SHARKARA

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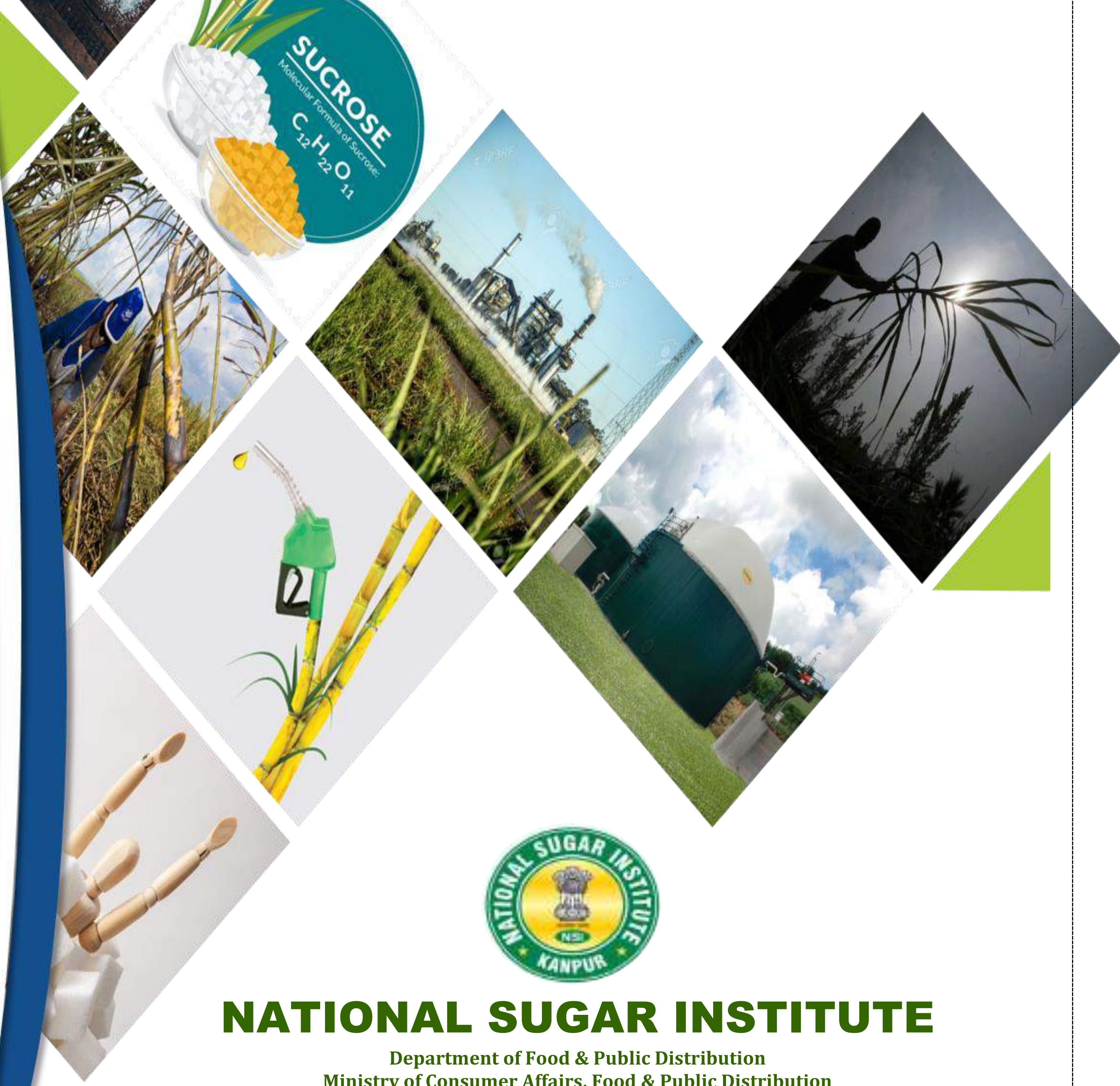

NATIONAL SUGAR INSTITUTE

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SHARKARA

VOLUME - 53, No .01

JANUARY-MARCH 2022

It contains……..

From Director's Desk…

Indian Sugar Industry is all set to create new records for highest ever sugar production. As per the revised estimates even after discounting sugar diverted for ethanol production, the approximate sugar production shall be about 33.5 MMT. However, looking to the probable export of about 8.0 MMT of sugar and considering domestic consumption of 26.0 MMT, the sugar stocks are expected to be low and thus the sugar prices are expected to remain stable and firm.

On ethanol front, the performance is again going to be exemplary and the industry is likely to achieve desired blending targets of 10% during the current alcohol year which stands 9.6% till March 2022. The country has now ethanol capacity of more than 850 crore litre per annum to cope up with the requirement. Ethanol capacity of molasses based distilleries were only 215 crore litre prior to 2014 which have increased by one and a half times and is currently 570 crore litre. Capacity of grain based distilleries which were 206 crore litre in 2013 has increased to 280 crore litre now.

Another welcome move by the Indian Sugar Industry is for converting Double Sulphitation Plants to Raw-Refined Sugar Plants about which NSI, Kanpur was trying to create awareness from last couple of years. It is heartening to see sugar factories now adopting environment and consumer friendly packaging of sugar and I hope more to follow. The industry is also now adopting production of specialty sugars looking to sector specific requirements.

Production of Compressed Bio-gas from filter cake is still facing several challenges and the issue of supplies and maintaining quality of filter cake for round the year operation needs to be addressed. Institute is continuously working on various fronts to see development of innovative technologies for producing value added products from waste and by-products of the sugar industry. During the current season, institute conducted laboratory and pilot plant scale trials of various other technologies viz. juice concentration by reverse osmosis, use of SMBS as a replacement for sulphur di-oxide gas and on juice clarification by removing impurities from defecated juice by floatation.

There is growing negative publicity about sugar consumption and associated health issues and thus to bring forth clarity in the matter a National Conference cum Expo- Meetha on the topic "Sugar & Health- Myth & Realities" was organized by the institute jointly with ISMA. The event was well attended and addressed by Diabetologist, Nutritionist and other experts. Institute looks forward for enhancing the activities further during the next financial year and academic session.

(Narendra Mohan)
Director

OUR PROVISIONS:

73rd REPUBLIC DAY CELEBRATED:

The Institute celebrated 73rd Republic Day on 26th January, 2022. On this occasion, Director hoisted the National Flag and took the salute from the security guards. Awards were also distributed to the winners of various competitions organized during **"Swachhta and Satarkata Pakhwada".** He complemented the staf for carrying out work during the out-break of corona and urged to continue the same pace for achieving many more milestones.



NATIONAL CONFERENCE & EXPO:

National Conference & Expo **"MEETHA-2022"** on **"Sugar & Health- Myth & Realities"** organized jointly by National Sugar Institute (NSI), Kanpur and Indian Sugar Mill Association (ISMA) at the Institute on 8th March 2022. Conference was graced by the Secretary (Food & Public Distribution), Joint Secretary (Sugar & Admn.) & Managing Director, Bajaj Hindusthan Sugar Ltd. Institute emphasised upon conducting awareness programmes to bring forth the reality as to whether sugar was the only culprit for diabetes, obesity and other health issues or it is attributed to lack of physical workouts and balanced diet.



The conference was also addressed by Director, National Sugar Institute, aminent scientists, Daabetologist & Nutritronist Various spesialiaty sugar, jaggery products & machinery manufacturers put up their stall at the expo.

NATIONAL SCIENCE DAY-2022:

On the occasion of **"NATIONAL SCIENCE DAY-2022"** commissioning of Automatic Weather Station (AWS) at National Sugar Institute, Kanpur was carried out on 28th February, 2022. It is to be used for real-time information about weather conditions at the farm level. It has been installed to capture real time data which would help in conducting various experiments at institute farm. Big LED display has been installed at the institute main gate to facilitate conveying information to general public as well.



BRAIN STORMING SESSION:

1. Brain storming session was organized on **"World Water Day**" at National Sugar Institute, Kanpur on 22nd March 2022 to discuss the ways and means to minimize fresh water consumption in sugar and allied industries for replenishing the ground water.



The event whose theme was **"Groundwater –Making the invisible, visible"** was held in the hybrid mode. It was attended by a large number of delegates from the sugar and ethanol industry from variuos sugar producing states of the country. In his inaugural address, Director, National Sugar Institute lauded the efforts made by sugar factories and distilleries situated in Ganga basin in improving working of the effluent treatment plants.

Prof. D. Swain made a presentation on ways & means to reduce, reuse & recycle water in sugar factories.Shri Pradeep Khandelwal, Unit Head, M/s Triveni Engineering & Industries Ltd. stressed upon need for taking appropriate measures to reduce water requirements from "Farm to Factory". Sugarcane is considered to be a water guzzler crop and thus modern techniques of irrigation, "Furrow Irrigation" and "Drip Irrigation" are required to be promoted in a bigger way.

