice Sulphiter at Experimental Sugar Factory"** by S.K. Trivedi published in International Journal of Innovative Science and Research Technology, Vol -5, Issue -7, in July, 2020.

5. A research paper on **"Automation in Indian Sugar Industry and Further Requirements: An Overview"** by Virendra Kumar and Brajesh Singh sent for publication in Indian Sugar.

6. A research paper on **"Suitability of Some Low Cost Stainless Steels as Fabrication Material in Cane Sugar Industry"** by Narendra Mohan & Ashutosh Bajpai in International Journal of Science & Research Vol. – Issue 8, August, 2020.

7. A research paper on **"Pre Clarification of Cane juice"** by Narendra Mohan, A. K. Garg, Subhash Chandra & Mohit Kumar has been accepted in International Journal for Scientific Research & Development for publication.

8. A research paper on **"An Overview of B-Heavy Molasses Diversion for Ethanol Production"** by Mohit Kumar, Vivek Pratap Singh & Narendra Mohan published in Indian Sugar in July, 2020.

9. A research paper on **"Bio Ethanol from Sugar Industry – How to Push?"** by Narendra Mohan, sent for publication in proceedings of STAI annual convention 2020.

10. A research paper titled **"Integrated Nutrition Management for Maximum Economic Cane Yield and Sustainable Soil Health"** by Dr. Ashok Kumar & Dr. Lokesh Babar, sent for publication in proceedings of STAI Annual Convention 2020.

11. A research paper on **"Natural Value added Product mix from Indian Sugar Industry – A Step towards Changing Tomorrow"** by Narendra Mohan & Anushka Agarwal, sent for publication in proceedings of STAI Annual Convention 2020.

12. A research paper on **"Valorization of Sugarcane Bagasse Cellulose to Methyl Levulinate with in a Bio-refinery Approach by Direct Alcoholics"** by Narendra Mohan, Vishnu P. Srivastava, Chitra Yadav & Tushar Mishra, sent for publication in proceedings of STAI Annual Convention 2020.

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BUREAU OF SUGAR STANDARDS:

The Institute, on behalf of Bureau of Indian Standards, prepares and issues Sugar Standard Grades to the entire Sugar Industry of the country for every sugar season. These Sugar Standard Grades are issued to facilitate quality control and to protect the interest of the common consumers. On the basis of these grades, sugar factories mark their produce accordingly. Meeting of the Expert Committee on sugar standards was held at IISR, Lucknow on 25th September 2020, wherein seven grades and their sale price were approved for the sugar season 2020-21.

On the basis of the approved Standards, Bureau of Sugar Standards Grades distribution commenced from 1st October, 2020.

Price schedule for the sugar season 2020-21:

1	Sugar Standard Grades to be issued	L-31, L-30, M31, M-30, S-31,S-30 & SS-31
2	Set of New Sugar Standard Grades containing 7 grades +3 empty glass bottles + 2 Velvet Cork in packing case	Rs.20,000/= each set
3	Single Sugar Standard Grade	Rs.2550/= each
4	Empty Sugar Standard Glass Bottle	Rs.450/= each
5	Packing case	Rs.600/= each
6	Velvet Cork	Rs.100/= each
7	Postal expenses, forwarding charges, if any	Extra as applicable
8	Payment	For Indian Sugar Standards 2020-21, payment shall be acceptable only through **BHARAT KOSH.** In any circumstances, **no Demand Draft / Cheque / Cash amount shall be accepted.**
9	Delivery of Sugar Standard Grades	Monday to Friday (10.00 AM to 5.00 PM)
10	Taxes	GST extra as applicable @18%.

The institute has taken up revision of various existing BIS standards viz. molasses tanks, raw, plantation white, refined and icing sugar etc. on behalf of Bureau of Indian Standards. BIS standards for some other sugars viz. organic sugar, brown sugar & low sulphur sugar are being drafted in consultation with various stake holders.

OUR ADVISORY:

Besides conducting teaching and training programmes, carrying out research in relevant field, another main functions of the institute are:

1. To function as a "Think-tank" to sugar and allied industry for proposing modernization and trouble free functioning of the process on advisory basis / through Extension Services.

2. To formulate strategies and promotes measures for expansion of capacities, energy conservation, co-product utilization etc. for sugar and allied industries.

3. To assist Govt. of India through technical contribution in policy formulation and control of Sugar Industry.

CONSULTANCY SERVICES:

During July - September, 2020 consultancy services were provided to the following:

1	M/s Dhampur Sugar Mills Ltd., Unit – Meerganj, Distt – Bareilly, U.P.
2	M/s Dwarikesh Sugar Industries Ltd., Unit – Bundki, Distt – Bijnor, U.P.
3	M/s Shree Kedarnath Agro Product Ltd., Distt – Bagalkot, Karnataka.
4	M/s Badami Sugars Ltd., Distt – Bagalkot, Karnataka.
5	M/s Integrated Casetech Consultants Pvt. Ltd. Noida U.P.
6	M/s Venus Sugar Ltd., Distt – Sambhal, U.P.
7	M/s Kisan Sahkari Chini Mills Ltd., Semikhera, Distt – Bareilly, U.P.
8	Triveni Engineering & Industries Ltd., Unit – Deoband, Distt – Saharanpur, U.P.
9	Triveni Engineering & Industries Ltd., Unit – Raninangal, Distt – Moradabad, U.P.
10	M/s Isha Agro Sciences Pvt. Ltd., Distt- Sahjahanpur (UP).
11	M/s The Jind Co-operative Sugar Mills Ltd., Haryana.
12	M/s DCM Shriram Ltd., Distt- Lakhimpur Kheri (UP).
13	M/s Kesar Enterprises Ltd., Distt- Bareilly (UP).
14	M/s Wave Sugar & Industries Pvt. Ltd., Unit Dhanaura Mandi Disst- Amroha (UP).
15	M/s The Kaithal Co-operative Sugar Mills Ltd., Distt- Kaithal, Haryana.
16	M/s Integrated Casetech Consultants Pvt. Ltd., Noida (UP).
17	M/s Harinagar Sugar Mills Ltd., Distt- West Champaran, Bihar.
18	M/s Seksaria Biswan Sugar Factory Ltd., Distt- Sitapur (UP).
19	M/s Kisan Sahkari Chini Mills Ltd., Kaimganj, Distt – Farrukhabad, U.P.

ANALYTICAL SERVICES:

The institute now has a Centralized NABL Accredited Analytical Laboratory to carryout analysis of sugar, molasses, alcohol and other related products as ICUMSA and other standards protocol. During the period, analytical services were rendered to following:

The samples of sugar, molasses, ethanol, hand sanitizer waste waters & condensates etc. were analyzed for the desired parameters in the NSI-Analytical Laboratory (NABL Accredited).

1	M/s The Kisan Sahkari Chini Mills Ltd., Sathion, Distt – Azamgarh, U.P.
2	M/s Balrampur Chini Mills Ltd., Unit – Gulariya, Distt – Lakhimpur, U.P.
3	M/s The Palwal Cooperative Sugar Mills Ltd., Palwal, Haryana
4	M/s Rai Bahadur Narain Singh Sugar Mills Ltd., Laksar, Distt – Haridwar, Uttarakhand.
5	M/s Maa Mahamaya Sahkari Shakkar Karkhana Maryadit, Ambikapur, Distt – Surajpur, Chhattisgarh.
6	M/s Seksaria Biswan Sugar Factory Ltd., Distt- Sitapur (UP).

