SHARKARA

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NATIONAL SUGAR INSTITUTE

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VOLUME - 55, No .04

JANUARY – MARCH 2024

It contains……

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From Director's Desk...

It gives me immense pleasure to hand over to you this issue of the first quarter of the year, January 2024 to March 2024. In the last decades the Institute has set new heights. The services provided by the Institute have not only increased the credibility of the sugar and allied industries but the Institute has also continuously improved the quality of its services. This success is not due to the continuous cooperation of any one person but of every officer and employee working in the Institute.

In the last month of the quarter, I had targeted a 4-point working scale. The first point was to convert all the PG Diploma courses to Masters Degree Course, which is in the process of seeking approval. The second point was to set up a Centre of Excellence for Biofuels which was a necessity to make India's target of E20 blending program a success by 2025-26. MoU is being signed between NSI Kanpur and IIT Kanpur to set up a Centre of Excellence for Biofuel in coordination. The Centre will work on projects based on non-food feed stock for biofuel production. The third point was to build up the faculty strength of the Institute to its full strength for which merger of some posts in different similar type of divisions was a necessity. It is already done in two divisions and for others it is being done in full speed. The last point but not the least was construction of two hostels and a cafeteria for the students as two of our hostels are on the verge of retirement and so needed replacement and there is an increase of student strength due to addition of several courses in the academic schedule of the Institute. Land development work for the hostels has started and topological drawings are with us for finalizing the final drawings.

In the context of enhancement of production of biofuel in the country, we need biofuel production from non-food feedstock and two seminars have been proposed to be conducted in the next month on biofuels.

The work of the Institute on pollution control measures in sugar and ethanol industry is tremendous and same amount of effort was given for training manpower involved in pollution control. A 3-days training program for the officers of state and central pollution boards conducted in March 2024 is an example.

(D Swain)
Director

IMPORTANT HAPPENING AT NSI, KANPUR DURING THE QUARTER (JAN-MAR 2024):

❖ 51st CONVOCATION ORGANIZED:

51st Convocation of National Sugar Institute, Kanpur was graced by Sadhvi Niranjan Jyoti, Honourable Minister of State, Ministry of Consumer Affairs, Food & Public Distribution and Rural Development and Joint Secretary (Sugar), Government of India on 12th January 2024. During the convocation 745 Fellowship, Post Graduate Diploma and Certificates were conferred. Balrampur Chini Mills Ltd. and Dalmia Bharat Sugar Industries announced **"Padamshri Meenakshi Saraogi Gold Medal & Cash Award"** and **"DCM Bharat Sugar Gold Medal"** respectively.

❖ CUSTOMIZED TRAINING PROGRAMME:

1. National Sugar Institute, Kanpur organized a customized training programme from 23rd January 2024 on **"Quality control & Good Laboratory Practices"** for technical person for Uttar Pradesh Co-operative Sugar Factories. During the training programme, faculty of the institute took the theory as well as practical classes.

2. National Sugar Institute, Kanpur organized a customized training programme 19th February 2024 on **"Quality control & Good Laboratory Practices"** for technical person for Uttar Pradesh Co-operative Sugar Factories (II- batch). During the training programme, faculty of the institute took the theory as well as practical classes.

3. National Sugar Institute, Kanpur organized three day training programme for the officials of Central Pollution Control Board (CPCB) and State Pollution Control Board (SPCB) on **"Best Practicable & Available Technologies for Sugar Factories and Distilleries in Control of Pollution & Mitigation Technologies"** at the institute conducted during 12th to 14th March 2024.

❖ NEW COURSE ON SUGAR REFINERY OPERATION:

National Sugar Institute, Kanpur got the permission to start the new short term course on **"Refinery Operation"** from Department of Food & Public Distribution, Ministry of Consumer Affairs, Food & Public Distribution. Admission procedure has been stared from 20th February 2024.

❖ DELEGATION FROM FIJI:

An 18 member delegations of progressive sugarcane farmers from Fiji visited National Sugar Institute, Kanpur on 27th February 2024, to seek knowledge about best available technologies for improving sugarcane productivity with minimum inputs. Then director NSI, Prof. Narendra Mohan while welcoming the delegates, presented the activities of the institute and briefed the delegates from Fiji about recent developments in Indian Sugar Industry for making it financially sustainable.

❖ VISIT OF BIHAR STATE FARMERS:

National Sugar Institute, Kanpur organized five days exposure visit cum training programme from 11th to 15th March 2024 for sugarcane farmers from East Champaran, West Champaran and Gopalganj districts of Bihar at institute.

❖ AWARD OF FELLOWSHIP (FNSI):

1. Fellowship of National Sugar Institute in Sugar Technology awarded to Mr. Mohit Kumar, Senior Technical Assistant (Sugar Technology), National Sugar Institute, Kanpur for developing Alternate Clarifying Agents for Cane Juice Clarification under the guidance of Director NSI, Kanpur.

2. Fellowship of National Sugar Institute in Sugar Technology awarded to Mr. Rajesh Singh, Dy. General Manager (Innovation & Dev.), Triveni Engineering & Industries Ltd., Khatauli, Muzaffarnagar, U.P. for developing **"Super Sugar"** containing Spirulina & Basal.

3. Fellowship of National Sugar Institute in Sugar Technology awarded to Mr. Amresh Pratap Singh, Senior Technical Assistant of Sugar Technology, National Sugar Institute, Kanpur for developing the technology of **"Mechanical Clarification of Cane Juice & Process Intermediate Products for Superior Quality of Sugar"** under the guidance of Director NSI, Kanpur.

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RESEARCH ACTIVITES:

1. **Studies on Sweet Sorghum Bagasse value addition:** The crude 5-Chloromethyl furfural (CMF) derived from fractionated sweet sorghum bagasse cellulose, was synthesized in the presence of chlorobenzene and hydrochloric acid at temperatures of 100 & 120 degree Celsius with vigorous stirring for two hours. Laevulinic acid and formic acid were also extracted from the aqueous layer during process.

2. **Comparative study of Five varieties of sweet sorghum for production of ethanol yield:** The trail for five varieties of sweet sorghum were harvested and assessed for ethanol potential in Biochemistry division. Report compilation completed.

3. **Cane juice syrup study for shelf-life and production of alcohol:** Syrup samples were collected and kept at room temperature in Biochemistry division from M/s Yamuna Nagar Saraswati Sugar Mills, Yamuna Nagar, Haryana & M/s Wave Sugar Mills, Dhanaura, U.P., A unit Detoriation in TRS seen in three month from the date of collection. The sample collected from M/s Balrampur Chini Mills, Maizapur, Gonda showed no detoriation in TRS two month.

4. **Comparative study on polarization by using lead, non-lead, clarificants and NIR polarimetry:** Data compilation work has been completed and research paper on related topic is being prepared.

5. **Production of low G.I. liquid sugar/ low G.I. sugar vitamin 'A' fortified liquid sugar:** Batches of low GI liquid sugar with dosing of Stevia and monk fruit extract were prepared in the month of (May-Feb) and (Oct-Feb) respectively. For the Stevia dosed low GI sugar observations such as solid content, colour, GI value etc. are tabulated in Table-1 below.

Table-1

Parameter	Low GI liquid sugar (Stevia – 10 months)	Low GI liquid sugar (Monk – 3 months)
Solids%	70.55	81.70
Color (IU)	410.56	449.99
GI value	54.98	66.33

No specific changes are observed up to 10 months of storage. However, the monk fruit extract dosed low GI sugar batch did not yield us good results as the GI value did not come within the expected range, the results in respect of colour value, GI value, solid content are tabulated in the table.

Therefore, to conclude the study it may be said that the produced sugar falls under low GI category with GI value to be around 54 -55. This sugar is also fortified with vitamin A and has assured shelf life for up to 9 months.

6. **Shelf life study of press mud over the period of time:** Ten press mud Samples from sugar factories situated in UP, Bihar, Haryana and Chhattisgarh were collected and stored keeping the

environment same as at the factory front. 10 Raw + 10 Treated sample of press mud of each factory as being analyzed for following parameters such as pH, Total Solids (moisture content), Ash content, Total volatile solids (TVS), Lignin and Total Convertible Volatile Solids (TCVS) on monthly basis. During twelvemonths of analysis as observed degradation (Fungal Growth) is occurring in both raw as well as treated press mud samples.

- The pH of the raw press mud was observed to be in the range of 6.84 – 7.42 while that for PM stab (treated sample) was observed to be in the range of 4.68 – 6.69.
- The Total Solids for the raw press mud and treated press mud were in the range of 87.6 – 91.12% and 22.31 – 29.31% respectively.
- The ash content of the stored raw and treated press mud samples were in the range of 29.39 – 35.21 % and 6.23 – 11.13% respectively.