BOOK RELEASE:

हिंदी भाषा मे लिखी पुस्तक"**चीनी उद्योग मे क्रिस्टलीकरण एवं अपकेंद्रण की तकनीक**" (Techniques of Crystallization and Centrifugation in Sugar Industry") का विमोचन 4 जनवरी 2022, हरकोर्ट बटलर टेक्निकल यूनिवर्सिटी, कानपुर के कुलपति प्रो. समशेर द्वारा संस्थान में किया गया। ये पुस्तक विशेषकर" **शुगर बॉयलिंग सर्टिफिकेट कोर्स** "के विद्यार्थियों एवं चीनी उद्योग में शुगर बॉयलिंग स्टेशन पर कार्यरत टेक्निकल स्टाफ को ध्यान में रखते हुए हिंदी में लिखी गयी है ।



ये पुस्तक विशेषकर "**शुगर बॉयलिंग सर्टिफिकेट कोर्स**" के विद्धार्थियों एवं चीनी उद्योग में शुगर बॉयलिंग के क्रिस्टलीकरण तथा चीनी एवं शीरे के सेपरेशन की तकनीकों व प्रयुक्त मशीनरी का व्यावहारिक ज्ञान दे सकेगी।

INDUSTRY SECTIONAL COMMITTEE OF BIS:

An online meeting of Sugar Industry Sectional Committee of BIS was held on 25th January 2022, under the Chairmanship of Director, National Sugar Institute, Kanpur. Various standards for lay out plan of labs in sugar factories, hygienic conditions during processing, industrial screens, steel tubes for heat exchangers, Jaggery. and Misri etc. were taken up for revision. Shri Narendra Mohan, Director, national Sugar Institute & chairman, sectional committee FAD-2 of BIS, desired for framing BIS standards for low sulphur & brown sugarson early date. The meeting was attended by scientists & experts from various organizations/ apex dodies of sugar factories and also representatives of various machinery manufacturing units.

MoA/MoU SIGNED:

1. National Sugar Institute, Kanpur on 31st January 2022, signed a Memorandum of Agreement (MoA) with **M/s Suzalkem Technologies, Hyderabad**, for developing enzymes to prevent deterioration of B Heavy molasses and sugar syrup upon storage.



RESEARCH WORK:

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 –** In order to execute the repeated experiments on 10 g scale (@ bagasse), initially preparation of bagasse (of current season) has been performed and then the experiments were performed to obtained acid treated bagasse (first stage pre-treatment). Further experiments related to second stage pre-treatment with alkali are on-going.

2. **Studies on synthesis of lactic acid from sugarcane bagasse hemicellulose -** The results obtained from identification and purification of the desired synthesis of lactic acid from C-5 sugar of bagasse under new reaction condition were not fruitful. The yield was very low near to undetectable from UV-spectrophotometry. These were almost similar to earlier results obtained under this study. Thus, the topic may be dropped. Based on the gained experience while working on this topic, the preparation of a review paper is under preparation for submission in journal.

3. **Studies on production of chloromethyl furfural from bagasse derived cellulose in biorefinery approach-** The experiments (four batches @ 1g treated bagasse) related to synthesize 5-(Chloromethyl) furfural (CMF) from bagasse were performed. The combined reaction mixtures were processed for isolating crude CMF. The purification and characterization of the bagasse derived CMF is ongoing.

4. **Studies on value addition of Sweet Sorghum Bagasse -** The compositional study of sweet sorghum bagasse (SSB) has been completed and The experiments related to fractionization of individual components of the SSB has been completed. Observations on lignin content in this bagasse are not in conformity with literature value. Thus reanalysis of lignin content is on-going. The experiments related to characterization study on composition of sweet sorghum bagasse had been carried out. The ash and lignin content were determined.

5. **Studies on utilization of molasses for synthesis of 5-alkoxymethylfurfural ethers as promising biofuel candidates -** 5-alkoxymethylfurfural ethers play significant role as a fuel candidate, diesel fuel additive as they have comparable energy density relative to standard gasoline and has shown promise when tested in engines, thus these compounds have attracted as promising biofuel candidates. The division has started to work towards developing innovative methodology to access them utilizing molasses as a raw molasses material. The literature survey on 5 – alkoxymethylfurfural ethers has been completed. The procurement process related required materials with reference to this study and others is in progress.

6. **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 programming part of microcontroller has been done. Some corrections as per the requirement were being made. The mechanical load system is being procured. The items related to the research work were taken to HBTU lab for interfacing, testing etc. The work is almost completed and the findings shall be published shorthly.

7. **Utilization of Potash Rich ash for production of valuable bio fertilizer -** Field Experiment on sugarcane crop was taken up so as to assess the effects of bio-fertilizers on its growth. Crop was

harvested on 17/2/2022 & 18/2/2022. Yield attributing characters of sugarcane were taken by Agriculture division and analysis of the juice was carried out at BC division. Samples were analyzed Brix RS, TRS, and Ethanol yield. Sugar cane samples were analysed for Brix%, RS%, TRS%, and ethanol yield. Data compiled and will be submitted in form of paper for publication.

8. **Comparative study of five varieties of sweet sorghum for production of ethanol yield -** Five sweet sorghum varieties namely CSH 22SS, SSV 84, SSV 74, ICSSH-28 and Phule Vasundhara gave satistatory results for production of ethanol in lab as well as on ethanol pilot plant. The average ethanol yield was estimated to be 40-45 liters/ ton of sweet sorghum stalk.

9. **Comparative study on polarization by using lead, non-lead clarificants and NIR polarimetry -** Polarimeter workable in NIR region has been procured and demonstration & other training related to operation of Polarimeter has been taken up. Procurement of Carrez reagents is in progress. The study shal be taken by polarising samples at 589 & 880mm wavelengths. The sudy is aimed under "Good Laboratory Practices" and lead free analysis of sugar house liquers.

10. **Study of B Heavy molasses for use as edible molasses –** Samples of B-heavy molasses have been collected from 03 different refined sugar plants and will be analyzed in the month of February, 2022. Analysis of collected 3 Nos. BHy molasses samples from refined sugar plants completed in sugar technology laboratory and further analysis of these BHy molasses samples is being carried out in Bio Chemistry laboratory.

11. **Use of Sodium Meta bi-sulphite based product for sugar cane juice clarification -** Lab trials on cane juice obtained from CO-0118 cane variety were conducted by using Guljag Crystasulf (a Sodium Meta bi-sulphite based product) as clarifying reagent in place of SO_2 gas to obtain clear juice. Four sets of experiments were carried out on various lime doses of 1.2, 1.4, 1.6 & 1.7% (V/V) and further neutralized by Crystasulf. Obtained clarified juice was analyzed for various parameters like pH, Brix %, Po l%, Purity, RS% and colour. The results obtained by using Guljag Crystasulf were found encouraging. Trial was also carried out at Experimental Sugar Factory of the institute with encouraging results.

12. **Preservation of syrup and B-heavy molasses upon storage by the use of different chemicals -** The dosing of EPA-I @ 10 ppm on solid basis (Enzyme was provided by M/s Catalyst Bio-Technologies Pvt. Ltd.) was carried out to prevent deterioration of BHy molasses. The analyses of these samples, along with untreated BHy molasses were carried out. No significant changes were observed in the quality of stored B heavy molasses. Further new samples from DS process & Refined process have been stored in the tanks for more experiment.


13. **"Concentration of clear juice by using Reverse Osmosis technology" -** The study on the topic is being carried out by the institute jointly with M/s Hydranautics (Nitto group company). A visit of technical team headed by the Director was also paid for the pilot plant trials and on basis of observations, some suggestions were given for improvement The trial is being conducted at M/s BCML unit – Kumbhi. The analysis & observations are under progress. Further trial shall be made in a back end refinery during the season.


RESEARCH PAPER:

1. A research paper entitled **"Bio-Ethanol-Saviour of Indian Sugar Industry" by** Narendra Mohan has been sent for publication in ISSCT XXXI Congress, 2023.

2. A research paper entitled **"Diversification & Integration-Business Model for Sugar Industry"** by Narendra Mohan & Anushka Agarwal has been sent for publication in ISSCT XXXI Congress, 2023.

3. A research paper entitled **"Nutritional and Healthier Dietary Fiber Enriched Cookies from Sugarcane Bagasse"** by Narendra Mohan, Anushka Agarwal & Shurti Shukla has publiced in International Journal of Recent Advances in Multidisciplinary Topics, Volume3, Issue2, February 2022.