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OUR OTHER ACTIVITIES:

1. Tree plantation was organized by the staff of institute at campus from 1 to 7th July, 2020. The plantion was taken up as one of the series of events being organized by the institute to keep the campus clean and green and also to beat the plastic pollution. The relatively young staff of the institute was motivated to take part and keep the activities going.

2. Dr. Smt. Seema Paroha, Professor (Biochemistry), participated as eminent speaker in National Webinar on **"Impact of Covid -19 in Human life and Environment" and** delivered lecture on **"Covid-19 Outbreak: Migration, Effects on Society, Global Environment and Prevention**" on 29th July, 2020 organized by National Academy of Sciences, Bhopal and Government PG college, Satna, (M P).

3. On the **74th Independence Day**, Director, hoisted the National Flag at the Institute and addressed the faculty members, staff, and students through online. The prizes were distributed to Staff for doing good work under "Swachhta Activities".

4. Shri Anoop Kumar Kanaujia, Assistant Professor (Sugar Engineering), presented article on **"Annual Inspection of Grossly Polluting Industries (Sugar & Distillery Units)-2020",** during one-day webinar, organized by Central Pollution Control Board (CPCB) and National Ganga River Basin Authority (NGRBA), on 7th August 2020, wherein he focused on various observations and findings based on Annual Inspections during 2019-20.

5. Sadbhavana Diwas- 2020 was observed on 20th August to commemorate the birth anniversary of former Prime Minister, Late Shri Rajiv Gandhi. Online oath was taken by the staff of the institute on this occasion.

6. Director, National Sugar Institute, Kanpur was nominated to the R&D committee of prestigious Harcourt Butler Technical University (HBTU) and he attended its meeting on virtual platform on 15th September, 2020.

7. **"Vishwakarma Pooja"** was organized in the Experimental Sugar Factory & Instrumentation Division of the institute on 17th September, 2020 following guidelines issued in respect of covid-19.

8. Online Entrance Examination-2020 for admission to various courses conducted by National Sugar Institute, Kanpur was organized on 20th September, 2020 at 15 centers across the country.

9. An online meeting of expert committee was held on 23rd September, 2020 to formulate guidelines for diversion of B Heavy molasses, juice, syrup or sugar for ethanol production during the forthcoming season.

10. Meeting of the Committee of Experts constituted by the Govt. of India under the Chairmanship of Director, National Sugar Institute for approval of Sugar Standards Grades for the season 2020-21 was held on 25th September, 2020 at IISR, Lucknow. The distribution of Standards commenced from 1st October, 2020.


NATIONAL SUGAR INSTITUTE

All Sugar Factories & Other users of Indian Sugar Standards

DIRECTOR

11. Institute established an **"Isolation Centre"** to take care of any unprecedented situation due to covid-19. Arrangements of pulse-oxy meter, thermal scanner, oxygen, nebulization and infusion have been made.

12. राजभाषा को बढ़ावा देने के लिए राष्ट्रीय शर्करा संस्थान कानपुर द्वारा 16 सितम्बर, 2020 को एक नए हिन्दी पुस्तकालय का शुभारंभ किया गया एवं राजभाषा मे उत्कृष्ट प्रदर्शन एवं प्रतियोगिताओं के विजेताओं हेतु पुरस्कार वितरण कराया गया ।

13. राष्ट्रीय शर्करा संस्थान, कानपुर को बगास से एक अन्य मूल्यवर्धित उत्पाद "मिथाइल लेवुलिनेट" बनाने मे सफलता प्राप्त हुयी है। एंटी फ्रीजिंग गुण के कारण इसे ठंडे एवं उच्च पर्वतीय क्षेत्रों मे इसका प्रयोग बायो-डीजल मे मिश्रण करने के लिए भी किया जाता है। इसका प्रयोग खाद्य पदार्थों मे फ्लेवर के रूप मे प्रयोग के साथ इसे कृषि कार्यों मे कीटनाशक, खर-पतवार नाशक एवं पौधों के उचित विकास के लिए किया जा सकता है।

इसे कैंसर मे लोकलाइजिंग एजेंट एवं फोटो डाइनिमिक थेरेपी के अतिरिक्त अन्य उद्योगों मे प्लास्टिसाइजिंग एजेंट के रूप मे भी प्रयोग किया जा सकता है।

14. राष्ट्रीय शर्करा संस्थान, कानपुर के कृषि रसायन अनुभाग द्वारा किसानो की जानकारी, **"मीठी चरी (स्वीट सोरघम) की खेती"** एवं **"गन्ने में खर पतवार के प्रबंधन"** हेतु बढ़ाने के लिए पुस्तिकाओं का सरल हिंदी मे प्रकाशन किया गया।

15. निदेशक, राष्ट्रीय शर्करा संस्थान, कानपुर, ने दीनार टाइम्स चैनल पर 30 सितम्बर, 2020 को शुगर इंडस्ट्रीज पर चर्चा हेतु भाग लिया और विभिन्न उत्पादों एवं शुगर इंडस्ट्री को उत्थान करने के लिए चर्चा की ।

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HAPPENING IN THE SUGAR INDUSTRY:

Government extends sugar export deadline by three months to help mills, farmers.
According to the statement, the CM said that his government will write to the Centre, seeking a roll-back of the ban which will affect a large number of onion growers in Maharashtra, a key producer of the commodity.

Food ministry seeks Rs 5,600 crore to pay export subsidy dues of sugar mills.
The food ministry has sought Rs 5,600 crore to clear export subsidy dues of sugar mills. The government gives a subsidy of Rs 10,448 for the export of every tonne of sugar. Exports in the current season are estimated to be 5.7 million tonnes.

Maharashtra govt guarantee for cooperative sugar mills: Crushing season a month away, but proposal yet to be cleared.
With barely a month to go before the 2020-21 sugarcane crushing season begins, the state government is yet to clear the proposal of 30-odd cooperative sugar mills to stand guarantee to raise new loans from banks.

India's sugar exports surge 50% to a record level of 5.7 million tonne this month.
India’s sugar exports will rise 50% to a record of over 5.7 million tonnes in the season-ending this month, helped by the depreciated rupee, subsidy, and lower output from rival suppliers. The government expects the robust performance to continue in the next season also.

Mawana Sugars faces adverse impact on financials due to Covid-19; stock slips 1.5%.
Mawana Sugars Limited informed that in view of national lockdown in the month of April and May 2020, the revenue and profitability of the company would be adversely impacted. The ethanol and chemical business have been largely impacted due to economic slowdown.

Pilibhit farmers prefer cane cultivation despite delay in payments.
Cultivating sugarcane continues to be first cropping choice among Pilibhit farmers despite arrears to the tune of Rs 443.52 crore owed by the four sugar mills in the district for the 2019-20 crushing season.

Maharashtra faces new challenge, as only 4 out of 39 sugar mills fulfill criteria to avail bank guarantees.
Ahead of the sugarcane crushing season of 2020-21, the state government has a new challenge on its hands when it comes to extending bank guarantees to financially weak cooperative sugar mills. Officials of the Sugar Commissionerate, after due scrutiny, have found that only four out of the 39 mills fulfill all the five criteria.

UP sugar administration issues 131 new licenses for raw sugar units to raise crushing capacity.

The state sugar administration has issued 131 new licenses for khandsari (raw sugar) units across the state, in order to generate additional sugarcane crushing capacity during the cane crushing season of 2020-21. This move will facilitate contract farmers with remunerative options.