Therefore, to conclude, it may be said that the PM Stab samples of press mud showed comparatively fair results as compared to the blanks samples kept in parallel study. The PM Stab samples may have good stability for up to 12 months as confirmed with the results furnished by the reports of the study to be further used for production of bio-gas.

MoU SIGNED:

National Sugar Institute, Kanpur (NSI) signed MoU with Fiji Sugar Corporation Limited, Balawa, Lautoka, Fiji for **"Cooperation in the fields of Sugarcane Processing and Manpower Development"** on 19th March 2024.

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RESEARCH PAPERS/ PRESENTATIOMS:

1. A research paper entitled **"Mitigating Issues with Sugar Consumption"** by Narendra Mohan & Anushka Akash Kanodia was sent for publication in 8th IAPSIT International Sugar Conference ISC-2024 & Sugarcon 2024.

2. A research paper entitled **"Sugarcane Industry: A possible Bio-Energy Hub"** by Narendra Mohan was sent for publication in 8th IAPSIT International Sugar Conference ISC-2024 & Sugarcon 2024.

3. A research paper entitled **"Low Glycemic Index (GI) Natural Sugar Fortified with Vitamin A"** by Narendra Mohan, Anushka Akash Kanodia, Shruti Shukla & Svechcha Singh was sent for publication in the conference **"Amifost"** organized by Amity University, Noida on 24th March 2024.

4. A research paper entitled **"Mechanical Clarification of Cane Juice and Process Intermediate Products for Superior Quality of Sugar"** by Amresh Pratap Singh & Narendra Mohan was published in Indian Sugar Journal, Vol. No. LXXIV, No. Ten, January 2024.

5. Sh. Anoop Kumar Kanaujia, Assistant Professor (Sugar Engineering) presented article on **"Latest Development in Indian Sugar Industries for Energy Efficiency/Conservation"** in one day workshop on "Best Practices in Energy Efficiency in Sugar Sector- A Path for Decarbonisation" on 21st March 2024 organized under the ASPIRE Programme of the Foreign, Commonwealth & Development Office (FCDO) of the UK Government, in collaboration with the Bureau of Energy Efficiency (BEE) at Lucknow, Uttar Pradesh.

6. A paper titled **"A Novel Multilevel Inverter fed Open-End Winding Coupled-Induction Motor Drive For Sugar Industry"** by Vinay Kumar and Sanjiv Kumar was published in the Journal IEEE Transactions on Energy Conservation, Volume 38, Issue 4, pp. 2706-2716.

7. A paper titled **"Synthesis, Properties and Modification Role of TiO2 Nanoparticles during Bio-based Lubricant Development Process"** by Sanjay Chauhan, Nishant Kumar Singh & Vinay Pratap Singh was presented in International Conference **CHEM TECH NOVA 2024** organized at Harcourt Butler Technical University (HBTU) Kanpur and published in Bharti Publications, New Delhi.

SALE OF SUGAR STANDARDS:

Sale of sugar standard grades commenced from 1st October 2023 for the sugar season 2023-24. Standard grades can be procured online also. Institute has been sale out 793 samples to the 156 sugar factories up to March 2024. 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 SERVICES:

Request for availing consultancy services of the institute were received and also provided to various sugar factories ethanol & other allied units 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 and to conduct technical audit etc.

Sr. No.	Factory Name
1	M/s Uttam Sugar Mills Ltd., Unit – Libberheri, Haridwar, U.K.
2	M/s The Seksaria Biswan Sugar Factory Ltd., Biswan, Sitapur, U.P.
3	M/s Balrampur Chini Mills Ltd., Unit – Maizapur, Gonda, U.P.
4	M/s Balrampur Chini Mills Ltd., Unit – Babhnan, Gonda, U.P.
5	M/s Balrampur Chini Mills Ltd., Unit – Balrampur, Balrampur, U.P.
6	M/s Shri Bajrang Chemical Distillery LLP, Raipur, Chhatisgarh
7	M/s Dwarikesh Sugar Industries Ltd., Unit – Dwarikesh Nagar, Bijnor, U.P.
8	M/s Magadh Sugar & Energy Ltd., Unit – Hasanpur Sugar, Samastipur, Bihar
9	M/s Dhampur Sugar Mills Ltd., Unit – Dhampur, Bijnor, U.P.
10	M/s Wave Industries Pvt. Ltd., Unit – Bijnor, U.P.
11	M/s Wave Industries Pvt. Ltd., Unit – Saharanpur, Saharanpur, U.P.
12	M/s Triveni Engineering & Industries Ltd., Unit – Sabitgarh, Bulandshahar, U.P.
13	M/s The Panipat Co-operative Sugar Mills Ltd., Rohtak, Panipat, H.R.
14	M/s Pangnism Innovations Pvt. Ltd., Sangli, Maharashtra
15	M/s Bajaj Hindusthan Sugar Ltd., Unit-Khambharkhera, Lakhimpur Kheri, U.P.

16	M/s Yadu Sugar ltd., Distt- Badaun, U.P.
17	M/s Bajaj Hindusthan Sugar Ltd., Unit-Rudhauli, Distt- Basti, U.P.
18	M/s U.P. Cooperative Sugar Factories Federation Ltd., Nanauta, Saharanpur, U.P.
19	M/s Baghauli Sugar & Distillery Ltd., Distt- Hardoi, U.P.
20	M/s Nanglamal Sugar Complex, Nanglamal, Distt- Meerut, U.P.
21	M/s Simbhaoli Sugar Ltd., Unit-Brijnathpur, Distt- Hapur, U.P.
22	M/s Simbhaoli Sugar Ltd., Unit-Chilwaria, Distt- Bahraich, U.P.
23	M/s DCM Shriram Ltd., Unit-Rupapur, Distt- Hardoi, U.P.
24	M/s Superior Food Grains Pvt. Ltd., Distt- Chandigarh, Haryana
25	M/s PBS Foods (Sugar) Pvt. Ltd., Distt- Bijnor, U.P.
26	M/s Avadh Sugar & Energy Ltd., Unit- Seohara, Distt- Bijnor U.P.
27	M/s Balrampur Chini Mills Ltd., Unit- Gularia, Distt- Lakhimpur Kheri, U.P.
28	M/s Bindals Papers Mills Ltd., Distt- Bijnor, U.P.
29	M/s The Kisan Sahkari Chini Mills Ltd., Nadehi, Udham Singh Nagar, U.K.
30	M/s Majhaulia Sugar Industries Distt- West Champaran, Bihar
31	M/s Dalmia Bharat Sugar & Industries Ltd., Unit – Jawaharpur, Sitapur, U.P.
32	M/s Majhaulia Sugar Industries (A unit of Jay Shree Tea & Industries Ltd.), Bihar
33	M/s The Bagpat Co-operative Sugar Mills Ltd., Bagpat, Meerut, U.P.
34	M/s Parle Biscuits Pvt. Ltd., Parsendi, Bahraich, U.P.
35	M/s Anheuser Bush In Bev India Ltd., Meerut, U.P.
36	M/s Renuka Sugars Ltd., Mumbai, Maharashtra

ANALYTICAL SERVICES:

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

Sr. No.	Factory Name
1	M/s Bindals Papers Mills Ltd., Bijnor, U.P.
2	M/s Dhampur Bio-organic Ltd., Dhampur, Bijnor, U.P.
3	M/s Sarjoo Sahkari Chini Mills Ltd., Belrayan, Lakhimpur Kheri, U.P.
4	M/s Dhampur Bio-organic Ltd., Unit – Meerganj, Bareilly, U.P.
5	M/s Dhampur Bio-organic Ltd., Unit – Asmoli, Sambhal, U.P.
6	M/s Dhampur Bio-organic Ltd., Unit – Mansurpur, Muzaffarnagar, U.P.
7	M/s Triveni Engineering & Ind. Ltd., Unit – Khatauli, Muzaffarnagar, U.P.