4. An abstract of a paper entitled **"A Bio-refinery Method for production of Chloro Methyl Furfural (CMF) and Vallin with Simultaneous fractionation of pentose Syrup and Lignin**

from Sugarcane Bagasse" by Narendra Mohan, Dr. Vishnu Prabhakar Srivastava, Mrs. Chitra Yadav and Mamta Shukla has been sent for publication in ISSCT XXXI Congress, 2023.

5. A research paper entitled **"A step ahead to reduce carbon footprints"** by Smt. Dr. Seema Paroha, D. Swain and N. Mohan has been sent for publication in ISSCT Hyderabad -2023.

6. A research paper entitled **"Measures to maximize juice extraction during milling"** by Sanjay Chauhan has been published in Sharkara Volume 53, issue no. 1, January – March, 2022.

SALE OF SUGAR STANDARDS:

Sale of sugar standard grades commenced from 1st October 2021 for the sugar season 2021-22. Standard grades can be procured online also. . Institute has been sale out 1063 samples to the 226 sugar factories up to March 2022. The details are available on our website http://www.nsi.gov.in

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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.
4. To render assistance to various government organizations in implementation of policies, validations and on associated matters.
5. To extend human resource management services to various government and private organizations.

CONSULTANCY:

Request for availing consultancy services of the institute was received from the following on various technical matters relating to diversion of B Heavy molasses/syrup, validation of ETP's, preparation of DPR's, validation of no increase in pollution loads in ethanol units upon enhancement in capacity etc.

1.	M/s Harinagar Sugar Mills Limited, Distillery Unit, District – West Champaran, Bihar.
2.	M/s Avadh Sugar & Energy Limited, Hargaon, District – Sitapur.
3.	M/s Bajaj Hindusthan Sugar Limited, Golagokarnath, District – Lakhimpur Kheri, U.P.
4.	M/s Mawana Sugar Works, Mawana, District – Meerut, U.P.
5.	M/s Bajaj Hindusthan Sugars Limited, Gangnauli, District – Saharanpur, U.P.
6.	M/s Avadh Sugar & Energy Limited, Unit – Rosa Sugar Works, District – Saharanpur, U.P.
7.	M/s Bajaj Hindusthan Sugar Limited, Khambharkhera, District – Lakhimpur Kheri, U.P.
8.	M/s Dalmia Bharat Sugar & Industries Limited, Sugar Unit – Nigohi, Shahjahanpur, U.P.
9.	M/s DCM Shriram Limited, Sugar Unit – Rupapur, District – Hardoi, U.P.
10.	M/s Balrampur Chini Mills Limited, Unit – Kumbhi, District – Lakhimpur Kheri, U.P.
11.	M/s Nanglamal Sugar Complex, Distillery Division, District – Meerut, U.P.
12.	M/s EID Parry (India) Limited, Sankili, District – Srikakulam, Andhra Pradesh, U.P.
13.	M/s Shamli Distillery & Chemical Works, District – Shamli, U.P.
14.	M/s The Sugar Technologists Association of India, New Delhi.
15.	M/s Maa Mahamaya SSK, Maryadit, Ambikapur, District – Surajpur, Chhattisgarh.
16.	M/s Bajaj Hindusthan Sugar Limited, Unit – Barkhera, Pilibhit, District – Pilibhit, U.P.
17.	M/s Triveni Engineering & Industries Limited, Khatauli, District – Muzaffarnagar, U.P.
18.	M/s Dwarikesh Sugar Industries Limited, Dwarikesh Nagar, District – Bijnor, U.P.
19.	M/s Bajaj Hindusthan Sugar Mills Limited, Budhana, District – Muzaffarnagar, U.P.
20.	M/s Sir Shadilal Distillery & Chemical Works, Mansurpur, District – Muzaffarnagar, U.P.

21.	M/s Gobind Sugar Mills Limited, Aira, District – Kheri, U.P.
22.	M/s Dhampur Sugar Mills Limited, Dhampur, District – Bijnor, U.P.
23.	M/s DCM Shriram Limited, Sugar Unit – Hariawan, District – Hardoi, U.P.
24.	M/s Daurala Sugar Works, Daurala, District – Meerut, U.P.
25.	M/s Uttam Suagr Mills Limited, Unit – Khaikheri, District – Muzaffarnagar, U.P.
26.	M/s Suzalken Technologies Private Limited, Hyderabad, Telangana.
27.	M/s Balrampur Chini Mills Limited, Unit – Gularia, District – Lakhimpur Kheri, U.P.
28.	M/s The Seksaria Biswan Sugar Factory Limited, District – Sitapur, U.P.
29.	M/s Wave Industries Private Limited, Unit – Bulandshahar, U.P.
30.	M/s DCM Shriram Limited, Sugar & Distillery, Unit – Hariawan, District – Hardoi, U.P.
31.	M/s Dalmia Bharat Sugar & Industries Ltd., Ramgarh, Sitapur, U.P.
32.	M/s Magadh Sugar & Energy Limited, Narkatiaganj, District – West Champaran, Bihar.
33.	M/s Shree Sangam SSK, Niyamit, Hidakaldam, District – Belagavi, Karnataka.
34.	M/s DCM Shriram Limited, Unit – Loni, District – Hardoi, U.P.
35.	M/s Avadh Sugar & Energy Limited, Unit – Hargaon, District – Sitapur, U.P.
36.	M/s Dhampur Sugar Mills Limited, Unit – Asmoli, District – Sambhal, U.P.
37.	M/s Dalmia Bharat Sugar & Industries Limited, Unit – Jawaharpur, District – Sitapur, U.P.
38.	M/s Wave Industries Private Limited, Unit – Dhanaura Mandi, District – Amroha, U.P.
39.	M/s Visited M/s Ugar Sugar Works Ltd., Belagavi, Karnataka.
40.	M/s Viswaraj Sugars Industries Ltd., B. Bagewadi, Karnataka.
41.	M/s Bajaj Hindustan Sugar Ltd., Unit – Kinauni, Meerut, U.P.
42.	M/s Bajaj Hindustan Sugar Ltd., Unit – Rudhauli, Basti, U.P.
43.	M/s Daya Sugar (A unit of B.K. Investment Services Pvt. Ltd.,), Saharanpur, U.P.
44.	M/s Avadh Sugar & Energy Ltd., Unit – Seohara, Bijnor, U.P.
45.	M/s Avadh Sugar & Energy Ltd., Unit - Hargaon, Sitapur, U.P.
46.	M/s Dhampur Sugar Mills Ltd., Unit – Mansoorpur, Muzaffarnagar, U.P.
47.	M/s Wave Industries Pvt. Ltd., Unit – Bijnor, U.P.
48.	M/s Magadh Sugar & Energy Ltd., Unit – Bharat Sugar Mills, Sidhwalia, Gopalganj, Bihar
49.	M/s Triveni Engineering & Industries Ltd., Unit – Deoband, Saharanpur, U.P.
50.	M/s Kesar Enterprise Ltd., Sugar Unit – Baheri, Bareilly, U.P.
51.	M/s Mawana Sugar Works, Mawana, Meerut, U.P.
52.	M/s Uttam Sugar Mills Ltd., Sugar Unit – Libberheri, U.K.
53.	M/s Triveni Engineering & Industries Ltd., Unit – Khatauli, Muzaffarnagar, U.P.

ANALYTICAL SERVICES:

Besides analysis of sugar & sugar house products, Ethanol and effluents etc. Institute started offering testing of Ethyl Alcohol based Sanitizer in its sophisticated, most modern NABL & BIS accredited analytical laboratory and other laboratories of the institute. Testing of bagasse for determination of GCV also taken up during the period. Analytical services were rendered to following:

1.	M/s DCM Shriram Limited, Sugar Unit – Rupapur, District – Hardoi, U.P.
2.	M/s DCM Shriram Limited, Sugar Unit – Ajbapur, District – Lakhimpur Kheri, U.P.
3.	M/s DCM Shriram Limited, Sugar Unit – Hariawan, District – Hardoi, U.P.