India's sugar production likely to go up by 12% to 30.5 mn tonnes in the sugar season 2020-21: ICRA.

The domestic sugar production is likely to go up by 12 % to 30.5 million tonnes, during the sugar year 2020-21, beginning October, due to availability of sugarcane in Maharashtra and Karnataka, according to a report.

Punjab Govt. to recover Rs. 223.75 cr. from private sugar mills.

In a blow to private sugar mills in the state, the Punjab government will recover Rs 223.75 crore from these mills, four years after the government paid the sugarcane farmers on behalf of these mills, during 2015-16 fiscal year.

Vizianagaram: Good days ahead for Bheemasingi sugars.

Bheemasingi Sugar Factory is likely to get facelift as the state government has sanctioned around Rs 8.4 crores to pay the pending bills of the farmers. The government has committed to modernise the factory with advanced mechanism to increase the production and productivity.

Maharastra: Relief for cooperative sugar mills as state govt. starts process to provide bank guarantee.

In a step that will bring significant relief to ailing cooperative sugar mills in Maharashtra, the state government has asked them for a proposal to consider their pleas to grant government guarantee, so that they are able to raise capital for the upcoming season.

Sugar exporters eye deals with China, waiting for border tension to ease.

Sugar traders are eyeing export deals with China, which they say are viable despite customs duty of 50%, but are afraid that the border tensions between India and China may cast a shadow on the trade.

UP private sugar mills struggle with Rs 3,500 crore dues.

Overdue payments of around Rs 3,500 crore, attributed to the subsidy on export of sugar stocks, buffer stock of sugar and electricity generated by them and sold to UP Power Corporation Limited (UPPCL), have left the state's private sugar mills struggling.

Mills seek govt. policy on sugar cane crushing.

Anticipating major hurdles in providing transportation and health facilities for sugar cane cutters, the sugar mill operators have urged the government to chalk out a policy for the 2020-21 crushing

season, which will begin from October 15. Deputy director (sugar), Shri N R Nikam had convened a meeting in Kolhapur, MS.

Brazil – Raízen Energia in talks to buy Biosev.

Biosev, a subsidiary of the American group Louis Dreyfus, said on 10 September that it has commenced negotiations for the sale of its operations to Raízen Energia, a joint venture between Royal Dutch Shell and Cosan, the largest sugarcane processor in Brazil, according to both local and international press reports.

Brazil – Deere completes the acquisition of Unimil, eyeing growth in cane business.

Deere & Company has completed the acquisition of the Brazilian company, Unimil, a provider of the aftermarket service parts business for sugarcane harvesters.

Argentina – Covid-19 related death toll at Ledesma's sugar factory rises to 13.

Argentina's top sugar producer Ledesma on 9th September reported the death of 53-year-old José Nina. He was the 13th Ledesma employee to die after being infected with Covid-19, according to local press reports.

Brazil – Tariff-free quota for ethanol imports extended to appease US.

Brazil extended its tariff-free quota on ethanol imports for 90 days starting 14 September after reaching an agreement with the US to open trade talks on the biofuel and increasing access to sugar (which is currently levied at 140%) as well as corn, according to the foreign ministry joint statement issued with the US Trade Representative (USTR) on 11th September.

Australia – Almoiz Group's proposed takeover Isis sugar mill not going ahead.

The Isis Central Sugar Mill (ICSM) board has ended a deal with a Pakistani sugar group to buy a controlling share of the business, according to local press reports.

The Netherlands – Health Minister says no to sugar tax.

The Dutch government will not introduce a tax on sugar in the near future because the effectiveness of such a measure has not yet been proven, and other agreements have been made with food firms on reducing sugar in soft drinks, health minister Mr. Paul Blokhuis has told members of parliament (MPs).

Japan – Daito Sugar launches the first vegan-certified sugar.

Daito Sugar commenced selling the first vegan-certified sugar in Japan on 1st September according to the company's press release.

USA – Silos at Domino Sugar refinery catches fire.

Two 10-storey high silos filled with refined sugar at Domino Sugar's refinery in Chalmette, Louisiana caught fire on the afternoon of August 27, according to local press reports.

Austria – Inadequate beet supply forces closure of Agrana's one of two sugar factories.
The listed fruit, sugar and starch group Agrana is to close its beet sugar factory in Leopoldsdorf next year due to significant drop in sugar beet production, making it unviable to support two factories, according to local press reports.

UK – Sugar beet growers welcome new contract with British Sugar.
British Sugar and NFU Sugar unveiled on 24th August one-year and three-year sugar beet contracts and prices from 2021.

Brazil – 2020/21 sugar output to exceed 39 million tonnes says Conab.
Brazil's total sugar production in the 2020-21 season (April-March) is expected to grow 32% and reach a record 39.33 million tonnes as mills allocate more cane to sugar production and less to ethanol, according to a press release from the government's food supply agency Conab.

Novvi commences production of plant sugars based base oils and process oils.
Novvi LLC recently announced the successful start-up of its Deer Park, Texas plant, where it is manufacturing and marketing 100 % bio-based base oils for the lubricants industry, and 100 % bio-based process oils for polymer, adhesives, and personal care industries.

Australia's The Product Makers launches sugarcane extract boasting health benefits.
Australian food flavouring company The Product Makers (TPM) has launched sugarcane extract Phytolin.

New catalytic process for bio-diesel production.
A new single-phase catalyst that enables the conversion of renewable and waste carbon into sustainable diesel fuels has been developed through a collaboration between the National Renewable Energy Laboratory (NREL) and two US Department of Energy (DOE) consortia, Chemical Catalysis for Bioenergy (ChemCatBio) and the Co-Optimization of Fuels & Engines (Co-Optima) initiative.

Ethiopia – Sugar and ethanol production on the rise on the back of sector reform.
The reform in the sugar sector has helped increase both sugar and ethanol output, according to Mr. Gashaw Ayichluhim, Corporate Communication Executive Officer, Ethiopian Sugar Corporation, reported The Ethiopian Herald.

India – Sugar consumption remains stable in spite of the pandemic lockdown.
Despite the Covid-19 lockdown, demand for sugar has not been adversely impacted as previous press reports had suggested, according to Shri Vivek Pittie, president, Indian Sugar Mills Association.

Indonesia – State company plans to double its sugar production to 2 million tonnes.
Indonesia, the world's second-biggest sugar importer is fostering expansion in sugar production to cut imports, reported Bloomberg.

India – 5 killed in a sugar plant explosion in Maharashtra.

Five workers were killed and several others critically injured in a boiler explosion at the Manas Agro Industries and Sugar Ltd. plant in Nagpur, a district of Maharashtra, according to local press reports.

Tanzania – Kilombero Sugar launches sugar packs across a range of affordability.
Kilombero Sugar Company Limited has introduced new sugar packs to cater for a range of customers with differing levels of affordability.

Pakistan to import 300,000 tonnes sugar as shortage looms.
The government allowed on 28th July the import of 300,000 metric tonnes of sugar in anticipation of a shortage.

Covid-19 – France – Tereos secures €230 million state-guaranteed loan.
The sugar and ethanol cooperative Tereos said it had secured a state-guaranteed loan of €230 million (US$269 million), which should help it meet challenges posed by the COVID-19 crisis, reported Reuters.