8	M/s Triveni Engineering & Industries Ltd., Unit – Chandanpur, Amroha, U.P.
9	M/s PBS Food Pvt. Ltd., Chandpur, Bijnor, U.P.
10	M/s Wave Industries Pvt. Ltd., Unit – Panni Nagar, Bulandshahar, U.P.
11	M/s Magadh Sugar & Energy Ltd., Unit – Hasanpur Sugar, Samastipur, Bihar
12	M/s Triveni Engineering & Ind. Ltd., Unit – Milak Narayanpur, Rampur, U.P.
13	M/s Sahkari Chini Mills Ltd., Nanauta, Sharanpur, U.P.
14	M/s Avadh Sugar & Energy Ltd., Unit – Seohara, Bijnor, U.P.
15	M/s Magadh Sugar Energy Ltd., Unit – Sidhwalia, Gopalganj, Bihar
16	M/s Wave Industries Pvt. Ltd., Unit-Dhanaura Mandi, U.P.
17	M/s Triveni Engineering & Ind. Ltd., Unit-Sabitgarh, Distt- Bulandshahar, U.P.
18	M/s Balrampur Chini Mills Ltd., Unit-Balrampur, U.P.
19	M/s Bisalpur Kisan Sahkari Chini Mills Ltd., Pilibhit, U.P.
20	M/s The Kisan Sahkari Chini Mills Ltd., Sathiaon, Azamgarh, U.P.
21	M/s The Kisan Sahkari Chini Mills Ltd., Distillery Unit Ghosi, Mau, U.P.
22	M/s Wave Industries Pvt Ltd. Unit-Saharanpur, U.P.
23	M/s Zuari Ind. Ltd., Unit – Gobind Sugar Mills, Aira, Lakhimpur Kheri, U.P.
24	M/s Ayushi Trading Company, Kanpur Dehat, U.P.
25	M/s Balrampur Chini Mills Ltd., Unit-Tulsipur, Balrampur, U.P.
26	M/s Triveni Engineering & Industries Ltd., Unit-Ramkola, U.P.

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OTHER HAPPENINGS/ DEVELOPMENTS:

1. National Sugar Institute, Kanpur celebrated New Year function at the institute on 8th January 2024, under the auspices of Old Boys' Association of the institute. Prizes distributed to the winners of games, played during the programme.

2. राष्ट्रीय शर्करा संस्थान, कानपुर में विश्व हिंदी दिवस पर एक कार्यशाला का आयोजन **"हिंदी भाषा और तकनीकी शिक्षा"** विषय पर दिनांक 10 जनवरी 2024 को किया गया जिसका मुख्य बिंदु कृत्रिम बुद्धिमत्ता (आर्टिफीसियल इंटेलिजेंस) के भविष्य मे बढ़ते प्रभाव पर केंद्रित था।

3. On the occasion of Makar Sankranti and Pongal, National Sugar Institute, Kanpur demonstrated technologies developed by institute for producing Low GI, Low Calorie, Liquid, Liquid Invert, Fortified, Flavored, other specialty sugars and spreads from sugarcane and sweet sorghum juice. Such demonstration was also made for producing fortified jaggery in different forms and jaggery based products viz. chocolate, cake, cookies and popcorns etc.

4. National Sugar Institute, Kanpur takes up pilot plant trials for preliminary concentration of sugarcane juice up to 22-24 deg. brix by **"Reverse Osmosis"** technique during the month of January 2024, at M/s Dalmia Bharat Sugar Industries, Nigohi, Shajhahanpur, Uttar Pradesh.

5. **"Shriram Madhuryam",** a low calorie, low glycemic index and Vitamin A fortified, liquid sugar developed by the institute produced with minimum use of chemicals was showcased during the month. It may prove to be a much wanted sugar in future.

6. On the occasion of consecration ceremony in the newly built temple of Ramlala at Ayodhya, a program was held on 22th January 2024, in the renovated temple **"Dev Dham"** of National Sugar Institute in which officers, employees and students of the institute participated enthusiastically. On this occasion, Ram Darbar was also established in the temple located in the colony of the institute amidst Vedic chanting.

7. **"Boiler Pooja"** was organized at Experimental Sugar Factory (ESF) of the institute on 23rd January 2024. Students will have the opportunity to get hands on training in 100 TCD sugar plant having facility for producing plantation white, raw and refined sugars.

8. The Institute celebrated "**75th Republic Day"** on 26th January, 2024. 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 Pakhwadas".**

9. **"Animal Care Unit"** and an **"Animal Welfare Group"** have been established on 30th January 2024, by National Sugar Institute, Kanpur for preventing cruelty to animals and to take care of destitute and helpless one's.

10. Prof. Narendra Mohan, Director, National Sugar Institute, Kanpur conferred **"Excellence Award"** during the Sugar & Ethanol International Award 2024 held on 01-02 February 2024 at New Delhi.

The award has been given in recognition of remarkable achievements and exceptional contribution to sugar & allied industry through development of innovative processes and products.

11. Director, National Sugar Institute, Kanpur addressed the delegates from the sugar industry on the concept **"Bio-refinery-Future of Indian Sugar Industry"** at Bhartiya Sugars, Kolhapur on 10th February 2024.

12. Tree plantation, Awareness programme conducted in primary school as well as distribution of personnel hygiene material, Cleanliness drive at local railway station, Creating awareness about plastic pollution as well as distribution of cloth bags in local market and Swachhata Oath administered to staff & students have been taken up during the **"Swachhata Pakhwada"** during the month of February 2024.

13. An English to Hindi dictionary **"Prayogik Shabdawali"** comprising technical words and terms generally used in sugar, ethanol and allied industry prepared by NSI, Kanpur released on 23rd February 2024.

14. Prof. D. Swain assumed charge as Director, National Sugar Institute, Kanpur on 1st March 2024. Prof. Swain takes over after the superannuation of Prof. Narendra Mohan.

15. International Women's Day celebrated at National Sugar Institute, Kanpur on 8th March, 2024 in which all the women Officers/staff of the institute included girl students participated in the programme.

16. राष्ट्रीय शर्करा संस्थान में दिनांक 18 मार्च 2024 को हिंदी कार्यशाला का आयोजन किया गया। कार्यक्रम के दौरान हिंदी भाषा का अधिक से अधिक प्रयोग करने की सीख दी गई। कार्यशाला में संस्थान में कार्यरत 40 से अधिक तकनीकी अधिकारियों ने भाग लिया।

17. Dr. Ashok Kumar, Assistant Professor (Agriculture Chemistry) and Dr. Lokesh Babar, Junior Scientific Officer (Agriculture Chemistry) attended one day National Seminar on topic "Mechanization of Sugarcane farming: Operational, Environment and Policy Constraints" on 7th March 2024 at Indian Institute of Sugarcane Research, Lucknow, Uttar Pradesh.

18. Director, National Sugar Institute, Kanpur discussed with M/s Advanta Seeds to bring sweet sorghum into the mainstream of ethanol production from nonfood source during the meeting at institute on 29th March 2024.

19. Educational tour for the students of Post Graduate Diploma Course of Associateship of National Sugar Institute in Sugar Technology (ANSI-ST) - 1st Year, was organized to learn the different process technologies at various factories during the month.

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HAPPENING IN THE SUGAR INDUSTRY:

SMA seeks Government support for innovations and sustainability initiatives in sugarcane production-

The sugar industry is facing challenges due to drop in sugarcane production caused by uneven monsoon rains due to El-Nino conditions, prompting the need for stabilising measures in vulnerable regions like Maharashtra, Karnataka, Telangana, and Tamil Nadu. Strategies such as drip irrigation, water resource augmentation, and mechanised harvesting are vital. Sugarcane, efficient but vulnerable to climate shifts, has experienced cyclic production due to extreme weather.

Ernakulam Krishi Vigyan Kendra sets up jaggery production unit in Alangad-

Kochi: Ernakulam Krishi Vigyan Kendra (KVK) has taken a step towards revitalizing the age-old tradition of sugarcane farming in the Periyar river basin by establishing a jaggery production unit in Alangad, reported The Hindu.