4.	M/s Balrampur Chini Mills Limited, Babhnan, District – Gonda, U.P.
5.	M/s The Kisan Sahkari Chini Mills Limited, Sathiaon, District – Azamgarh, U.P.
6.	M/s The Kisan Sahkari Chini Mills Limited, Powayan, District – Shahjahanpur, U.P.
7.	M/s The Ganga Kisan Sahkari Chini Mills Limited, Morna, District – Muzaffarnagar, U.P.
8.	M/s K. M. Sugar Mills Limited, Motinagar, District – Faizabad, U.P.
9.	M/s Balrampur Chini Mills Limited, Balrampur, U.P.
10.	M/s Seksaria Biswan Sugar Factory Limited, Biswan, District – Sitapur, U.P.
11.	M/s Tirupati Sugars Limited, District – West Champaran, Bihar.
12.	M/s Balrampur Chini Mills Limited, Maizapur, District – Gonda, U.P.
13.	M/s Rudrabilas Kisan Sahkari Chini Mills Limited, Bilaspur, District – Rampur, U.P.
14.	M/s Bisalpur Kisan Sahkari Chini Mills Limited, Pilibhit, U.P.
15.	M/s Balrampur Chini Mills Limited, Kumbhi, District – Lakhimpur Kheri, U.P.
16.	M/s The Kisan Sahkari Chini Mills Limited, Budaun, U.P.
17.	M/s Food Inspection Organization, (QMG Branch), Delhi.
18.	M/s Dhampur Sugar Mills Limited, Unit – Asmoli, District – Moradabad, U.P.
19.	M/s Dhampur Sugar Mills Limited, Unit - Meerganj, District – Bareilly, U.P.
20.	M/s Triveni Engineering & Industries Limited, Unit - Deoband, District – Saharanpur, U.P.
21.	M/s The Kisan Sahkari Chini Mills Limited, Gajraula, District – Amroha, U.P.
22.	M/s Balrampur Chini Mills Limited, Rauzagaon
23.	M/s Avadh Sugar & Energy Limited, District – Shahjahanpur, U.P.
24.	M/s Triveni Engineering & Industries Limited, Raninangal, District – Moradabad, U.P.
25.	M/s Balrampur Chini Mills Limited, Unit – Akbarpur, District – Ambedkar Nagar, U.P.
26.	M/s Balrampur Chini Mills Limited, Unit – Tulsipur,
27.	M/s Triveni Engineering & Industries Ltd., Unit – Sabitgarh, District – Bulandshahar, U.P.
28.	M/s Balrampur Chini Mills Limited, Unit – Haidergarh, District – Barabanki, U.P.
29.	M/s Dhampur Sugar Mills Limited, Meerganj, District – Bareilly, U.P.
30.	M/s Dhampur Sugar Mills Limited, Asmoli, District – Sambhal, U.P.
31.	M/s Dhampur Sugar Mills Limited, Mankapur
32.	M/s Kisan Sahkari Chini Mills Limited, Tilhar, District – Shahjahanpur, U.P.
33.	M/s Balrampur Chini Mills Limited, Gularia, District – Lakhimpur Kheri.
34.	M/s Triveni Engineering & Industries Ltd., Unit – Khatauli, District – Muzaffarnagar, U.P.
35.	M/s Avadh Sugar & Energy Limited, Seohara, District – Bijnor, U.P.
36.	M/s The Kisan Sahkari Chini Mills Limited, Sathiaon, District – Azamgarh, U.P.
37.	M/s Govind Sugar Mills Ltd., Aira Estate, District Lakhimpur Kheri, U.P.
38.	M/s Triveni Engineering & Ind. Ltd., Raninangal,
39.	M/s Dhampur Sugar Mills Ltd., Mansoorpur, District Muzaffarnagar, U.P.
40.	M/s Dhampur Sugar Mills Ltd., Asmoli, District Bheem Nagar, U.P.
41.	M/s Dhampur Sugar Mills Ltd., Meerganj, District – Bareilly, U.P.
42.	M/s Magadh Sugar & Energy Ltd., Narkatiaganj, District West Champaran, Bihar
43.	M/s Sarjoo Sahkari Chini Mills Ltd., Belrayan, U.P.
44.	M/s Kisan Sahkari Chini Mills Ltd., Powayan, Pilibhit, U.P.
45.	M/s Viswaraj Sugar Industries Bagewadi, Karnataka

46.	M/s The Ganga Kisan Sahkari Chini Mills Ltd., Morna, U.P.
47.	M/s Shravasti Kisan Chini Mills, Nanpara, Bahraich, U.P.
48.	M/s Kisan Sahkari Chini Mills Ltd., Mahmudabad, U.P.
49.	M/s Balrampur Chini Mills Ltd., Unit – Babhnan, (Chemical Division), U.P.
50.	M/s Avadh Sugar & Energy Ltd., Unit – Seohara, U.P.
51.	M/s Triveni Engineering & Ind. Ltd., Sugar Unit – Chandanpur, Amroha, U.P.
52.	M/s Rasi Nutri Foods India Private Limited, Edayarpalayam, Coimbatore, Tamil Nadu
53.	M/s Kisan Sahkari Chini Mills Ltd., Unit – Kaimganj, Farrukhabad, U.P.
54.	M/s Wave Industries, Unit – Bijnor, U.P.
55.	M/s Wave Industries, Unit – Dhanaura, Amroha, U.P.
56.	M/s Wave Industries, Unit – Bulandshahar, U.P.
57.	M/s Avadh Sugar & Energy Ltd., Unit – Rosa Sugar Works Ltd., Sahajahanpur, U.P.
58.	M/s Triveni Engineering & Ind. Ltd., Sugar Unit – Deoband, U.P.
59.	M/s Bajaj Hindusthan Sugar Ltd., Unit - Barkhera, U.P.
60.	M/s Daya Sugar (A unit of B.K. Investment Services Pvt. Ltd.,), Saharanpur, U.P.
61.	M/s Dalmia Bharat Sugar Ltd., Unit – Jawaharpur, Sitapur, U.P.

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OUR OTHER ACTIVITIES:

1. **राष्ट्रीय शर्करा संस्थान में हिंदी भाषा के प्रोत्साहन के लिए संस्थान के अधिकारीयों एवं कर्मचारियों के मध्य एक स्लोगन प्रतियोगिता का आयोजन किया गया और 10 जनवरी विश्व हिंदी दिवस पर आयोजित स्लोगन प्रतियोगिता मे विजेताओं को पुरुस्कृत किया गया।**



2. National Sugar Institute, Kanpur organized a COVID-19 test camp for employees and students on 12th January, 2022.



3. Looking to the growing no. of Corona cases, **"Isolation Centre"** has been made ready for the students and employees of the institute. Oxygen Cylinders, Oxygen Concentrators and other first aid material has also been provided on 13th January, 2022.



4. नाइजीरिया के नाइजीरियन शुगर इंस्टिट्यूट के चार शिक्षकों ने अपना एक वर्ष का फेकल्टी डेवलपमेंट प्रोग्राम राष्ट्रीय शर्करा संस्थान कानपूर से पूर्ण कर संस्थान से दिनांक 14 जनवरी 2022 को विदा ली ।



5. Boiler Pooja was organized at Experimental Sugar Factory (ESF) at the institute on 18th January 2022.



6. M/s Emami Ltd. desired to seek assistance of National Sugar Institute, Kanpur for producing high quality jaggery and jaggery based healthcare products on 19th January, 2022.

7. आगामी अकादमिक सत्र से राष्ट्रीय शर्करा संस्थान, कानपुर मे शुगर इंजीनियरिंग, अल्कोहल टेक्नोलॉजी एवं क्वालिटी कण्ट्रोल पाठ्यक्रमों मे सीटें बढ़ायी जाएंगी। यह निर्णय चीनी उद्योग मे इन पाठ्यक्रमों के छात्रों की बढ़ती मांग के कारण लिया गया। संस्थान के निदेशक श्री नरेंद्र मोहन ने बताया कि संस्थान के लगातार प्रयासों से चीनी उद्योग मे सह उत्पादों, खोई का पावर जनरेशन एवं शीरे का इथेनॉल मे बढ़ा है जिसके कारण सम्बंधित तकनिकी मानव शक्ति कि मांग मे वृद्धि हुई है। साथ ही

चीनी उद्योग मे फूड सेफ्टी एवं गुड़वत्ता पर चीनी के निर्यात एवं देश के पेय एवं फार्मा सेक्टर क़ी मांग को देखते हुए क्वालिटी कण्ट्रोल केमिस्टों क़ी मांग बढ़ रही है। इसको देखते हुए शुगर इंजीनियरिंग मे सीटें 33 से 40, अल्कोहल टेक्नोलॉजी मे 38 से 50 एवं क्वालिटी कण्ट्रोल पाठ्यक्रम मे 22 से 30 क़ी जाएंगी।

संस्थान द्वारा नियमित पाठ्यक्रमों के अतिरिक्त अल्प अविधि के दो पाठ्यक्रम चलना भी प्रस्तावित है जिनमे एक "शुगर बिज़नेस मैनेजमेंट" एवं दूसरा "मूल्य वर्धित गुड़ और गुड़ आधारित बेकरी उत्पाद" पर आधारित होगा। संस्थान के निदेशक ने बताया कि गुड़ पर आधारित पाठ्यक्रम के लिए एक "इनोवेशन सेंटर फॉर गुड़ एंड खांड़सारी " स्थापित करने का कार्य प्रगति पर है जिसमे इस पाठ्यक्रम के छात्रों को व्यावहारिक ज्ञान भी दिया जायेगा।

8. National Sugar Institute, Kanpur has achieved success in producing **"Activated Bio-char"** from sugarcane bagasse. It can be used for de-colorizing sugar melts in sugar refineries and waste water treatment.