Egypt – Sugar beet acreage down 13.3%, cane productivity declining.
Sugar beet acreage decreased this year by about 80,000 acres (32,375 ha), registering 520,000 acres compared to 600,000 acres last season, a decrease of 13.3%, according to the media outlet Al-Arabi Al-Jadeed.

Indonesia – Cane acreage to expand by 60,000-70,000 hectares.
Indonesian state-owned plantation company PT Perkebunan Nusantara III (PTPN III) will add 60,000 to 70,000 hectares to its sugar plantation to expand sugar production, PTPN CEO, Mohammad Abdul Ghani told parliament on 8th July, reported Reuters.

Malaysia – MSM to consolidate sugar-refining operations – driven by losses.
In a cost-saving measure, MSM Malaysia Holdings Bhd will be consolidating its refined sugar production by relocating its factory operations for MSM Perlis Sdn Bhd (MSMP) in Chuping to MSM Sugar Refinery (Johor) Sdn Bhd (MSMJ) in Pasir Gudang and MSM Prai Bhd (MSMPB) in stages from June 20th, according to local press reports.

USA – Tariff rate quotas for raw, refined and specialty sugars set for 2020-21 (Oct-Sept).
The Office of the U.S. Trade Representative (USTR) announced on 22nd July the country-specific and first-come, first-served in-quota allocations under the tariff-rate quotas (TRQs) on imported raw cane sugar, refined and specialty sugar and sugar-containing products for Fiscal Year (FY) 2021 (October 1st, 2020, through September 30th, 2021).

Silica from sugarcane ashes being exploited for beauty products.
Aprinnova an Amyris joint venture, is commercializing plant-derived silica made from sugarcane ashes. Silica is used widely in personal care and cosmetics. It is traditionally sourced from non-renewable sand dredging, which requires significant energy consumption and emits large amounts of CO_2.

China – Cane growers in Guangxi get poverty alleviation loans.
In a bid to support cane growers and sugar companies during the Covid-19 pandemic, by the end of March 2020, loans to the sugar industry made by the Bank of China, Guangxi Branch, increased by 73.39% compared with the previous year, according to local press reports.

Jamaica – Closure of Appleton's St Elizabeth sugar factory imminent as it racks up losses.
The Appleton Estate Sugar Factory in Siloah, St Elizabeth is facing closure amidst heavy losses during the 2019-2020 crop year, its owner J. Wray & Nephew Ltd said in a press release on 15th July.

Egypt – Canal Sugar contracts Al-Diab group to reclaim 42,000 ha.
Canal Sugar recently announced the conclusion of a contract for the reclamation of 100,000 feddans (42,000 hectares) in collaboration with Al-Diab group for Land Reclamation, which marks the first phase of its 181,000 feddans reclamation scheme in western Minya, according to local press reports.

Dubai – Al Khaleej sugar refinery on full throttle as demand rises.
Al Khaleej Sugar, the world's largest port-based sugar refinery, expects to keep operating its plant at full capacity of 7,000 tons a day for the next three months as it tries to fill the gap left by Thailand's sugar output plummeting following drought, according to the refinery's managing director Jamal Al Ghurair, reported Bloomberg.

Kenya – Government opts to lease five state-owned sugar mills.
The Kenyan government has decided not to sell its sugar mills but rather lease them as part of a plan that will see it maintain control of the industry, reported Bloomberg.

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➢ RESEARCH ARTICLE:

"MEASURES TO MAXIMIZE JUICE EXTRACTION DURING MILLING"

by

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ABSTRACT

India now is one of the largest sugar producer in the world. This has become possible due to varietal improvement in sugar cane and technological advancement in sugar factories. Most of the sugar factories achieving consistent crush rate with trouble free operation. This has become possible only by continuous efforts made by the employees associated with sugar industries and adapting the advance technology by sugar industries. For better result of overall juice extraction, it is important that primary extraction should be higher and as a result of this it would be less difficult to achieve extraction by following mills.

Primary juice extraction is easily found in the range of 70% and can be achieved upto 74-75% according to fibre% cane, Preparatory Index (PI), Feeding rate, Mill setting, Hydraulic load, Juice drainage and optimum mill speed. Better the extraction of mill, better is the efficiency and higher the sugar extracted by mill. It is practically analysed & observed that on achieving rise of 1% in primary juice extraction, it may increase the overall juice extraction from 0.10% to 0.12%.

KEY WORDS

Extraction, Squeeze, Specific fibre loading, Effective grooving, Lift, Imbibition.

INTRODUCTION

The main objective of the three roller mills is to squeeze out the juice available in prepared cane. The prepared cane when passed between rotating top and feed rollers, juice squeezes out and

is collected in juice trough. After first squeeze of prepared cane the bagasse obtained is to be guided by the trash plate and to the discharge roller opening. It is again squeezed between top and discharge rollers. The juice extraction in first squeeze between top and feed roller should be around 60-70% and in second squeeze between the top and discharge roller should be around 30-40%. This pattern of three roller mill is to be designed for sucrose extraction up to 96-97% with minimum milling losses.

The hydraulic load applied on top roller is to be 100% utilized for juice extraction. The trash plate absorbs around 25% of hydraulic load applied on top roller and remaining 75% of hydraulic load is utilized between feed and discharge roller in proportion of 25% and 50% for juice extraction. Juice extraction during milling with minimum power consumption play an important role. Juice extraction plant consumes around 40-45% power of total captive consumption of sugar plant. Out of this 15-20% is consumed in cane preparation and 22-25% in cane milling. Better the cane preparation higher may be the power consumption at cane preparation. It thus may result into better juice extraction.

MEASURES EFFECTING THE JUICE EXTRACTION:

The purpose of milling is to extract maximum quantity of juice from prepared cane and minimize the milling losses. To achieve better milling results, following measures are to be taken:

1. **Cane Preparation:** Better cane preparation results in better juice extraction and lower power consumption at milling for identical crush rate. It is measured by preparation index (P.I.). Preparation Index is the measure of the disintegrated cells of sugar cane. For better juice extraction PI should be maintain in range 89-90.

2. **Consistency in crush rate:** It is very important parameter for better milling results. It improves the juice extraction with minimum milling losses. Irregular feeding distorts the lift and prepared cane passes without effective juice extraction.

3. **Lift:** In milling lift varies with the variable feed rate, if the feed rate becomes more than desired crush rate then it will increase the lift of top roller. This leads to poor extraction of sucrose and results in higher loss in final bagasse.

4. **Mill Speed:** It is very important parameter for better milling extraction. For consistent crushing the mill's speed should be maintained with respect to limit of desired lift i.e. lift should be maintained within limits. The optimum value of Juice extraction depends upon the combination of mill speed and lift of top roller.

5. **Hydraulic load:** It is important parameter which maintains the load on top roller against upward force created by the bagasse passing through the mill. By maintaining desired hydraulic load as per design and size of mill, the desired milling extraction can be maintained.

6. **Drainage Area:** It should be suitable as per desired crush rate. If the drainage area is short then there are chances of reabsorption of extracted juice from mills. Due to reabsorption of juice extraction shall be adversely affected and moisture of bagasse may increase. It is practice to maintain suitable size of massecheart grooves in feed roller and lotus holes on top roller. Both these type of grooves/holes are used to provide the suitable drainage area. It is observed in most of the factories that in case of GRPF/TRPF, the juice is sometimes flooded over the pressure chute and enter between the top and feed rollers. It reloads the mill and increases the power demand. To avoid it, there should be proper diversion of juice at top face of the pressure chute.