चीन में एथेनॉल उत्पादन के लिए मक्के या गन्ना की जगह कोयले पर फोकस-

बीजिंगचीन में सरकारी मीडिया ने बताया कि :, मक्के या गन्ना जैसी फसलों का उपयोग करने के बजाय कोयले के उपयोग के माध्यम से एथेनॉल के उत्पादन का परीक्षण शुरू कर दिया है। 600,000 मीट्रिक टन की वार्षिक उत्पादन क्षमता वाला दक्षिण पूर्वी चीन में स्थापित प्लांट दुनिया का सबसे बड़ा एथेनॉल प्लांट है। चीनी अधिकारियों ने कहा कि, एथेनॉल बनाने के लिए महत्वपूर्ण खाद्य स्रोतों के बजाय देश के प्रचुर कोयला संसाधनों का उपयोग करना और साथ ही ईंधन आयात कम करना हमारा लक्ष्य है।

2024-25 सीजन में ब्राजील का चीनी उत्पादन रिकॉर्ड 43.1 मिलियन टन तक पहुँचने का अनुमान : Datagro-

पुणे चीनी और एथेनॉल कंसल्टेंसी :Datagro ने कहा कि, गन्ने की फसल की कम आपूर्ति के बावजूद ब्राजील के शीर्ष उत्पादक क्षेत्र से चीनी उत्पादन 2024-25 सीजन में रिकॉर्ड 43.1 मिलियन मीट्रिक टन तक बढ़ सकता है। वसंतदादा शुगर इंस्टिट्यूट द्वारा आयोजित तीसरे अंतरराष्ट्रीय चीनी सम्मेलन में बोलते हुए डेटाग्रो के (वीएसआई) निदेशक गुइलहर्मे नास्तारी ने बताया कि, ब्राजील के मुख्य केंद्रदक्षिण क्षेत्र से चीनी उत्पादन बढ़ने की संभावना- है, क्योंकि मिलों ने चीनी उत्पादन को प्राथमिकता देने की योजना बनाई है।

Reliance Industries plans to set up more than 50 CBG plants in next two years-

Reliance Industries Limited (RIL) is accelerating its foray into the green energy sector with plans to establish over 50 compressed biogas (CBG) plants in the next two years, according to media report. This ambitious project, estimated to cost upwards of ₹5,000 crore, follows chairman Mukesh Ambani's announcement at the company's annual general meeting last year to set up 100 CBG plants within five years, reported The Economic Times.

फिजी: नई चीनी मिल स्थापित करने की योजना :-

सुवा : फिजी के चीनी उद्योग मंत्री चरण जेठ सिंह ने कहा कि, सरकार रकीराकी में एक नई चीनी मिल स्थापित करने के लिए प्रतिबद्ध है। पिछले शुक्रवार को एक संवाददाता सम्मेलन के दौरान सिंह ने कहा था कि वे परियोजना के संबंध में व्यवहार्यता अध्ययन करने के लिए एक थाई कंपनी को नियुक्त करेंगे।

Real time sugar output projection: Online registration of sugarcane farmers in Maharashtra, Karnataka from next season-

In the ongoing season, India has experienced inaccurate forecasts as the country has reported higher than expected sugar production. Due to projections of lower sugar production, the government has limited sugar diversion for ethanol production and restricted sugar exports. Consequently, there is a pressing need for accurate forecasts. In response, the government is formulating strategies to ensure precise production estimations.

Europe's sugar manufacturers association meet EU Commissioner to protect industry in light of Ukraine 'unlimited' imports-

Six agriculture Associations of Europe representing producers and manufacturers from the sugar, cereals/oilseeds, poultry meat and eggs sectors met with European Commissioner Wojciechowski today, to express their strong concerns regarding the unlimited import from Ukraine that is creating a trade imbalance in Europe. The Associations in the meeting suggested possible constructive solutions for managing the flows in the future.

मलेशियाई चीनी उद्योग की दिशा वैश्विक आपूर्ति पर निर्भरघरेलू व्यापार मंत्री :-

कुआलालंपुरघरेलू व्यापार और जीवन यापन की : लागत मंत्री दातुक आर्मिज़न मोहम्मद अली)Domestic Trade and Cost of Living Minister Datuk Armizan Mohd Ali) ने कहा कि, स्थानीय चीनी उद्योग और आपूर्ति की दिशा को न केवल स्थानीय बाजार में चीनी की कीमत पर देखा जाना चाहिए। उन्होंने कहा कि, आयातित कच्ची चीनी आपूर्ति की स्थिरता और स्थानीय प्रसंस्कृत चीनी आपूर्ति उद्योग श्रृंखला की स्थिरता जैसे अन्य कारकों पर भी ध्यान दिया जाना चाहिए। और तो और, उनके अनुसार, देश घरेलू बाजार के लिए कच्ची चीनी के आयात पर 100 प्रतिशत निर्भर है।

Investment of Rs 60,000 crore in food processing sector to generate thousands of jobs in UP: Govt-

Lucknow: The Ground Breaking Ceremony 4.0, organized by the Yogi government recently, saw the initiation of an investment of over Rs 60,000 crores in the food processing sector of Uttar Pradesh, of which the top five projects are expected to generate over 3,000 employment opportunities in Bijnor, Muzaffarnagar, Sandila, Bareilly, and Baghpat districts, an official statement said on Wednesday.

मेक्सिको का चीनी उत्पादन 10 वर्षों में सबसे कम होने का अनुमान :Czarnikow-

न्यूयॉर्क विश्लेषक और आपूर्ति श्रृंखला सेवा प्रदाता :Czarnikow ने कहा, 2023-24 सीज़न में (सितंबर-अक्टूबर) मेक्सिको का चीनी उत्पादन पिछली फसल से15% गिरकर 4.7 मिलियन मीट्रिक टन होने का अनुमान लगाया गया है, जो पिछले 10 वर्षों में सबसे कम है। Czarnikow के विश्लेषक स्टेफ़नी रोड्रिग्ज ने एक रिपोर्ट में कहा कि, अपर्याप्त बारिश के कारण इस सीज़न में मेक्सिको में गन्ने की फसल पर प्रतिकूल असर हुआ, जिसके परिणामस्वरूप प्रति हेक्टेयर गन्ने की मात्रा कम हुई और साथ ही पेराई के दौरान औद्योगिक पैदावार भी खराब हुई।

बांग्लादेश: प्रधानमंत्री ने चीनी आयात शुल्क कम करने का निर्देश दिया :-

बांग्लादेश की प्रधानमंत्री शेख हसीना ने सोमवार को संबंधित प्राधिकारी को आगामी रमजान से पहले चार आवश्यक वस्तुओं – चावल, खाद्य तेल, चीनी और खजूर पर आयात शुल्क कम करने का निर्देश दिया।
यह निर्देश प्रधानमंत्री शेख हसीना की अध्यक्षता में उनके कार्यालय में हुई कैबिनेट बैठक से आया है।

Piyush Goyal assures farmers a reduction in security deposit needed for using WDRA-run godowns-

New Delhi [India], March 4 (ANI): Union Commerce; Food and Public Distribution Minister Piyush Goyal on Monday assured reducing the security deposit for farmers from the current 3 per cent to 1 per cent for using the warehouses under Warehousing Development and Regulatory Authority(WDRA).

थाईलैंड में चीनी का सेवन WHO की दैनिक सीमा से लगभग चार गुना अधिकरिपोर्ट :-

बैंकॉक: मीडिया रिपोर्ट के मुताबिक, थाईलैंड में चीनी की खपत बढ़ गई है। थाई नागरिक प्रतिदिन औसतन 23 चम्मच चीनी का उपभोग करते हैं, जो विश्व स्वास्थ्य संगठन (WHO) द्वारा अनुशंसित दैनिक सीमा से लगभग चार गुना अधिक है। Thai Health Promotion Foundation (Thai Health) द्वारा यह जानकारी सामने आई, जिसमें बताया गया कि यह चीनी का सेवन WHO के प्रतिदिन छह चम्मच के दिशा निर्देश से कहीं अधिक है।

पाकिस्तान: किसानों को गन्ने की खेती शुरू करने की सलाह दी गई :-

फैजाबाद फैसलाबाद जिले सहित पूरे पंजाब प्रांत में वसंत ऋतु में गन्ने की फसल की खेती शुरू हो गई है। किसानों : को सलाह दी गई हैकि, वे फसल की केवल अनुमोदित किस्मों की खेती करें क्योंकि फसल की खेती के लिए सबसे अनुकूल समय फरवरी के मध्य से मार्च के अंत तक है।

गुयाना: राष्ट्रपति द्वारा चीनी रिफाइनरी स्थापित करने की घोषणा :-

जॉर्ज टाउन क्षेत्रीय चीनी उद्योग का विस्तार करने के उद्देश्य :से गुयाना के राष्ट्रपति डॉइरफान अली ने एनमोर ., ईस्ट कोस्ट डेमेरारा अमेरिकन -में एक चीनी रिफाइनरी की योजना स्थापित करने की घोषणा की है। इंटर (ईसीडी) के कैरेबियन गवर्नर्स के साथ बारहवीं वार्षिक परामर्श के उद्घाटन समारोह के दौरान (आईडीबी) डेवलपमेंट बैंक, राष्ट्रपति अली ने पूरे कैरेबियन को परिष्कृत चीनी उत्पादों की आपूर्ति करने के लिए गुयाना की प्रतिबद्धता की पुष्टि की।

Modernizing sugar production: The crucial role of MVR technology-

Right now, the sugar industry is going through a revolutionary period in which Mechanical Vapor Recompression (MVR) technology is essential. This cutting-edge approach tackles the industry's efficiency and environmental issues, paving the path for a more economical and sustainable future.