9. Crushing season of **Experimental Sugar Factory** (ESF) of National Sugar Institute, Kanpur commenced on 1st February 2022 to impart practical training to the students of various courses. NSI, Kanpur being the only sugar institute across globe to have such facility for training of students. A trial of new technique of sugar juice clarification by floatation was also carried out during the month.



10. Dr. Naveen Prakash Singh, Chairman, Commission for Agriculture Cost and Prices (CACP), Government of India visited the National Sugar Institute, Kanpur on 11th February 2022 and discussed on diversification and value addition for economically sustainable Indian Sugar Industry. He also visited various research laboratories of the institute to see ongoing activities..



During the visit, presentation about activities of National Sugar Institute and its role in growth and development of the Indian Sugar Industry was made by the Director. He also presented details of institute proposed road map for converting "Sugar Factories" to "Bio-refineries" for producing bio-food, bio-energy, bio-chemical and bio-water.

11. स्वच्छता पखवाड़े के अन्तर्गत, दिनांक 16-28 फरवरी तक मनाये जा रहे राष्ट्रीय शर्करा संस्थान में दिनांक 18.02.2022 को वृक्षारोपण कार्यक्रम का आयोजन किया गया।


12. National Sugar Institute, Kanpur conducted trials of **"Floatation Technique"** for sugarcane juice clarification in its Experimental Sugar Factory in collaboration with STAI and M/s Chemical System Technologies. Preliminary results indicate a ray of hope for its adoption in raw sugar units or integrated refineries.


13. In pursuit of developing low cost, indigenous technologies, experts of National Sugar Institute, Kanpur has developed an automation system for controlling water requirement for condensers of vacuum system. In sugar factories juices and other sugar liquors are boiled under vacuum so as to enable low temperature boiling so as to minimize colour development and sugar losses. By doing so, instead of carrying out boiling at 103-105 deg. C, the boiling is made at 55-60 deg. C.


In the system developed under the supervision of Shri Virendra Kumar, Senior Instrumentation Engineer and installed in Experimental Sugar Factory of the institute, the quantity of injection water is controlled sensing vacuum, vapour temperature, injection water and outlet water temperature. The trials confirm lesser water requirement and thus decrease in power consumption by around 25%.

14. Director, National Sugar Institute, Kanpur addressed the webinar which was organized by The Sugar Technologists Association of India (STAI) on the topic **"Issues & Way Forward for Ethanol Production from Sugarcane Syrup"** on 24th February, 2022. In the webinar various issues been confronted at fermentation and spent wash handling stages were discussed. It was generally opined that ethanol production from syrup shall necessitate higher nutrient requirement and support fuel.


15. National Safety Day celebrated at Experimental Sugar Factory (ESF) of National Sugar Institute, Kanpur on the theme **"Nurture Young Minds-Develop Safety Culture"** on 4thMarch 2022. Students, Staff & Officers were participated in the National Safety Day program with the goal of raising awareness and commitment to working safely.


16. सेण्ट मेरी कान्वेंट स्कूल की हाई स्कूल की विद्यार्थियों द्वारा दिनांक 14.03.2022 को राष्ट्रीय शर्करा संस्थान का शैक्षिक भ्रमण किया गया। विद्यार्थियों को देश की चीनी उद्योग एवं राष्ट्रीय शर्करा संस्थान की बारे मे जानकारी देने की लिए डाक्यूमेंट्री दिखाई गयीं। विद्यार्थियों ने संस्थान मे विभिन्न प्रकार की चीनियों की उत्पादन, चीनी मिलों की बाई प्रोडक्ट्स से वैल्यू एडेड प्रोडक्ट बनाने और क्वालिटी कण्ट्रोल की तकनीक की बारे मे जानकारी प्राप्त की गयी। उन्होने ऑटोमेशन एंड इंस्ट्रूमेंटेशन लेबोरेटरी मे (प्रवाह) फ्लो, (ताप) टेम्परेचर एवं पी एच नियंत्रित करने हेतु विभिन्न कण्ट्रोल की जानकारी प्राप्त की। साथ ही उनको अनाज एवं शीरे से इथेनॉल उत्पादन की जानकारी एवं उसके पेट्रोल मे मिलाने की महत्त्व की बारे मे भी जानकारी दी गयी।



17. Director National Sugar Institute, Kanpur attended 21st meeting of FSSAI's Scientific Panel on Sweets, Confectionery, Sweetener, Sugar and Honey on 15th March 2022. Long and very useful discussions were carried out on framing some new standards.

18. Director, National Sugar Institute, Kanpur participated in "Sugar & Ethanol Conference 2022" on 20th March 2022 and tried for active participation through presentations and panel discussions on green energy, value addition, diversifications, sugar quality and sugar consumption patterns.


19. Director, National Sugar Institute, Kanpur delivered a lecture on **"Energy Management in view of current ethanol diversification in Indian Sugar Industry"** in the webinar organized by International Society of Sugarcane Technologists on 29th March 2022.


20. Construction of a new **"Alcohol Technology Laboratory"** completed on 31th March 2022 to cope up with the requirement as the number of seats in **"Post Graduate Diploma Course in Industrial Fermentation and Alcohol Technology (DIFAT)"** are to be increased from academic session 2022-23


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HAPPENING IN THE SUGAR INDUSTRY:

Brazil's ethanol production premium surpasses 200 points over sugar.

Brazilian ethanol's growing production premium to sugar -- a measure of which product is most profitable to produce --reached 208 points as of April 1, according to data from S&P Global Commodity Insights. A 7.8% jump in Brazil's Center- South hydrous ethanol price combined with a 6.8% appreciation in the real against the dollar from March 10 to April 1 were the primary reasons for ethanol's spike in production premium. NY11 May sugar futures posted a meager 1.4% price rise over the same period. The ethanol production premium to sugar in Brazil moves closer to 240 points if decarbonization credits, CBIOs are added into the premium calculation. The CBIO, equivalent to 1 mt of carbon dioxide not released in the atmosphere, is an instrument issued by biofuel producers and importers to ensure Brazil attains its future decarbonization targets.

USDA sees U.S. sugar beet area down 1.4%

The US Department of Agriculture in its March 30 Prospective Plantings report said farmers intend to plant 1,143,400 acres of sugar beets in 2022, down 16,600 acres, or 1.4%, from 1,160,000 acres planted in 2021. It is reported by bakingbusiness. Planting intentions were down 3,000 acres, or 0.7%, in top-producing Minnesota at 424,000 acres. But planted area in No. 2 North Dakota were unchanged from 2021 at 226,000 acres. Idaho growers intend to plant 170,000 acres of sugar beets, down 2,000 acres, or 1.2%, from last year. The largest decline was in Michigan at 145,000 acres, down 10,000 acres, or 6.5%, from 2021. Lower planted area also was indicated for Montana, Wyoming and Oregon. Increases were forecast for Nebraska and Colorado. Acreage was expected to be unchanged from 2021 in California and Washington.

Pakistan – FBR's track and trace system at sugar mills generates 33% increase in tax collection.

The Federal Board of Revenue (FBR) has achieved a milestone by successfully implementing the track and trace system (TTS) in sugar mills during the ongoing crushing season. As a result, it has collected PKR26.5 billion (US$144 million) sales tax from the millers in the current campaign as against PKR19.9 billion collected in the previous year, according to local press reports.

Vietnam now has to combat Thai sugar smuggled from Cambodia and Laos, says VSSA .

The Vietnam Sugar and Sugarcane Association (VSSA) reports that the volume of sugar exported to Vietnam from Laos has increased sixty-fold since the country imposed an anti-dumping tax on Thai sugar in 2021

France – Cristal Union to invest €100 million to store water produced from beet during processing and install biogas units.

One of the top French sugar producer Cristal Union is planning to invest €100 million at its plants to store water recycled during sugar beet processing as well as install methanizers to produce biogas from wastewater effluent.

France – Soaring gasoline prices boost demand for conversion kits to power cars with cheaper ethanol.

Sales of kits that convert gasoline-powered cars to run on bioethanol are surging in France as drivers switch to using the sharply cheaper crop-based fuel amidst soaring oil prices.

Brazil – Import tariffs on ethanol waived for nine months

The Brazilian government has waived until December 31 its 18% import tariff for a handful of products, including ethanol.

Govt. fixes 21.5 LMT monthly sugar quota for domestic sale in March 202.