7. **Donnelley Chute Level**: For better juice extraction, it is necessary that the level of Donnelley chute should be maintained in the range of 40-60%. To maintain such level the speed of previous carrier should be controlled by using infra- red level sensor.

8. **Feed and Discharge juice extraction:** There should be periodic practice to measure for feed and discharge extraction. Feed extraction should be in the range 60-70% and discharge extraction should be in range 30-40%. A proper record is to be maintained for each analysis, because every mill has different nature and its own record is the benchmark for the next analysis of the same mill. If any deviation is found in mentioned range of extraction then it will indicate for further readjustment of mill setting.

9. **Effective Grooving:** Roller grooving play an important role for better juice extraction. The mill roller grooves presses and squeezes the prepared cane for juice extraction. It drives the bagasse effectively and provide path for juice drainage. The further uncut cane cells are broken in grooves and to help in increase of juice extraction in following mills.

10. **Specific fibre loading:** As the specific fibre loading increases**,** extraction decreases. For example, if crush rate increased from 100 TCH to 110TCH (i.e. 10%) the reduced mill extraction (RME) will be reduced from 95 to 94.83.

11. **Imbibition:** Mill extraction will be better on increasing the imbibition upto optimum level (refer fig-1). The mill extraction increases rapidly at first and slowly later, on increasing the imbibition. Extraction may easily be controlled by controlling the imbibition water. Change in imbibition% fibre by 1%, change in extraction by 0.01 point.

DATA COLLECTION AND ANALYITICAL STUDY

Comparative study between various milling efficiency parameters of the few sugar factories is discussed herein.

The data collected from some of the sugar factories for analysis and comparison purpose are given in table-1. These parameters directly or indirectly affect the performance of mill**.** By using these data from table-1, a graph has been plotted for comparative study.
From the table-1 & fig-2, following interpretations has been drawn:

1. Higher primary extraction means lesser LMJ brix and lower the pol% bagasse of last mill.
2. Better preparatory Index (PI) results in better Primary extraction (PE).
3. Pol % final bagasse mostly found lower than last mill discharge juice brix.
4. In most of the cases last mill juice brix (LMJ) remains lower than last mill discharge juice brix.

COMPARATIVE STUDY BETWEEN POL% BAGASSE FOR FIRST & LAST MILL

For comparative study of juice extraction, the data of some factories has been collected to analyse the first & last mill pol % bagasse. The collected data are tabulated here and a graph is plotted for comparative study and interpretation. From fig-3, it is interpreted that if the pol% first mill bagasse is higher (i.e. near to 8) than it indicate inefficient extraction of first mill. Thus the last mill pol % bagasse can be higher. It means pol% bagasse of last mill can be controlled by controlling it from first mill. If first mill extraction is optimum then the pol % bagasse of last mill can be lower.

Beside of this, if we consider the case of five mills tandem as in Dalmia Nigohi, Awadh sugar & Magadh sugar factory then you can see that final pol % bagasse are 1.48, 1.46 & 1.59, while the first mill pol% bagasse is 8.0, 7.96 & 8.05. It means pol% final bagasse could be achieved by these factories less than 1.6 due to five mills in their tandem (i.e. one additional mill).

If we take the case of four mills in tandem as in Dalmia Jawaharpur, Capataiganj & KSCML Sathion then we observed that in case of Captainganj the first mill Bagasse pol% is 8.6 comparatively higher than other two as a result of this we observed that pol% final bagasse in Captainganj is highest i.e 2.2. It means the first mill performance should be better for better milling results.

CONCLUSION

It is concluded that the juice extraction may depend on the parameters like fibre% cane, Preparatory Index (PI), Feeding rate, specific fibre loading, mill lift, mill setting, hydraulic load, Juice drainage and optimum mill speed. The optimum value of PI should be in range 89-90 for better juice extraction. Bagasse pol and moisture should be maintained within optimum limit at first mill to achieve desired results at last mill. It is suggested that for optimum working of mills, the first mill pol% bagasse should be maintained in range 6 to 7 % and primary extraction on juice basis should be in range 73-75%. Rate of Imbibition% cane is also a controlling parameter of mill extraction. Feed and discharge extraction of individual mills indicate for effective working of individual mills. It can be ensure by maintaining the measures as discussed here, the results of milling and juice extraction can be substantially improves.

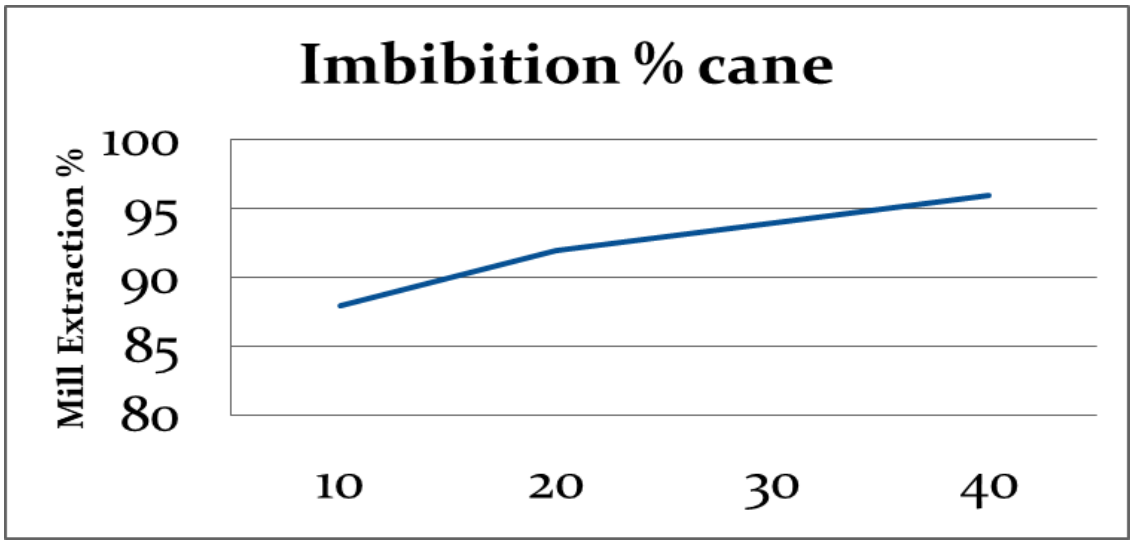
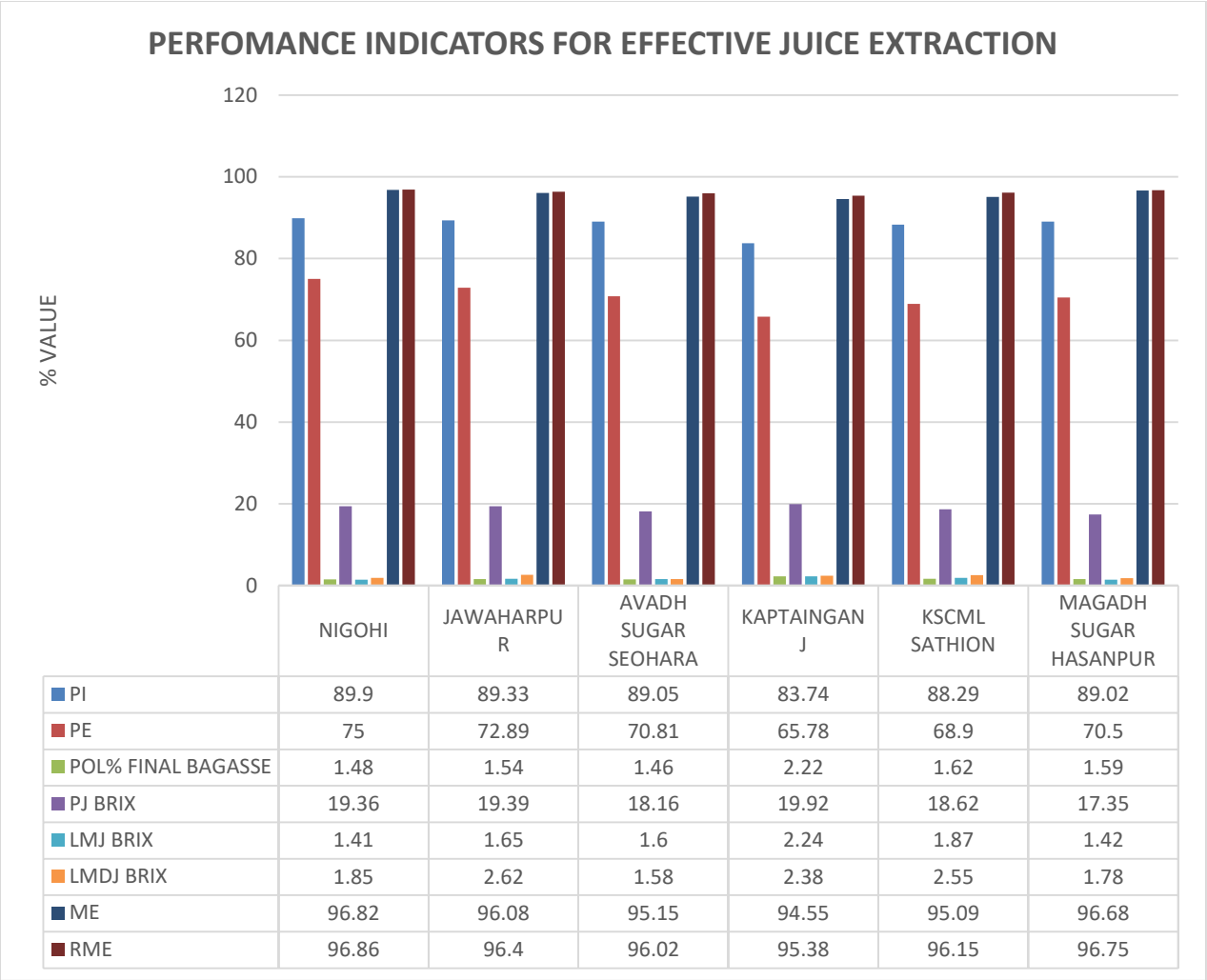