Focus on 'Ethanol 100': 400 outlets to sell E100 by April 15

The government is now focusing on 'Ethanol 100' (E100) to boost biofuel production. Today, Petroleum Minister Hardeep Singh Puri launched 'Ethanol 100' from an Indian Oil (IOCL) outlet in Delhi.

FSSAI's central advisory committee unveils action plan on anti-microbial resistance-

New Delhi: The Central Advisory Committee (CAC) of Food Safety and Standards Authority of India (FSSAI) unveiled the authority's action plan on Anti-Microbial Resistance (AMR) during the 43rd CAC meeting in Tamil Nadu's Coimbatore on Friday.

केन्या में चीनी की कीमतों में आई गिरावट-

नैरोबी गन्ने की पेराई पर चार महीने के लंबे प्रतिबंध की समाप्ति के बाद फरवरी में चीनी की कीमतों में :4.6 प्रतिशत की कमी आई, जिससे स्थानीय उत्पादन में वृद्धि हुई, जिससे उपभोक्ताओं को बड़ी राहत मिली। Kenya National Bureau of Statistics (KNBS) के आंकड़ों से पता चलता है कि, फरवरी में एक किलो चीनी औसतन Sh200.01 में बेची गई, जो जनवरी में Sh209.55 से 9.54 कम है।

नेपाल: चीनी मिलों के सामने गन्ने के कमी की समस्या :-

रौतहाटरौतहट और सरलाही जिले की चीनी मिलें गन्ने की कमी से जूझ रही है। चूंकि गन्ना किसानों ने खेती बंद कर : दी है, इसलिए इन जिलों की चीनी मिलों को गन्ना नहीं मिल रहा है। चीनी मिलर्स का कहना है कि, मुख्य सीजन में गन्ने की कमी है। रौतहट के कथरिया स्थित बाबा बैजूनाथ शुगर एंड केमिकल इंडस्ट्री के संचालक बैजू बाबरा ने बताया कि मुख्य सीजन में गन्ने की कमी है।

India allows urea import by state-owned fertiliser companies until March 2025-

New Delhi: The central government has allowed the import of urea through three state-owned fertiliser companies for another year until March 31, 2025, according to a notification by the Directorate General of Foreign Trade.

India's water usage for per tonne crop production 2-3 times more than developed nations: Niti Aayog's Ramesh Chand-

New Delhi: India uses two-to-threefold more water per tonne of crop compared to several developed and developing nations, and this must be reduced and state governments, in particular, should promote sustainable agricultural practices, said Professor Ramesh Chand, Member of government think tank Niti Aayog.

अमेरिका: प्रमुख चीनी उत्पादकों पर कीमत को कृत्रिम रूप से बढ़ाने का आरोप, मुकदमा दायर :-

न्यूयॉर्क यूनाइटेड : शुगर, डोमिनोज़ और अन्य प्रमुख उत्पादकों पर दायर एक नए मैनहट्टन संघीय मुकदमे में दानेदार चीनी की कीमत को कृत्रिम रूप से बढ़ाने का आरोप लगाया गया, जिससे खरीदारों को 13 बिलियन डॉलर से अधिक मूल्य के बाजार में स्वीटनर के लिए अधिक भुगतान करने के लिए मजबूर होना पड़ा। न्यूयॉर्क स्थित KPH हेल्थकेयर सर्विसेज द्वारा दायर प्रस्तावित वर्ग कार्रवाई में एएसआर ग्रुप सहित आधा दर्जन से अधिक प्रतिवादियों का नाम दिया गया, जो डोमिनोज़, मिशिगन शुगर और यूनाइटेड का मालिक है।

पाकिस्तान: चश्मा चीनी मिल एथेनॉल प्लांट स्थापित करेगी :-

इस्लामाबाद : देश की सबसे बड़ी चीनी मिलों में से एक, चश्मा शुगर मिल्स लिमिटेड (CHAS) ने एथेनॉल प्लांट स्थापित करने की घोषणा की है। प्रीमियर ग्रुप की सहायक कंपनी ने मंगलवार को पाकिस्तान स्टॉक एक्सचेंज (पीएसएक्स) को दिए अपने नोटिस में इस घटनाक्रम को साझा किया।

Sucro Can Sourcing to set up Canada's biggest sugar refinery in Ontario-

Sucro Can Sourcing has unveiled plans to construct Canada's largest sugar refinery at the Port of Hamilton, Ontario, utilizing land owned by HOPA Ports (Hamilton-Oshawa Port Authority), reported Foodincanada.

EID Parry looking to grow revenue from branded FMCG and biofuel segment-

Chennai: EID Parry, the sugar manufacturer under the Murugappa Group, is strategizing to boost revenue reported The Times of India. Muthu Murugappan, CEO and whole-time director of EID Parry, stated plans to focus on expanding into branded FMCG (Fast Moving Consumer Goods) and biofuel segments in an interview with the TOI.

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RESEARCH ARTICLE:

Centrifugation of Cane Juice, Syrup & Molasses for Superior Quality of Sugar

By

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Abstract:

Sugar quality is a well-known consideration of the all sugar factories viz. raw sugar, plantation white sugar or refined sugar with the minimum chemical& other costs during the processing. The market of sugar for institutional buyers totally depend up on the quality norms as well as Indian sugar industry can export such sugar in to the global market. In India, there are several type of proven manufacturing technologies that gives good clarification efficiencies in colour removal& turbidity reduction and have been reviewed from time to time in order to find out effectiveness and financial viability too. Authors have tried mechanical clarification of cane juice, syrup & intermediate products for the removal of suspended impurities and also colour removal in pursuit of making superior quality of sugar at lower cost, particularly with lowest chemical requirements. From the lab trials, mechanical clarification gave excellent results and brilliant juice & syrup were obtained. The mechanical clarification can reduce the turbidity up to 95% &colour reduction archived up to 25% in the cane juice, while in the case of syrup & intermediate products turbidity removal &colour reduction was observed up to 50% & 20% respectively. This mechanical centrifugation process can be reduce the half of the clarification load in the conventional clarification process and thus may reduce lime, sulphur& other process chemicals consumption in further clarification process.

Key words: *Centrifugation, colour, turbidity, gravity factor, reducing sugars, viscosity, pan boiling.*

Introduction:

India is second world's largest sugar producing and world's largest sugar consuming country. Indian sugar, industry has played an important role in the socio-economic development of rural area. Sugar industry holds second rank next to textiles industry in the country on regards agro based industries which shows its importance.

This industry engages around 50 million farmers and generates employment nearly to 2 million of people directly and indirectly. Indian sugar industry encompasses of more than 532 operational sugar factories producing raw, plantation white & refined sugar. In the process of production of sugar by either defecation process or double sulphitation process, impurities in the raw juice are precipitated by application of milk of lime alone or along with sulphur di-oxide gas. The sugar factories in India are producing mostly plantation white sugar by Double Sulphitation Process. During clarification process sulphur di-oxide gas is used for juice and syrup treatment known as double sulphitation process. Lime and Sulphur are the basic clarifying agents used in clarification of sugar cane juice for production of plantation white sugar. In India about 85 % sugar is produced by double sulphitation process with the ICUMSA value range from 80 to 120 IU and sulphur content of 10-30 ppm.

For making better quality sugar, the sugar factories adopted number of proven technologies at added cost to control and reduce the sugar colour, and these technologies are reviewed in order to identify effective and economically viable means of reducing the colour of sugar produced by Indian Sugar Factories to reasonable level. The aim of sugar manufacturing to produced good quality of sugar at lowest processing cost and at minimum loss of sugar.

Object of research:

- To improve the sugar quality produced by Double Sulphitation (DS) Process by separating the suspended impurities through centrifugation and through colour reduction by use of chemicals in cane juice, process intermediate products produced during sugar processing.
- To improve the crystallization process by reducing the viscosity of process intermediate products.
- Ultimately to reduce the sugar losses in final molasses.

Reduction in turbidity and colour value may be achieved by doing physico-chemical treatment of sugar cane juice, & process intermediate products which will improve performance of crystallization process by reduction in viscosity level, reduce the steam consumption and finally improve the sugar quality and reduction in sugar losses.