In a notification issued on 28th day of February 2022, the food ministry has allocated 21.5 LMT monthly sugar quota for March 2022 to 566 sugar mills which is 1.5 LMT higher than the quota allocated in February 2022.

ISMA's review of sugar production estimates for 2021-22 season.

According to the Indian Sugar Mills Association (ISMA), during 2021-22 Sugar Season(SS), from 1st October 2021 to 28th February 2022, 516 sugar mills had started operations (as against 503 sugar mills which had operated last year till 28th February,2021). 27 sugar mills across the country have ended their operations by 28th February 2022.

Brazil's sugarcane crush expected to reach 562 million tonnes in 2022-23 season.

Agribusiness consultancy Datagro stated on Friday that the center-south region of Brazil is likely to crush 562 million tonnes of sugarcane in 2022/23.

चालू सीजन में 75 लाख टन चीनी निर्यात होने की संभावना।

देश में पिछले तीन से चार सालों से गन्ना और चीनी का रिकॉर्ड उत्पादन हो रहा है, और दूसरी ओर चीनी निर्यात में भी भारत हर साल नया मुकाम हासिल कर रहा हैै। केंद्र सरकार द्वारा मिल रहे मदद के कारण चीनी उद्योग फलफूल रहा है। आपको बता दे कि, एक तरफ जहां चीनी उत्पादन के वैश्विक कमी की बात की जा रही है, वही दूसरी तरफ भारतीय चीनी की मांग में संभावित वृद्धि का अनुमान लगाया जा रहा है।

Russia-Ukraine War: कच्चे तेल की कीमतों में बढ़ोतरी एथेनॉल सम्मिश्रण को बढ़ावा दे सकती हैं

रूस संघर्ष के बाद आपूर्ति बाधित होने की चिंताओं और घरेलू ईंधन की कीमतों में भारी बढ़ोतरी के बीच ब्रेंट क्रूड की कीमत बुधवार को 113 डॉलर प्रति बैरल से अधिक हुई। कच्चे तेल की कीमतों में बढ़ोतरी से केंद्र सरकार के महत्वाकांक्षी एथेनॉल सम्मिश्रण कार्यक्रम (ईबीपी) को बढ़ावा मिल सकता है।

पाकिस्तान द्वारा चीनी के रणनीतिक भंडार करने पर सोच विचार।

कीमतों में उतार–चढ़ाव से बचने के लिए, सिंध और पंजाब की संघीय और प्रांतीय सरकारें फरवरी से जून 2022 तक चीनी मिलों से 0.50 मिलियन मीट्रिक टन चीनी खरीद सकती हैं। सरकार अंतरराष्ट्रीय बाजार से महंगी दरों पर चीनी के आयात से बचने के लिए चीनी के रणनीतिक भंडार का निर्माण करने के लिए पूरी तरह तैयार है।

Kolhapur region registers 11.66 per cent sugar recovery so far.

Kolhapur division is leading in the state in terms of recovery rate with the mills in the division producing 250.21 lakh quintal sugar by crushing 214.61 lakh tonne sugarcane with a recovery rate of 11.66 per cent. Kolhapur region has always remained ahead in the recovery rate as far as Maharashtra state is concerned.

Philippines: Food makers support government's move to import 200,000 MT of sugar.

Food manufacturers in the Philippines have urged the government to continue with its plan of importing 200,000 metric tons (MT) of refined sugar as there is a demand-supply gap. This may give chance to India as well to export sugar.

GOI mandates maintaining minimum distance norm for standalone distilleries producing cane based ethanol.

The DFPD in a notification directed standalone distilleries proposing to produce ethanol from sugarcane juice by crushing sugarcane in its premises is required to follow the provisions of Sugarcane (Control) Order, 1966 including maintaining a distance of 15 km from the neighboring existing sugar mills or the distance higher than 15 kms fixed by the concerned State Governments.

Largest ethanol production unit in Asia to come up in Maharashtra.

Swaraj Green Power & Fuel, a company operating in the sugar and ethanol production business, has initiated the plan to set up an ethanol production unit with a capacity of 1,100 KLPD at Phaltan (Satara) in Maharashtra, reports The Financial Express. It is envisaged as a mega and ambitious project.

How high can Indonesian sugar consumption go?

Indonesia's sugar consumption has grown by 40% across the last 10 years. The global average had been only 9% in this period. Many of the factors that have driven this growth could still do so, but how high can it go?

Govt. fixes 21.5 LMT monthly sugar quota for domestic sale in January 2022 with extension for unsold quota of Dec'21.

In a notification issued on 30th day of December 2021, the food ministry has allocated 21.5 LMT monthly sugar quota for January 2022 to 559 sugar mills which is 1.5 LMT higher than the quota allocated in January 2021.

Start making flex-fuel vehicles in six months, Nitin Gadkari advises manufacturers.

Union Minister for Road Transport and Highways Nitin Gadkari has said that to substitute import of petroleum as fuel and provide direct benefits to farmers, the automobile manufacturers in India have now been advised to start manufacturing Flex-Fuel Vehicles (FFV).

Pakistan Millers threaten to hike sugar prices if not acted against middlemen.

The sugar mills in Pakistan have threatened to increase sugar rates if the government fails to take action against the middlemen who are responsible for hiking sugarcane purchase prices.

Bangladesh to revive six closed sugar mills with foreign help.

The Bangladesh government is trying to revive its closed six sugar mills with the help of foreign assistance to increase domestic sugar output.

Season 2021-22: Ukraine produces 1.3 million tonnes sugar so far.

Sugar refineries in Ukraine have processed 9.12 million tonnes of sugar beet and produced 1.3 million tonnes of white sugar in the 2021-22 crushing season, said the national sugar union.

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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 producers 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 achieve consistent crush rates with trouble-free operation. This has become possible only by continuous efforts made by the employees associated with sugar industries and adapting the advanced technology by sugar industries. For better results of overall juice extraction, primary extraction must be higher. As a result of higher PE, 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 up to 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 the mill, better is the efficiency and higher the sugar extracted by the mill.

KEY WORLD

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

INTRODUCTION

The main objective of the three roller mills is to squeeze out the juice available in the prepared cane. The prepared cane when passed between the rotating top and feed rollers, juice squeezes out and is collected in juice trough. After the 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 the top and discharge rollers. The juice extraction in the first squeeze between the top and feed roller should be around 60-70% and in the second squeeze between the top and discharge roller should be around 30-40%. This pattern of three roller mills is to be designed for sucrose extraction up to 96-97% with minimum milling losses. The hydraulic load applied on the top roller is to be 100% utilized for juice extraction. The trash plate absorbs around 25% of the hydraulic load applied on the top roller and the remaining 75% of the hydraulic load is utilized between feed and discharge roller in the proportion of 25% and 50% for juice extraction. Juice extraction during milling with minimum power consumption plays 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 in better juice extraction.

MEASURES AFFECTING THE JUICE EXTRACTION:

The purpose of milling is to extract the maximum quantity of juice from prepared cane and minimize the milling losses. To achieve better milling results, the 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 rates. It is measured by the preparation index (P.I.). Preparation Index is the measure of the disintegrated cells of sugar cane. For better juice extraction PI should be maintained in the range 89-90.

2. **Consistency in crush rate:** It is a 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 the top roller. This leads to poor extraction of sucrose and results in a higher loss in the final bagasse.

4. **Mill Speed:** It is a very important parameter for better milling extraction. For consistent crushing the mill's speed should be maintained concerning the limits 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 the top roller.

5. **Hydraulic load:** It is an important parameter that maintains the load on the top roller against the upward force created by the bagasse passing through the mill. By maintaining desired hydraulic load as per the design and size of the 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 a practice to maintain the suitable size of massecheart grooves in the feed roller and lotus holes on the top roller. Both these types of grooves/holes are used to provide a suitable drainage area. It is observed in most of the factories that in the case of GRPF/TRPF, the juice is sometimes flooded over the pressure chute and enters between the top and feed rollers. It reloads the mill and increases the power demand. To avoid it, there should be a proper diversion of juice at the top face of the pressure chute.

7. **Donnelley Chute Level**: For better juice extraction, the level of Donnelley chute must be maintained in the range of 40-60%. To maintain a suitable level in D-chute, the speed of the previous carrier should be controlled by using the infrared level sensor.