Fig-1- Imbibition vs Mill Extraction

	PI	PE	POL% FINAL BAGASSE	PJ BRIX	LMJ BRIX	LMDJ BRIX	ME	RME
DALMIA NIGOHI	89.9	75	1.48	19.36	1.41	1.85	96.82	96.86
JAWAHARPUR	89.33	72.9	1.54	19.39	1.65	2.62	96.08	96.4
AVADH SUGAR SEOHARA	89.05	70.8	1.46	18.16	1.6	1.58	95.15	96.02
KAPTAINGANJ	83.74	65.8	2.22	19.92	2.24	2.38	94.55	95.38
KSCML SATHION	88.29	68.9	1.62	18.62	1.87	2.55	95.09	96.15
MAGADH SUGAR HASANPUR	89.02	70.5	1.59	17.35	1.42	1.78	96.68	96.75

Table-1: Efficiency Figures of different mills



	NIGOHI	JAWAHARPUR	AVADH SUGAR SEOHARA	KAPTAINGANJ	KSCML SATHION	MAGADH SUGAR HASANPUR
PI	89.9	89.33	89.05	83.74	88.29	89.02
PE	75	72.89	70.81	65.78	68.9	70.5
POL% FINAL BAGASSE	1.48	1.54	1.46	2.22	1.62	1.59
PJ BRIX	19.36	19.39	18.16	19.92	18.62	17.35
LMJ BRIX	1.41	1.65	1.6	2.24	1.87	1.42
LMDJ BRIX	1.85	2.62	1.58	2.38	2.55	1.78
ME	96.82	96.08	95.15	94.55	95.09	96.68
RME	96.86	96.4	96.02	95.38	96.15	96.75

Fig-2: Graphical representation of performace figure

Name of the factory	Pol % Bagasse		No of Mills in a Tandem
	First Mill	Last Mill	
Dalmia NIgohi	8.0	1.48	5
Awadh Sugar Seohara	7.96	1.46	5
Magadh Sugar Hasanpur	8.05	1.59	5
Dalmia Jawaharpur	6.14	1.54	4
Captainganj	8.6	2.22	4
KSCML Sathion	6.79	1.62	4