Theoretical aspects:

Sugar cane juice, syrup and process intermediate products contain impurities as suspension. Hence, solid liquid separation could be made possible by increasing the gravitational force in a centrifugal separator. Sedimentation centrifuges are based on the principle of density difference-

The Stokes formula for settling velocity,

$$v = \frac{d_p^2 g (\rho - \rho_p)}{18 \eta}$$

Calculates the velocity v of settling of solid particles suspended in a liquid under the influence of gravity. It forms the basis on which quantitative comparisons of centrifugation efficiencies are

made. The formula indicates that the pertinent variables are particle diameter d_p density difference $(\rho - \rho_p)$ between the mother liquor and the solid particles, and liquor viscosity η. Particle diameter is influenced by precipitation speed (reaction kinetics) and crystallization properties of the precipitate. Viscosity is affected by composition, temperature and fluid concentration. Liquor density depends on the composition, concentration, and temperature while particle density is a property of the precipitate which is not likely to vary significantly under different conditions. Gravitational acceleration is represented by the symbol **g**.

Principle of centrifugation:

It is a unit operation working for separation separating the consequent present in a dispersion with the help of centrifugal force. It is a technique which involves the application of centrifugal force to separate particles from a solution according to their size, shape, density, the viscosity of the medium and machine speed.

- The centrifuge involves the principle of sedimentation.
- The principle of the centrifugation technique is to separate the particles suspended in liquid media under the influence of a centrifugal field. These are placed either in tubes or bottles in a rotor in the centrifuge.
- Sedimentation is a phenomenon where suspended material settles out of the fluids by gravity. The suspended material can be particles such as clay or powder.
- The particles having size more than 5 micrometres are separated by simple filtration process while the particles having size 5 micrometre or less do not sediment under gravity. The central force is useful to separate those particles.

In centrifugation, centrifugal force is used as the driving force for the separation of particles. Centrifugal force is replacing a gravitational force which is responsible for the sedimentation of two particles. Thus centrifugation is useful when the ordinary filtration methods do not apply to the separation of particles. When two particles having different sizes but same densities are suspended in any liquid medium then they may not be able to separate by a simple filtration method. In such kind of cases, centrifugation method is useful.

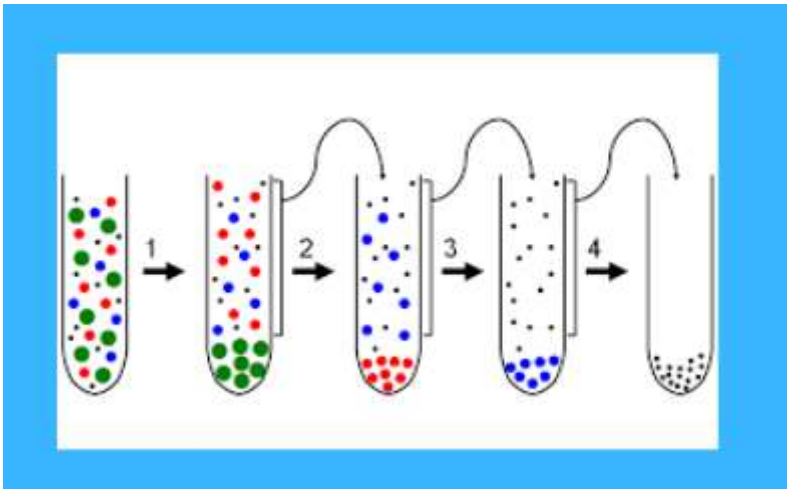

Fig. 1 – Steps in centrifugation process

As shown in the Fig. 1, the particle size above 5-micrometre sediment at the bottom with the help of gravity but the particles having a size less than 5 micrometres, start Brownian motion and do not sediment because of the gravity that's why they require the centrifugal force to separate properly. The centrifugal force causes the denser dense particle direction of the radical where writer practical moves to the centre. The ratio of the force acting on radical the direction to the gravitational force is the centrifugal effect.

Methodology:

Experiments were designed to study the quality of sugar cane juice, syrup and process intermediate products produced during sugar processing i.e. B & C sugar melt, A-light. These experiments were conducted in the laboratory of a commercial sugar factory following Double Sulphitation process in Uttar Pradesh, India during crushing season as well as in research lab of National Sugar Institute, Kanpur.

- **Optimization of Brix-** For the optimization of brix of raw juice 12-14^0 and Syrup, B & C sugar melt, A-light was taken as 60^0 for the study.
- **Optimization of centrifugation speed** - For optimization of centrifugal speed, experiment were carried out at different rpm and quality affecting parameters were analyzed.
- **Optimization of chemical doses** – Chemical settling aid (flocculant) & heating were used for treatment.

Analysis of mix juice, syrup & intermediate products was done before and after treatment for pH, Brix%, Pol %, Purity, Conductivity, Colour (IU), Turbidity, and Reducing Sugars.

Material and Method:

The samples of cane juice, syrup & intermediate products produced during sugar processing were procured from some commercial sugar factories producing Double Sulphitation Sugar, Raw-Refined Sugar as well as from Experimental Sugar Factory (ESF) of National Sugar Institute, Kanpur.

- For the purpose, samples of sugarcane juice, syrup & intermediate products like B/C sugar melt, A-light, molasses were taken.
- During the all experiment, Remi make bench top centrifuge machine (NEYA-12, Model: A6-50 maximum rpm: 9500/10050) containing 6 tubes sample holding (capacity – 6 x 50g) was used for the mechanical clarification of different samples.
- Trials were conducted at different RPM (round per minute) i.e. 2000, 3000, 4000 & 5000 for cane juice, syrup, A-light molasses & B&C melt and on different brixes for optimization of speed of rotation as well as brixes of intermediate products.
- Dilution of sugarcane juice, syrup & intermediate products for different brixes was carried out by using distilled water.

- Application of some commercially available chemicals like Phosphoric acid, &Flocculant- LT-27 was also carried out at different doses on solid basis to see the improvement in quality of these intermediate molasses.
- During the experiments, 2375 Double Beam Spectrophotometer was used for the analysis of colour (ICUMSA), and MCP 5300 Sucromat make Anton Paar was used for the analysis of Pol.

In each experiment intermediate molasses samples were analyzed before and after treatment for the parameters pH, color, conductivity, turbidity, R.S./$_{100^0}$ brix, Brix%, Pol% & Purity to see the effectiveness of the treatment.

Analytical methods:

The physicochemical parameters of intermediate molasses like color, turbidity, conductivity, pH etc. was observed as per the following procedure.

1. **Brix%**
   Degrees Brix is a measure of the percentage of dissolved solids in a liquid containing sugar, and is commonly used to measure dissolved sugar content of an aqueous solution. Brix of sugarcane juice, syrup & intermediate products were observed by the IS 15279 method as per System of Technical Control.

2. **Pol%**
   Pol is the value determined by polarimeter. Pol represent the quantity of sugar in the sugar solution. Pol of sugarcane juice, syrup & intermediate products were observed by the Indian Standard code as per System of Technical control.

3. **Purity**
   Purity is the ratio of pol% to the brix%.

$$\text{Purity} = \frac{\text{Pol\%}}{\text{Brix\%}} \times 100$$

4. **Colour (ICUMSA):**

   The ICUMSA method GS1/3-7 (for colour measurement) using a wavelength of 420 nm was applied for testing the color of cane juice, syrup, Melt, A-light. Apparatus used for the purpose were; spectrophotometer equipped with 01cm cells, membrane filters of pore size 0.45 µm, precision refractometer and reagents used was 0.05M hydrochloric acid (HCl) and 0.05M Sodium hydroxide (NaOH) solution.
   The result was expressed as the following.

$$\text{ICUMSA Colour (IU)} = \text{Abs} * \frac{1000}{b*c}$$

Where: b- Cell length (cm)
c- Concentration of total solids (gm/ml)

5. Turbidity (NTU):

Turbidity is the cloudiness or haziness of a fluid caused by large numbers of individual particles that are generally invisible to the naked eye. The turbidity of intermediate process liquors is a measure of the effectiveness of the clarification process. The turbidity of intermediate process liquors measured by turbidity meter as well as by spectrophotometer following ICUMSA method GS7-21.

6. The pH:

pH is also referred to as acidity or basicity, historically denotes "**Potential of Hydrogen".** It is a scale used to specify the acidity or basicity of an aqueous solution. Acidic solutions are measured to have lower pH values than basic or alkaline solutions. pH of the sugarcane juice, syrup & intermediate products were determined using glass electrode attached to pH meter after calibration at pH 4.00, 7.00 and 9.00 at 20°C following ICUMSA method GS1/2/3/4/7/8-23.