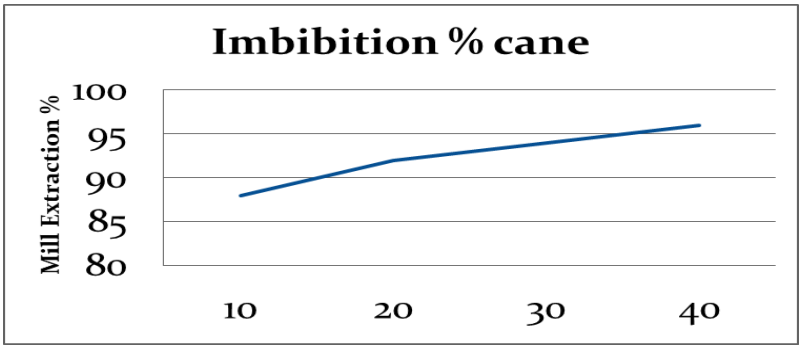
8. **Feed and Discharge juice extraction:** There should be periodic practice to measure for feed and discharge extraction. Feed extraction should be in the range of 60-70% and discharge extraction should be in the range of 30-40%. A proper record is to be maintained for each analysis because every mill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

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

10. **Specific fiber loading:** As the specific fiber loading increases**,** extraction decreases. For example, if the 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 up to the optimum level (refer fig-1). The optimum range of imbibition is 250-350% on fiber depending on available evaporator capacity. The mill extraction increases rapidly at first and slowly later on increasing the imbibition. Extraction may easily be controlled by controlling the imbibition of water. Change in imbibition% fiber by 1%, may change in extraction by 0.01 point.

Fig-1: Imbibition vs Mill Extraction



DATA COLLECTION AND ANALYTICAL STUDY

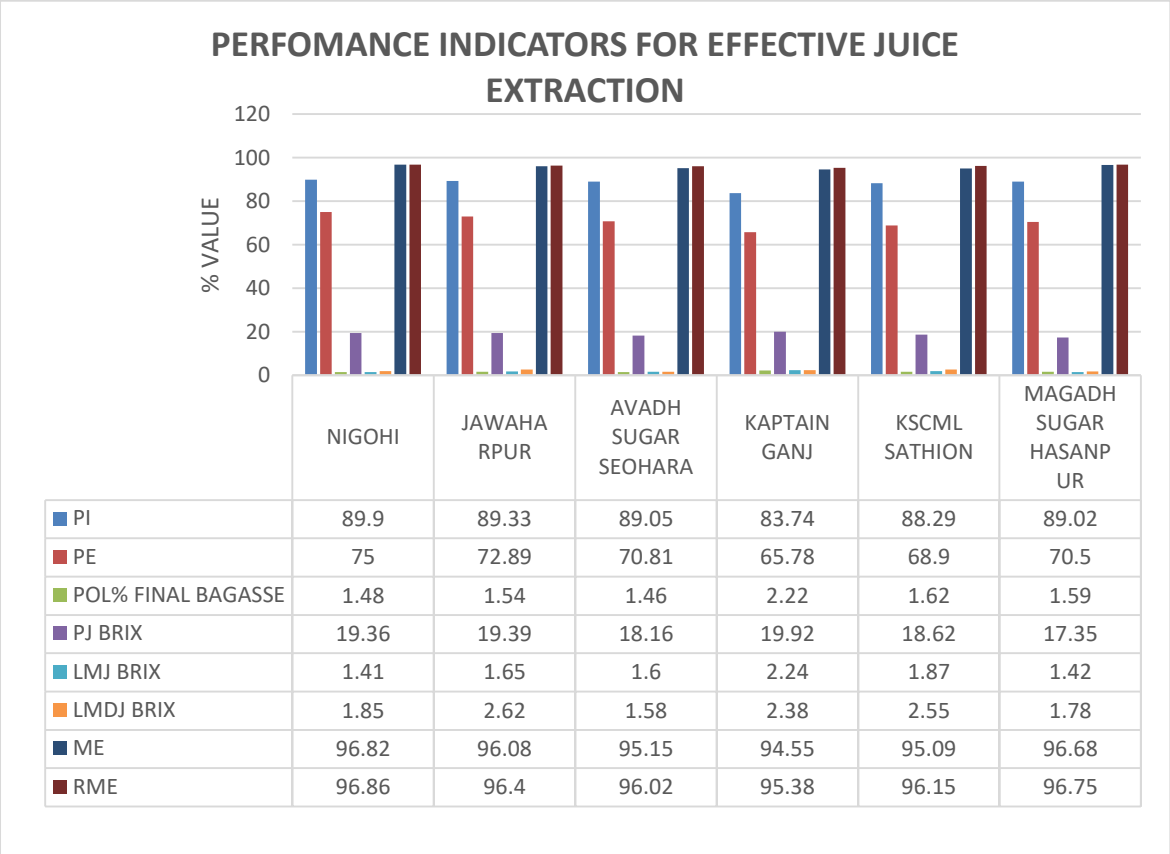
A comparative study between various milling efficiency parameters of the few sugar factories is being discussed here.

Table-1: Parameters effecting Milling

PARTICULAR	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

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

Fig-2 : Observed Performance Indicators



	NIGOHI	JAWAHARPUR	AVADH SUGAR SEOHARA	KAPTAIN GANJ	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

From table-1, the following interpretations have been drawn:

1. Higher primary extraction means lesser LMJ Brix and lowers the pol% bagasse of the 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 cases, the last mill juice Brix (LMJ) remains lower than the last mill discharge juice Brix.

COMPARATIVE STUDY BETWEEN POL% BAGASSE FOR FIRST & LAST MILL

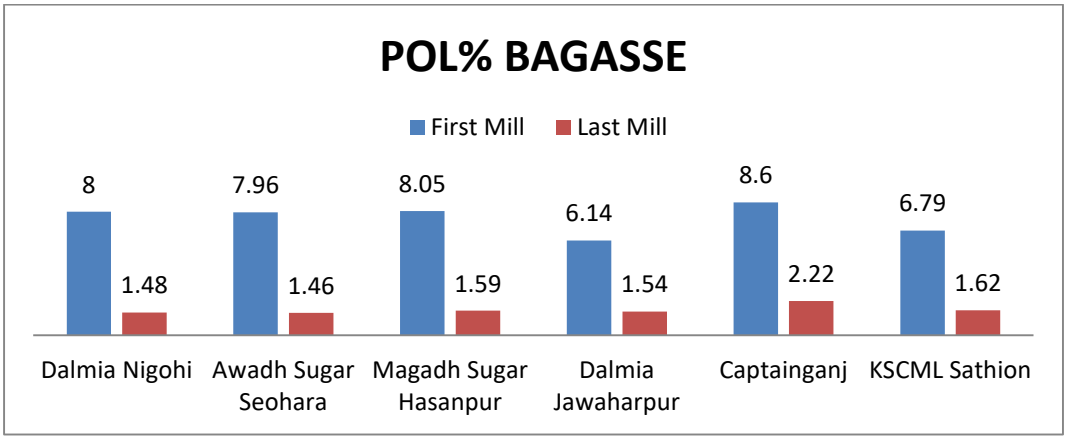
For a comparative study of juice extraction, the data of some factories have been collected to analyze the first & last mill pol % bagasse. The collected data are tabulated here and a graph is plotted for comparative study and interpretation. From fig-3, it is interpreted that if the pol% first mill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

in the case of Captainganj the first mill pol% bagasse is 8.6 comparatively higher than the other two as a result of this it is 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.

Table-2 : No. of mills vs Pol% bagasse

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

Fig-3 : Pol % bagasse as observed in various factories



CONCLUSION

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

ACKNOWLEDGEMENT

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ABSTRACTS

Bio-Circular Economy: an Opportunity for Diversification for Sugar Industries in Compressed Biogas (CBG) and Organic Fertilizer Production by Sanjay Patil & Kakasaheb Konde in Sugar Tech Journal-2022.

Press mud cake (PMC) is one of the world's most abundant sugarcane-based wastes, and in an Indian context, 8–10 million tonnes per annum is produced. The current use of PMC is restricted to use as filler material in bio-composting process or directly as fertilizer to improve soil fertility without any previous recovery of value-added products. However, considering its potential, only fertilizer use is not the best valorization route. Due to lack of transportation, press mud is unused and left in piles in most sugar mills, leading to blockage of drains and becoming a cause of water pollution. At the same time, increasing consumption of fossil fuels and environmental concern has led to increased use of compressed natural gas (CNG) in the transportation sector. Keeping in view limited resources of CNG, biogas is advised as potential fuel to provide continuous supply of CNG in the form of bio-CNG or Compressed Biogas (CBG). This paper aims to produce a strong outlook on the importance of CBG production through anaerobic digestion and its purification. Further, an out sketch of five models has been designed showing the possibility to produce maximum CBG using existing biogas plant (sugar mill complex) with addition of a new biogas plant. Production of value-added CBG and recycle of digestate on organic fertilizer are perfect case of bio-circular economy.

Indian Sugar Industry: Towards Self-reliance for Sustainability by S. Solomon & M. Swapna published in Sugar Tech Journal-2022.