Table-2: Working of first and last mill

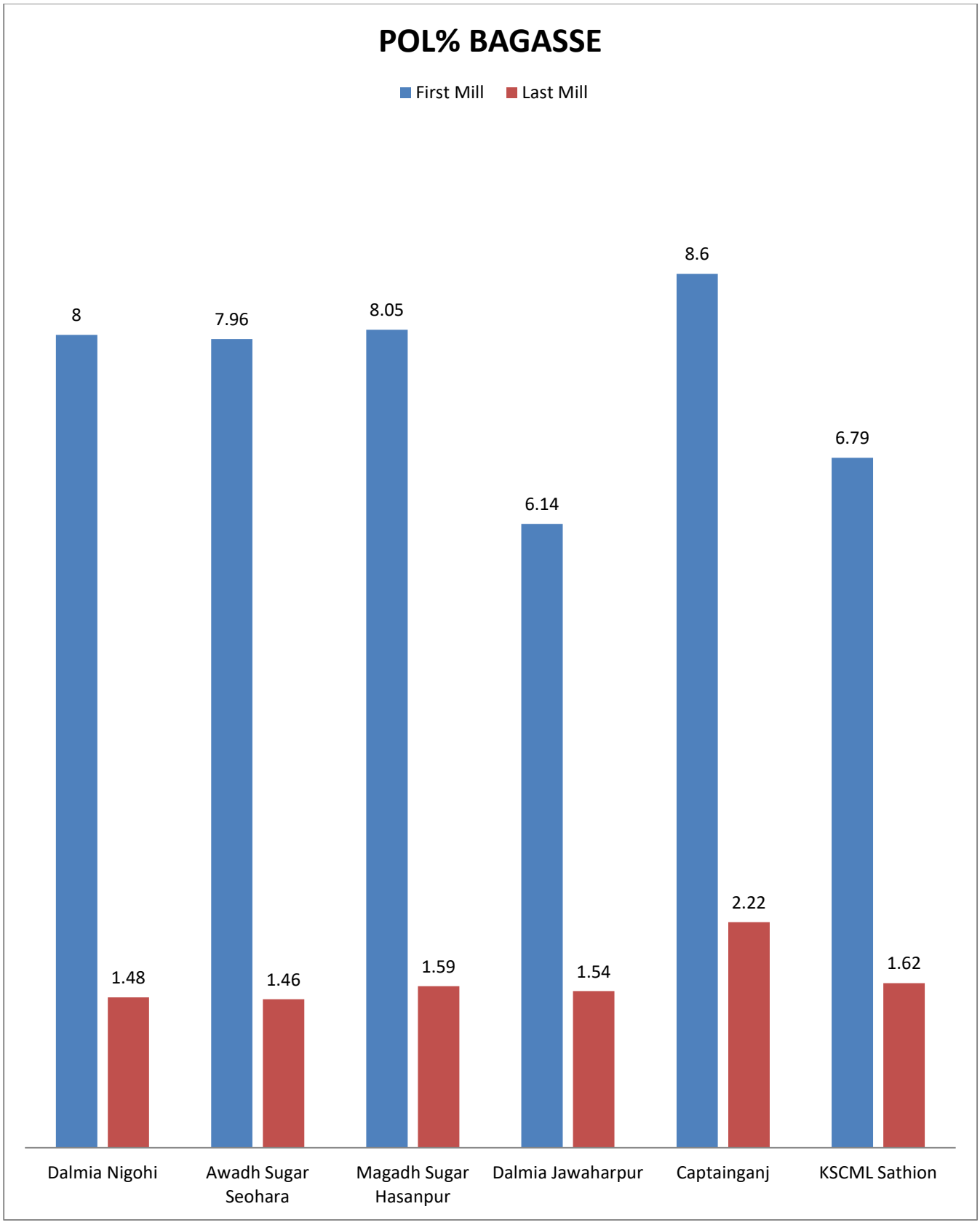


Fig-3: Pol% bagasse

ACKNOWLEDGEMENT

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ABSTRACTS:

Scale up studies for the simultaneous removal of colorants and protein from a refinery sugar liquor using powdered activated carbon – a pilot plant study by Isabel M. Lima, Ana Maria Jiménez, Gillian Eggleston , Benhur Pabon, Emmanuel Sarir & Jack Thompson published in International Sugar Journal in July, 2020.

Pilot plant studies were carried out to scale up laboratory results reporting on the ability of powdered activated carbon (PAC) in removing multiple impurities from sugarcane refinery streams. Clarified refined liquor, at 75 or 80°C, was spiked with either 0.5 or 1 ppm of high temperature stable α-amylase and treated with powdered activated carbon (PAC) at doses of 250, 500, or 750 ppm on a Brix basis. PAC effectiveness to simultaneously remove color and protein was monitored over 45 min residence time to determine best performance conditions.

Recurrent selection cycles for pre-breeding in sugarcane: enhancing the sugar-accumulation potential in selection cycles by M Swapna, DK Pandey & R Kapur published in International Sugar Journal in July, 2020.

Progeny populations from sugarcane hybridization programs indicate that a very low proportion of these progenies carry the optimal genome composition favouring an increase in sugar content. Pre-breeding is an effective way of introgressing new gene combinations into the existing background, increasing the frequency of favourable combinations and, thereby, the variability in the population. This also identifies potential true-breeding parents for transmitting the desirable traits to progeny. Convergent breeding and recurrent selection were used with a diverse base population to develop high-sugar genetic stocks. The base population, comprising many high-sugar genotypes were crossed in all possible combinations.

Evaluation of genetic response of sugarcane (Saccharum species hybrids) genotypes with varied concentration of cytokinins for rapid in vitro mass multiplication by Neelagangavva V Navali, T.E. Nagaraja, H.C. Lohithaswa & Suresh Yadav published in International Sugar Journal in July, 2020.

In a lab experiment, the efficacy of six different combinations of cytokinins 6-Benzyl amino purine (BAP) and kinetin (Kin) on in vitro multiplication of four sugarcane genotypes were evaluated. Findings indicated that MS medium supplemented with BAP (0.2 mg/l) + Kin (0.015 mg/l) produced the best growth response in genotype Co 86032 with superior auxiliary bud emergence, and shoot establishment than the other genotypes. MS medium with BAP (0.5 mg/l) + Kin (0.015 mg/l) proved optimum for genotypes VCF 0517, CoVC 09-61-07, and CoVC 10-43-06. However, multiple shoot induction characters varied widely among the four sugarcane genotypes.

A new approach to secondary air in bagasse boilers by PC Du Toit & S Van Der Merwe published in International Sugar Journal in July, 2020.

This paper describes a new methodology to the standard approach in secondary air systems, i.e. high-pressure fan and small-bore nozzles. The benefits of high temperature air introduced at the lower bagasse chutes are described with both computational fluid dynamics and site data. The computational fluid dynamics results indicated increased turbulence in the furnace leading to higher and more uniform combustion rates. An improvement in the furnace heat flux was also seen. Site data of two seasons operation with and without the new secondary air system indicated a decrease in fuel burnt on average.

Adoption of practices to mitigate harvest losses: 2017 results by P Patane, G Landers, M Thompson, B Nothard, CA Norris & M Olayemi published in International Sugar Journal in July, 2020.

Harvesting Best Practice (HBP) recommends that harvesters maintain pour rates of 80-90 t/h, depending on make and model, and recommends extractor-fan speed guidelines that ensure minimal cane loss with low extraneous matter (EM). Exceeding the recommended pour rate overloads the cleaning capacity of modern harvesters and increases EM in the cane supply. To attempt to counterbalance the EM issue, it is usual to increase fan speeds above those recommended, resulting in greater cane loss. Use of HBP recommendations across the industry is low and full HBP adoption would substantially increase industry revenue.

Investment activity in the global sugar sector over the period July 2019 to June 2020 by Arvind Chudasama published in International Sugar Journal in August, 2020.

This snapshot of investment activity over the past year is neither exhaustive nor complete. It is compiled from reported news in the global media. More often than not, details are not forthcoming, and it is not easy to corroborate. Amidst the volatility in the sugar market, diversification is on the rise as companies try provide some cushion and stability to their business.

Is certification used, and effective, to bring extra-value to producers around the sugar world? by Timothé Masson published in International Sugar Journal in August, 2020.

Sugar operates in a bear market. Producers face the challenge of maintaining their competitiveness in local, regional and global markets. This paper looks at strategies shared by 21 members of the World Association of Beet and Cane growers. These include producing for a niche market (organic sugar) or be a part of a recognized programme that has international appeal (Fairtrade) – both collectively represent less than 1% of the global market; pursuing prescriptive production practices recommended by supporting bodies (e.g. Bonsucro); or voluntarily following recommendations supplied by R&D institutions and aided by grower associations.

Design and implementation of a starting system for a sugarcane shredder by LF Muñoz, JJ León & HH Saldarriaga published in International Sugar Journal in August, 2020.

The goal of the implemented shredder drive starting system is to overcome the large inertias of the machine (shredder) at the start

of its operation, and to decrease the time of the starting current in the three-phase induction motor. The turbine-gearbox drive assembly, for starting the shredder, was sized according to the requirements of the shredder and the needs of the electricity grid using high-pressure steam (4482 KPa). To complete the start-up system, a spiral-jaw high-torque coupler with positive contact was designed and manufactured to fit the minimum operating space.

Analysis of milling operation with electro-hydraulic individual drives in the Ferrari Sugar Mill by Juliusz Lewinski, Luis Barrientos, Paulo Grassmann, Mattias Fredriksson & Paulo Fantinatti published in International Sugar Journal in August, 2020.

The Ferrari Sugar Mill tandem in Brazil is fully automated with variable speed for all the drives involved. The mills' rollers are individually moved by electro-hydraulic drives (including the fourth roller in mill one), thus offering a great advantage to automate the mill in a very accurate way and to also measure the speed and torque in each of the rollers driven. The speeds and the torque of each roller of five four rollers mills tandem were registered continuously, providing information on the power consumed in each roller, in each mill and in the whole tandem.