7. Conductivity:

Conductivity of an electrolyte solution is a measure of its ability to conduct electricity. Specific conductance of sugarcane juice, syrup & intermediate products before and after experiment was measured by digital conductivity meter.

8. Reducing Sugar (R.S.):

Those sugars which act as reducing agents are called reducing sugars. They contain an aldehyde (- CHO) are or a ketonic C = O all monosccharides and disaccharides (except sucrose) are reducing sugars, e.g., glucose, fructose, lactose etc. They reduce Fehling solution and Tollen's reagent. The Lane &Eynon method used for determination of reducing sugar in intermediate molasses as per System of Technical control.

During the study the work was carried out under the following conditions to asses mostfavorable condition for the best results.

- Mechanical clarification of cold cane juice, hot cane juice of 70^0C and hot cane juice of 70^0C plus dosing of flocculant @ 1 ppm
- Mechanical clarification of syrup, hot syrup of 70^0C and hot syrup of 70^0C plus dosing of flocculant @ 10 ppm
- Mechanical clarification of hot, A-light molasses, A-light molasses of 70^0C and A-light molasses of 70^0C plus dosing of flocculant @ 10 ppm
- Mechanical clarification of B&C sugar melt, hot B&C sugar melt of 70^0C and hot B&C sugar melt of 70^0C plus dosing of flocculant @ 10 ppm

Result and discussion:

Table- 1 (Mechanical clarification of cane juice, Brix% – 12.60, Purity – 81.40)

Sr. No.	Parameter	Original	Before centrifuge (cold)	After centrifuge (Temp.- 70^{0}C, rpm – 3000, duration – 10 minutes)	After centrifuge (Temp.- 70^{0}C, rpm – 3000, duration – 10 minutes, flocculant dosing – 1 ppm)
1	PH	5.2	5.2	5.3	5.3
2	RS/100 brix	5.5	5.6	5.5	5.6
3	Conductivity	2410	2243	2367	2910
4	Turbidity (NTU)	140	36	6.4	7.9
5	Colour (IU)	17560	16710	14865	12890
6	% of colour removal	-	4.8	15.34	26.6
7	% of turbidityremoval	-	74	95	94

Table- 2(Mechanical clarification of Syrup Brix% – 60.00, Purity – 81.48)

Sr. No.	Parameter	Original	After centrifuge (cold)	After centrifuge (Temp.- 70^{0}C, rpm – 5000, duration – 15 minutes)	After centrifuge (Temp.- 70^{0}C, rpm – 5000, duration – 15 minutes, flocculant dosing – 10 ppm)
1	PH	6.4	6.4	6.5	6.5
2	RS/100 brix	5.7	5.6	5.6	5.6
3	Conductivity	1170	980	950	1080
4	Turbidity (NTU)	9.6	4.8	5.8	5.6
5	Colour (IU)	16421	15673	14666	14230
6	% of colour removal	-	4.56	10.69	13.34
7	% of turbidity removal	-	50	40	42

Table- 3 (Mechanical clarification of A-light Molasses Brix% – 60.00, Purity – 90.14)

Sr. No.	Parameter	Original	After centrifuge (cold)	After centrifuge (Temp.- 70^{0}C, rpm – 5000, duration – 15 minutes)	After centrifuge (Temp.- 70^{0}C, rpm – 5000, duration – 15 minutes, flocculant dosing – 10 ppm)
1	PH	6.08	6.07	6.09	6.07
2	RS/100 brix	5.49	5.48	5.48	5.47
3	Conductivity	920	1020	891	672
4	Turbidity (NTU)	12	7.6	6.7	6.5
5	Colour (IU)	2130	2050	1680	1725
6	% of colour removal	-	3.76	21.13	19.01
7	% of turbidity removal	-	36.67	44.16	45.83

Table - 4 (Mechanical clarification ofB&C Sugar Melt, Brix% – 60.00, Purity – 95.50)

Sr. No.	Parameter	Original	After centrifuge (cold)	After centrifuge (Temp.- 70^{0}C, rpm – 5000, duration – 15 minutes)	After centrifuge (Temp.- 70^{0}C, rpm – 5000, duration – 15 minutes, flocculant dosing – 10 ppm)
1	PH	5.82	5.87	5.80	5.83
2	Conductivity	360	280	297	269
3	Turbidity (NTU)	4.2	2.7	2.6	2.1
7	Colour (IU)	1530	1430	1280	1270
8	% of colour removal	-	6.5	16.3	17.0
9	% of turbidity removal	-	35.7	38.1	50.0

Conclusion:

1. Pre-clarify of sugarcane juice & other intermediates process liquors is likely to improve the sugar quality & recovery with many other added benefits partially reduction in quantity of main process chemicals viz. lime &sulphur by 30-50%.

2. During the course of various experiments, turbidity (NTU) removal was observed in the range of 70-90 % in case of sugarcane juice clarification and even up to 95% in one case, while in case of syrup & intermediate products removal of turbidity observed in the range of 40-50 %, which shows the improvement in the quality of intermediate products resulting in probable viscosity reduction which was improve crystallization process during pan boiling and ultimately reducing the loss in final molasses.

3. Conductivity is a measure of a solution's ability to conduct electricity through ions. Since electricity needs charged particles in order to flow, there is generally a positive relationship between the concentration of ions and the ability of a solution to conduct electricity. In almost experiments it was clearly observed that there is a slight reduction in the value of specific conductance after centrifugation & chemical treatment. The main reason attributed to this reduction is the trap of ions or adsorption of ions on the sediment surface.

4. In case of sugarcane juice clarification,15-25 % colour reduction was observed, while in case of syrup & intermediate products 15-20 % colour reduction was observed, which indicates possible improvement in the sugar quality by the treatment of sugarcane juice, syrup &intermediate products.

5. It was also observed that in almost all the experiments, there was negligible impact of treatment on pH, brix%, pol%, purity and RS/$_{100}^{0}$ brix which indicates that while treating the sugarcane juice, syrup &intermediate products no inversion / destruction of reducing sugar was occurred.

6. It may also be mentioned that use of lower qualities of process chemicals may results in reduced scaling of heating surfaces, lower cost on de-scaling & lesser wear & tear of heating surfaces.

7. Additional cost involved in physicochemical treatment of cane juice, syrup, A-light molasses & B/C melt produced during sugar processing, was worked out and it was observed to be very low and finally helps in making of superior quality sugar at lower cost, particularly with lowest chemical requirements.

These results of experiments provide a novel way for scaling up the mechanical clarification from laboratory scale to commercial scale for the clarification of cane juice, syrup & intermediate products but a pilot scale trial at commercial sugar factory site are yet to be taken up.

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ABSTRACTS:

CONSORTIUM OF NEW SUCROSE RICH SUGARCANE VARIETIES FOR HIGHER SUGAR PRODUCTIVITY IN PENINSULAR ZONE by C. Appunu, K. Mohanraj and G. Hemaprabha, Indian Sugar Journal, January 2024

Identification and release of high yield and quality with resistance to red rot is a key component in sugarcane development programmes for enhancing the cane and sugar productivity for the benefit offarmers and the sugar industry. Under changing climatic conditions and the unpredictable nature of the monsoon, the identification of consortiumof sugarcane varieties with different maturity categories would help to improve sugar and sugar cane productivity. Three new sugarcane varieties namely Co 14012 (AVANI), Co 11015(ATULYA) and Co 14005 (ARUNIMA) were identified and released through AICRP(S) for commercial cultivation in Peninsular zone comprising the states of Andhra Pradesh, Gujarat, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Tamil Nadu and Telangana. Co 14012 registered 5.59%, 5.37% and5.76% improvement for CCS %, Sucrose % and Pol % in cane, respectively. Co 11015 is an early maturing variety with remarkably high sucrose content which recorded extremely high sucrose at8th and 10th month. It has shown an improvement of 11.87% and 5.84% over the best early standard CoC 671 at 8thand 10thmonth, respectively. Co14005 recorded the highest sugar yield of 16.64 t/ha at 360 days across the peninsular zone with an overall improvement of 12.79 %, 3.08 % and1.83 % over the standards CoC 671(14.75 t/ha),Co 86032 (16.00 t/ha) and Co 09004 (16.18 t/ha)respectively. It ranked first in the zone for cane yield and recorded 118.83 t/ha and registered an improvement of 19.51% over CoC 671, 8.45% over Co 09004 and 1.14% over Co 86032. It is also an excellent ratooner with cane yield of 104.21 t/ha. The consortium of these sucrose rich sugarcane varieties (Co 14012, Co 11015 and Co 14005) would substantially improve the sugar and cane yield in the states under peninsular zone.