The South-Asian region including India is a major hub of sugar producing countries with ample presence in the global sugar scenario. India has a rich history of sugarcane and sugar production since time immemorial, and the industry has gradually evolved to find a place among the top sugar producing countries of the world. The innovative technological interventions for sugarcane improvement, production and management have helped the industry to progress towards a diversified and bio-based productive, sustainable and profitable one, thereby gradually becoming self-reliant. This self-reliant industry with the right mix of linkages and collaborations, has been successful in tackling the various unforeseen challenges including those that cropped up during COVID-19 pandemic. The industry also fulfils its Corporate Social Responsibilities leading to the overall betterment of its stakeholders. This has enabled the Indian sugar industry to align itself with the 2030 Agenda for Sustainable Development Goals.

Assessment of microbial degradation in factory mixed juice and filtrate by C Shi & DW Rackeman published in International Sugar Journal in, 2022.

Undetermined sucrose loss is a serious problem in raw-sugar manufacturing. Laboratory deterioration experiments were conducted at ambient temperature using factory mixed juice (MJ) and filtrate (FIL). Well-known metabolic products, including mannitol, lactic acid, polysaccharides, oligosaccharides and organic acids, were

detected. Unexpectedly, methanol was found in both the untreated and deteriorated juices and is suspected to be caused by the action of microorganisms on the pectin present in sugarcane juice. The deterioration rate of filtrate was generally slower than that of mixed juice, but the formation of exocellular polysaccharides was significantly higher

Evaluating effectiveness of a biocide with dextran and mannitol analysis by M. Saska Zossi published in International Sugar Journal in 2022.

Five-hour laboratory incubation of cane juice at 32°C, complemented with dextran, mannitol, and pH analysis, was applied to test the efficacy of biocides in reducing or eliminating microbial deterioration of cane juice and hence sucrose loss. In the case of sodium hypochlorite (bleach), an inorganic oxidizing biocide frequently used in sugarcane mill tandems, the results showed no effect at 10 – 20 mg hypochlorite (150 g/L bleach) per liter juice, which is commonly used in mills. At concentrations above 200 mg/L, the microbial activity was reduced or completely suppressed.

Weed control in sugar beet with autonomous hoeing and precision spot spraying by Peter, Johnannes Risser Steinfort published in International Sugar Journal in 2022.

Herbicide usage reduction is called for in the EU's Green Deal and Farm-to-Fork strategy. New developments in autonomous weed control have led to the first robots for practical use in organic farming, such as the sowing and weeding robot FarmDroid FD 20. They can significantly reduce manual weeding by hoeing not just between the rows, but also within the rows. However, hoeing is not an option where weeds are within a short distance of a crop plant to avoid possible damage to it.

Control of fructans, dextran, and mannitol at the sugarcane factory with commercial biocides by S. Imbachi- Ordonez, G.eggleston & P. Gaston published in International Sugar Journal in,2022.

Biofilms (microbiological fouling) represent a technical problem in sugarcane factories, mainly in stagnant areas where biofilms are preferentially formed. In this factory study, current commercial biocides used in Louisiana (LA) factories were evaluated for their control of slimy biofilms. A new system was developed using rough iron coupons placed in the inner sidewall a rotary vacuum filter (RVF) to evaluate the effect of commercial biocides on biofilm formation. Bleach (sodium hypochlorite) and sodium permanganate, both oxidizing biocides, and sodium carbamate, a nonoxidizing biocide, were sprayed (3.8 L) on coupons every 2 days for 5 days. Since the biocide doses to control fructans at the factory were unknown, each biocide and water (at ~25 °C) control was shot-fed at 12.5% v/v. Dextran and fructan exopolysaccharides were both major biofilm components, although the dextran concentration was always higher than for fructan. Water promoted the biofilm formation, protein, dextran, fructan, and especially mannitol. Bleach significantly ($p<0.05$) decreased the biofilm mass formation (53.8%), protein (83.3%), mannitol (45.5%), and dextran (13.1%) production on the coupons in the mud filter, but its action on fructan was less clear. Carbamate and, to a lesser extent, permanganate also reduced the production of biofilm mass, protein, dextran,

fructan, and mannitol, but without any significant differences.

Corrosion under insulation – prevention, control and detection by D. Franke published in International Sugar Journal in February, 2022.

Corrosion under insulation (CUI) is a real threat to the reliability of many plants, including sugar mills. CUI can cause failures in areas that are not normally of primary concern to an inspection program. The failures are often the result of localised corrosion and not general wasting over a large area, making it very difficult to develop a cost-effective inspection program. CUI failures can be catastrophic or at least have an adverse safety and economic effect on the plant due to lengthy downtime and repairs following an unexpected failure. Whether the insulation material is hydrophilic or hydrophobic influences the likelihood of CUI, and other key effects such as insulation system design and insulation material in-service breakdown products.

A desktop comparison between hydrophilic Rockwool and hydrophobic Pyrogel insulation material was made to codes such as BS 5422 Method for specifying thermal insulating materials for pipes, tanks, vessels, ductwork and equipment operating within the temperature range -40°C to +700°C; and 2BS5970 Thermal insulation of pipework, ductwork, associated equipment and other industrial installations in the temperature range of -100°C to +870°C. CUI is difficult to detect because it is hidden by the insulation masking the corrosion until it is too late.

The effect of scaling on heat transfer in a first-effect falling-film evaporator by OP Thaval, SS Mallikarjun & A. Lehnberger published in International Sugar Journal in January, 2022.

In recent times, falling-film type evaporators have gained attention in the cane sugar industry owing to their ability to operate at lower temperature differences, a good heat-transfer coefficient at high brix, and low juice residence time in the evaporator. The falling-film type (tubular) evaporator station at the ICPL sugar mill has been in operation since 2011. The station was reconfigured in 2013 with additional heating surface area to increase the juice processing capacity and further reduce the exhaust steam consumption. After seven years in operation, a second evaluation of the evaporator performance was undertaken.

Reuse of Uncontrolled Burnt Bagasse Ash from Sugar Industries with Waste Rubber Powder in Construction: A Waste to Wealth Approach for Sugar Mills by K. S. Teja, R. Senthilkumar & G. Athira published in Sugar Tech Journal, April-2022.

Sugar industries generate large quantities of sugarcane bagasse ash as a by-product, which is subsequently landfilled despite its potential to be used as a supplementary cementitious material in concrete, similar to the currently used rice husk ash. Even though the pozzolanic nature of bagasse ash is known, the performance of bagasse ash along with other industrial by-products such as tire rubber powder in construction products has not yet been investigated. Hence, the combined use of uncontrolled burnt sugarcane bagasse ash as a supplementary cementitious material and rubber tire powder as fine aggregate for the development of cement concrete and alkali-activated concrete

with minimum characteristic compressive strength 35 MPa is investigated in the present study. It was observed that a maximum of 10% unprocessed bagasse ash along with 10% rubber powder could be used in concrete paver blocks. Besides, 30% unprocessed bagasse ash by weight of the binder can be used along with 10% rubber powder in the case of alkali-activated concrete. Together, up to 40% of the ingredients in alkali-activated concrete were effectively replaced with bagasse ash and rubber powder. The influence of different parameters on the performance of alkali-activated binders was also investigated and the optimum performance was witnessed for specimens activated with 8 M sodium-based activators and cured at ambient conditions.

Therefore, bagasse ash and waste rubber tire powder can be used as value-added products in construction instead of their disposal as waste.

Use of waste waters in Agriculture by YashaPal Singh in AIDA News Letter March 2022.

Water security has emerged as a vital issue for India and the World. Climate change projections forecast and imbalance in water availability and a consequent adverse impact on Agriculture productivity. Sugar Cane water intensive crop is expected to suffer a yield reduction of 30% in India because of water related issues. It is in this context that waste water emerged as potential source for meeting the water demand after essential treatment. Many industrial effulent content variable amounts of plant nutrients. It gainfuly utilized in agriculture, they have capacity to replace the use of synthesis fertilizers which are a major environmental concern. Effulent irrigation offer a low cost altertinative where both the fertilizing and irrigation aspects of the waste can be utilized and the receptors (Land, Air, Water etc.) and communities protected against pollution. Nitrogen, Phosphorus and Potessium are valuable nutrients. Waste water irrigated field generate a great employment opportunities also.

Impact on Groundwater

In the absence of sufficient surface leaching the use of undiluted spent wash may result in increased salinity of soil and ground water. Some authors believed that there is no consequent Nitrate pollution in ground water even after sustained use of spend wash over year. Nevertheless, utilization of spend wash for irrigation needs to be persuade with caution because of the possibilities of leaching. Ground water need to be constantly monitored as also suggested by the CPCB protocol.

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