Integrated management of the Simunye effluent plant system by D Mabilai, H Lung Kit Ng & P Myeni published in International Sugar Journal in August, 2020.

Environmental hazards are of concern worldwide due to waste water pollution which is putting aquatic life in danger. The Royal Swaziland Sugar Corporation (RSSC) uses an integrated management system to treat effluent in order to comply with the legal requirements. Simunye factory has a backend distillery, and the effluent produced is sent to the effluent treatment plant (ETP). The concentrated molasses stillage (CMS) is blended with additional chemicals and applied as a liquid fertiliser to the cane fields. The waste water from the effluent plant is treated and used for sprinkling and flood irrigation at a COD.

Field evaluation of infestation levels of the sugarcane mealybug Saccharicoccus sacchari (Cockerell) on different sugarcane varieties in Guangxi Province, China: Preliminary results by Zhen-Qiang Qin, Ya-Wei Luo, De-Wei Li, Xiu-Peng Song, Jin-Ju Wei, Chun-Yan Wei, Amin Nikpay & Francois-Regis Goebel published in International Sugar Journal in September, 2020.

The pink sugarcane mealybug, Saccharicoccus sacchari is one of the important pests of sugarcane in China. Infestation levels of S. sacchari on 8 sugarcane varieties were investigated at sugarcane regional trial stations in 2018-2019 in Guangxi Province, China. Damage levels were assessed by counting the number of mealybugs per stalk and calculating the percentage of stalk damage. The results showed that there were significant differences in population density and damaged level of S. sacchari on new planted sugarcane varieties at Laibin sugarcane regional experiment stations in 2018, and population density on ratoon sugarcane varieties at Laibin and Chongzuo (Longzhou) sugarcane regional.

Effect of the germination threshold temperature on the geographical distribution of the variety R583 in Reunion Island by C Poser, L Barau, M Mézino, FR Goebel & F Ruget published in International Sugar Journal in September, 2020.

In Reunion Island, new sugarcane commercial varieties selected for constrained environments, particularly with regard to low temperatures, have demonstrated their better adaptability by producing more biomass in the high-lying parts of the island. The germination dynamics of populations of single bud setts were studied and characterized in growth chambers for three contrasting varieties at different constant temperatures. The emergence of setts as a function of time is faster and more complete for the variety R583, which is known to be better adapted to low temperatures than for R570 and R577.

Effect of post-harvest cleaning on cane yield by GA Kent, SP Ginns, JH Panitz & BG Robotham published in International Sugar Journal in September, 2020.

In-field cane loss is well recognised as a major source of sucrose loss. Strategies to reduce that cane loss typically involve reducing the harvester forward speed and the extractor-fan speed. Reducing harvester forward speed generally increases the cost of harvesting, while reducing extractor-fan speed generally increases the extraneous matter content of the cane supply. Efforts are being made to promote this lower speed strategy. An alternative strategy to reducing harvester forward speed is to introduce a post-harvest cane cleaning operation. Post-harvest cleaning has the potential to address the problem of increased extraneous matter content in the cane supply.

Experiences with the use of filtering nozzles in sugar mill XM-type rolls by JJ Sanchez & S. Chavarro published in International Sugar Journal in September, 2020.

Sugar mills use “XM rolls” (rolls with internal drainage) in order to reduce juice reabsorption during the milling process. Nevertheless, it is almost unavoidable that both nozzles and the internal drainage channels of the XM rolls get clogged with solids as the milling season advances. To minimize this problem, different kinds of nozzles have been designed, always keeping the basic principle of being conical and divergent. The best results were obtained with the new design that consists of nozzles with multiple holes that together maintain the same area as the original design with one-hole nozzle. Tests started in 2015 with one nozzle and were followed by several tests in different sugar mills until the XM rolls started to be used with all new-type nozzles and in all mill positions in the tandem (top, feed, delivery or fourth roll). Besides avoiding the clogging with bagasse, better and more stable milling indicators were obtained during the milling season. Currently, XM rolls with all their nozzles of the new type and of different diameters and number of holes (three to eight) are being fabricated. At the same time, different materials for the nozzle are also being tested to achieve an optimal lifespan to match of the XM roll itself.

Bioconversion of cane sugar processing by-products to protein and lipids by black

soldier fly (BSF) larvae by Giovanna M. Aita & Young Hwan Moon published in International Sugar Journal in September, 2020.

The cane sugar industry can be subjected to abrupt changes in sugar prices which are mostly driven by surpluses in global production. Sugarcane factories are aware of these changes and the possible ramifications and are working towards diversifying their product portfolio beyond their traditional options of sugar, ethanol, electricity, and biomass (briquettes, pellets) from their various processing streams and by-products (e.g., blackstrap molasses, bagasse). Additionally, global food demand continues to rise with major shifts most likely to happen in diets favoring protein and lipid-rich foods. Therefore, there is an urgent need to replace conventional animal feed ingredients.

An Overview of B-Heavy Molasses Diversion for Ethanol Production by Mohit Kumar, Vivek Pratap Singh and Narendra Mohan published in Indian Sugar Journal in July, 2020.

With government impetus on pushing the ethanol blending programme, many policy interventions have been made to encourage ethanol production and to make it a value added product for sugar mills. The government has provided the policy assurance for ethanol prices recently which will result in boosting in ethanol production by sacrificing sugar through various routes, being a better preposition. The diversion of B-heavy molasses may lead to curtailment in sugar production, thereby creating balance in sugar demand supply scenario to a certain extent, keeping sugar prices at reasonable levels, thus helping sugar factories in clearing farmer's sugarcane dues. Due to pandemic COVID-19 and consequential lockdown the sugar consumption has been adversely effected and uncertainty looms large about the future. Keeping in view the Indian sugar balances and global sugar prices due to which export shall be tougher, diversion of B heavy molasses is considered a vital tool for balancing sugar demand scenario and coping up with ethanol requirement for EBP 10. An overview of B- Heavy molasses diversion taken up by some of the Indian sugar factories during the sugar season 2019-20 is discussed here.

Increased Energy Efficiency of a Backward-Feed Multiple-Effect Evaporator Compared with a Forward-Feed Multiple-Effect Evaporator in the Cogeneration System of a Sugar Factory by Somchart Chantasiriwan published in Indian Sugar Journal in September, 2020.

The cogeneration system of a sugar factory consists of boiler, steam turbine, and sugar juice evaporation process. The multiple-effect evaporator used for the conventional sugar juice evaporation process is the forward-feed multiple-effect evaporator, in which steam and sugar juice flow in the same direction. The main objective of this paper is to investigate the energy efficiency of the backward-feed multiple-effect evaporator, in which steam and sugar juice flow in opposite directions, compared with that of the forward-feed multiple-effect evaporator. Mathematical models are developed for both multiple-effect evaporators, and used to compare the performances of two cogeneration systems that use the forward-feed and backward-feed

multiple-effect evaporators. The forward-feed multiple-effect evaporator requires extracted steam from a turbine at one pressure, whereas the backward-feed multiple-effect evaporator requires steam extraction at two pressures. Both evaporators have the same total heating surface area, process the same amount of sugar juice, and operate at the optimum conditions. It is shown that the cogeneration system that uses the backward-feed multiple-effect is more energy efficient than the cogeneration system that uses the forward-feed multiple-effect because it yields more power output for the same fuel consumption.

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