Mechanical Clarification of Cane Juice and Process Intermediate Products for Superior Quality of Sugar By Amresh Pratap Singh & Narendra Mohan, National Sugar Institute, Kanpur, India, Indian Sugar Journal, January 2024

Sugar quality is a well-known consideration of the all sugar factories viz. raw sugar, plantation white sugar or refined sugar with the minimum chemical & other costs during the processing. The market of sugar for institutional buyers totally depend up on the quality norms as well as Indian sugar industry can export such sugar in to the global market. In India, there are several typeof proven manufacturing technologies that givesgood clarification efficiencies in colour removal & turbidity reduction and have been reviewed from time to time in order to find out effectiveness and financial viability too. Authors have tried mechanical clarification of cane juice, syrup & intermediate products for the removal of suspended impurities and also colour removal in pursuit of making superior quality of sugar at lower cost, particularly with lowest chemical requirements. From the lab trials, mechanical clarification gave excellent results and brilliant juice & syrup were obtained. The mechanical clarification can reduce the turbidity up to 90-95% & colour

reduction archived up to15-20% in the cane juice, while in the case of syrup & intermediate products turbidity removal & colour reduction was observed up to 40% & 15%respectively. This mechanical centrifugation process can be reduce the half of the clarification load in the conventional clarification process and thus may reduce lime, sulphur & other process chemicals consumption in further clarification process.

Proposals for enhancing / stabilizing cane production for long term / sustainable achievement of EBP targets from sugar industry and related matters. Indian Sugar Journal, January 2024

A year ago, the Industry and the Government were confident that the sugar industry will meet the demands for ethanol as per the target set in the EBP. Unfortunately the El-nino situation has led to sudden drop in the cane production from about462 million tons in 2021-22 to 420 million tons in2023-24 (as per the latest estimate). This suddenunexpected drop has awakened us about the need for stabilizing Sugarcane production in vulnerable areas like Maharashtra, Karnataka, Telangana, Tamil Nadu etc., through important measures like installation of drip irrigation systems, augmenting water resources through various on-going schemes such as bore wells, percolation wells, water storage ponds etc. Certain members of ISMA have emplemented water shed development for both soil and water conservation successfully. The mechanization of cane harvesting is another important aspect to make the farmers adopt sugarcane cultivation in certain parts of the country where the H&T cost is gone very high to almost 30-35% of the FRP. There are several schemes that are being implemented by the Govt. of India through the State Governments.

Water Footprint- A comprehensive framework for assessment of Water use efficiency in Sugarcane and Sugar industry, Indian Sugar Journal, January 2024

Sugarcane is an important commercial crop contributing significantly to the World economy. It not only contributes to food production, but also is an important source of "Bioenergy" used in the form of fuel and electricity. It also generates valuable bi-products which can be used as source of plant and animal nutrition. Sugarcane is a plant with C4 metabolism which enables higher photosynthetic efficiency (eg: other C4crops are Maize and Sorghum) compared to plants with C3 metabolism (Eg: other C3 plants are Rice, Wheat, etc.). Also, Sugarcane is a long duration crop ranging from 12-18 months period grown both in tropical and sub-tropical regions. In India Sugarcane is grown in 4.5 to 5.8 million ha majorly in 12-13 States of the country. The yield of Sugarcane ranges from 60 tons per ha to 100 tons per ha, which is subject to agro- climatic conditions, ratooning, choice of plant variety, availability of irrigation, management practices, soil health, etc. Cane yields produced under rainfed conditions can vary greatly.

Land, water and carbon footprints of circular bioenergy production systems by B. Holmatov, A.Y. Hoekstra, M.S. Krola, Indian Sugar Journal, January 2024

Renewable energy sources can help combat climate change but knowing the land, water and carbon implications of different renewable energy production mixes becomes

a key. This paper systematically applies land, water and carbon footprint accounting methods to calculate resource appropriation and CO 2eq GHG emissions of two energy scenarios. The '100% scenario' is meant as a thinking exercise and assumes a complete transition towards bioenergy, mostly as bioelectricity and some first-generation biofuel. The 'SDS-bio scenario' is inspired by IEA's sustainable development scenario and assumes a 9.8% share of bioenergy in the final mix, with a high share offirst-generation biofuel. Energy inputs into production are calculated by differentiating inputs into fuel versus electricity and exclude fossil fuels used for non-energy purposes. Results suggest that both scenarios can lead to emission savings, but at a high cost of land and water resources. A 100% shift to bioenergy is not possible from water and land perspectives. The SDS-bio scenario, when using the most efficient feed stocks (sugar beet and sugarcane), would still require 11–14% of the global arable land and a water flow equivalent to 18–25% of the current water footprint of humanity. In comparative terms, using sugar or starchy crops to produce bioenergy results in smaller footprints than using oil-bearing crops. Regardless of the choice of crop, converting the bio-mass to combined heat and power results in smaller land, water and carbon footprints per unit of energy than when converting to electricity alone or liquid biofuel.

Strategies to Contain Red Rot of Sugarcane in Sub-Tropical India by R. Viswanathan1, Govind P Rao Dinesh Singh, and Sushil Solomon Corresponding author: Dr.R.Viswanathan, Director, ICAR-IISR, Lucknow, Indian Sugar Journal, February 2024

Red rot caused by Colletotrichum falcatum is the
major fungal disease responsible for deteriorating and knocking down of major commercial sugarcane varieties out of cultivation during the last 120 years. During the SS 2023-24 sugar production in Uttar Pradesh has declined substantially. One of the main reasons is the popular variety with a very high yield and sugar, Co 0238, has become victim of red rot due to the emergence of a new virulent pathotype,CF13. However, this variety still occupy >50 % area in Uttar Pradesh, the major sugarcane growing state in India and because of its breakdown, both the farmers and mill owners are facing serious losses. In view of the prevailing situation, an immediate attention is required to replace the mono cropping of this single variety in the command areas of the state and follow some important crop management approaches, to sustain and revive the sugar industry future in the state. Here, we have suggested some important red rot management practices to reduce losses caused by red rot epidemics and to sustain sugarcane cultivation in sub-tropics

R & D Initiatives and Prospects of Sugar Beet Cultivation In India : ICAR-IISR, Lucknow Leading The Way by A.K. Mall, Varucha Misra, S. Solomon and R. Vishwanathan, Indian Sugar Journal, February 2024

Sugar beet crop is a product of nineteenth-century breeding efforts from table and fodder beets. It thrives primarily in temperate climates and is now finding success in subtropical and even tropical regions. In addition to its traditional habitat, sugar beet cultivation has expanded its cultivation in India as well. Presently, over a quarter of the

world's sugar demand is fulfilled by sugar beet, with the beet sugar industry firmly established in45 countries spanning four continents. Over the past two centuries, sugar beet has undergone careful selection and breeding to maximize sucrose production. The agricultural viability and economic potential of sugar beet in India has proven its worth primarily in subtropical regions which is now even extending to some tropical areas of the country as well. Sugar beet stands as a significant sugar crop complementing sugarcane for the country. This is chiefly due to its shorter growth cycle (6–7 months compared to sugarcane's 10–12 months), high sugar content (15–17%), impressive sugar recovery rate (12–14%), and superior purity (85–90%).Consequently, it holds promise in narrowing the gap between current sugar production and anticipated national demand. However, in the current context, it will support in achieving the ethanol blending policy of Government as it has higher potential in ethanol production. Beyond sugar, sugar beet yields valuable by-products like green beet tops and beet molasses, beneficial for cattle feed and fermentation industries. Due to its exceptional chemical quality, beet molasses holds export potential, enhancing sugar beet's significance in the country's sugar economy. Sugar beet is a versatile crop adaptable to various climatic and soil conditions. Its resilience to salinity and frost can reclaim hundreds of hectares of uncultivable land. Additionally, it can extend the processing season for factories, potentially boosting employment opportunities. Harvested in early April, sugar beet allows factories to efficiently process both sugarcane and sugar beet during peak productivity periods, fostering asymbiotic agricultural and manufacturing economy. cane-fibre analysis has been mainly undertaken using the SRI can fibre machine.

Sugar taxes come under scrutiny as governments fight inflation, by S&P Global Commodity Insights, INTERNATIONAL SUGAR JOURNAL FEB 2023

The increased prevalence of obesity over the past two decades in the West, in particular, has exercised policymakers. In the US, the sugar consumption trend has been downwards over the same period, as has been the case in developed economies. While a positive correlation between sugar consumption and obesity is only apparent when sugar is over consumed, it is equally clear to nutrition researchers that obesity is a multi factorial disease.

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