SHARKARA

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APRIL-JUNE 2022

It contains……..

From Director's Desk…

India is expected to record all time high sugar production of 35.5 MMT, even after expected diversion of 3.5 MMT of sugar for ethanol production. Under the favorable conditions, the exports, expected to be 9.0-10.0 MMT, the carryovers shall not be worrying. However, there is no room to sit back and relax and sugar industry is required to keep on pondering ways and means to balance sugar production & consumption with time for implementation of WTO restrictions coming closer.

The Indian Sugar Industry has now understood the magic of ethanol for balancing demand-supply of sugar and thus to have economic sustainability. I hope, with the prices of ethanol from various feed stocks remaining reasonable, country will witness higher diversion of sugar for ethanol production. However, for achieving higher blending rates, more juice or syrup diversion shall be required. The challenges in fermentation and spent wash handling, thus, are to be circumvented.

In pursuit of boosting ethanol production, MoPNG approved amendments in National Policy on Bio-fuels 2018, which enhance the scope of procuring raw materials for producing ethanol under EBP. As on June 5, 2022, OMC's cumulatively issued LOI's for 443.24 crores liters. Of this, 439.80 has been contracted and 224.93 crore liters has been delivered, thus, achieving a blending target of 10.04% as on June 5, 2022.

Institute is all set to commence it's new academic session 2022-23 with increased seats in courses of Alcohol Technology, Sugar Engineering and Quality Control. The institute conducted the entrance test online on 26th June 2022 at 13 centres across the country. The placement scenario appears to be good, particularly for Alcohol Technology students, as institute has started receiving requests for conducting campus interviews now only.

On the research front, the pace is maintained with development of technology for producing nano silica particles from bagasse fly ash. R&D on development of other value added products viz. bio-plastics and chloro methyl furfural from bagasse and for developing techniques for non-lead polarimetry & cane juice clarification using SMBS is ongoing. The institute also got two more patents in its shelves viz. production of graphene oxide and surfactant from bagasse. Hope our endeavors for developing many other value added products from by-products and waste's will meet sucess.

(Narendra Mohan)
Director

OUR PROVISIONS:

WORLD EARTH DAY 2022 CELEBRATED:

"World Earth Day 2022" was celebrated on 22th April 2022 at National Sugar Institute, Kanpur on the theme **"Invest in our Planet"**. Director called upon the staff and students for carrying out vigorous efforts and creating more awareness about the dire need to protect our environment. On this special day, emphasis should be made on the reasons for increasing environmental problems, including over population, loss of biodiversity, depleting ozone layer which all results in rising pollution.

National Sugar Institute, Kanpur has also taken up the task of replacing the existing process of sugar production with a more environment friendly process which would also lead to superior quality sugar, informed Shri Ashok Garg, Assistant Professor of Sugar Technology. On this occasion tree plantation was also carried out in the institute premises in which staff and students of the institute participated enthusiastically.

54th ADVISORY BOARD MEETING:

The 54th Meeting of the Advisory Board of the National Sugar Institute, Kanpur was held under the Chairmanship of Joint Secretary (Sugar & Admn.) on 17th May 2022.

Important issues related to restructuring of the institute, development of infrastructural facilities and for enhancing institute-industry interaction were discussed.

INAUGURATION OF TRAINING CUM CONVENTION HALL:

The newly constructed **"Training cum Convention Centre- Sharkara Saudh"** at National Sugar Institute, Kanpur was inaugurated on 8th June 2022 by Sadhvi Niranjan Jyoti, Hon'ble Minister of State, Ministry of Consumer Affairs, Food & Public Distribution and Rural Development, being the Chief Guest. Mrs. Neelima Katiyar, Hon'ble Member of Legislative Assembly was also present during the occasion as Distinguished Guest.

The Centre has facilities all require infrastructure to organize training programmes, seminars and conferences on hybrid mode and thus it would be possible to connect overseas participants in any such programme. Hon'ble Minister also carried out tree plantation in the Centre premises as a mark of concern towards growing levels of pollution

Mrs. Neelima Katiyar, MLA was also graced the occasion. Stalwarts of sugar industry received the awards in a glittering ceremony.

ENTRANCE EXAMINATION:

Online Entrance Examination-2022 for admission to various courses conducted by National Sugar Institute, Kanpur was organized on 26th June 2022 at various centers across the country.

ONE DAY NATIONAL SEMINAR ORGANIZED:

One day National Seminar on **"Modelling of Indian Sugar Industry in Diversification Era"** organized jointly by National sugar Institute, Kanpur and U.P. Sugar Mills Association was

inaugurated on 29th June 2022, by Shri Laxmi Narayan Chaudhary, Hon'ble Minister for Sugarcane Development & Sugar Industries, Government of Uttar Pradesh.

Shri Narendra Mohan, Director, National Sugar Institute in his key note address advised industry personnel to develop an **"out of box thinking"** to change the conventional model of sugar factories producing sugar to one having multiple products. From ethanol to green hydrogen and from sugar to dietary fibre, from fuel to eco-friendly cutlery, the sugar industry provides enormous opportunities for diversification. While it is necessary to diversify to improve economic sustainability, it also important to develop a robust self-sustainable model for ensuring availability of raw material and other infrastructural facilities and thus the capacities of sugar and other integrated units should be carefully planned, he said.

Experts discussed various models for sacrificing sugar and also producing value added products from by-products of sugar factories with simultaneous balancing of plant & machinery and also having fuel-steam-power balance.

TRAINING PROGRAMME ORGANISED:

1. Two weeks training programme on **"Quality & Chemical Control"** for the technical staff of sugar factories of U.P. Cooperative Sugar Factories Federation Ltd., commenced on 23rd May 2022, at National Sugar Institute, Kanpur. The training programme is being attended by 40 personnel from 20 sugar factories of the federation.

Inaugurating the training programme, Shri Narendra Mohan, Director, National Sugar Institute called upon the participants to take advantage of theoretical & practical training to be imparted

for enriching their knowledge about the analytical procedures to be followed in sugar industry as per the recommendations of International Commission for Uniform Methods of Sugar Analysis. Learning of techniques of chemical control is also of paramount importance to assess efficiencies attained at various unit operations and productivity as a whole, he said.

2. Training Programme was organized for the staff of Uttar Pradesh Cooperative Sugar Factories on the topic "**Automation & Instrumentation"** during the period at National Sugar Institute, Kanpur.

3. Training programme was organized for the pan boiler staff of Uttar Pradesh Cooperative Sugar Factories on the topic **"Advancements in Sugar Crystallization & Centrifugation"** at National Sugar Institute, Kanpur.

4. Short duration training programme was conducted for the officials of Udupi Chamber of Commerce & Industry (Incorporated), Karnataka on **"Models of Ethanol Production".** They were imparted knowledge on various models of ethanol plants based on feed stocks from sugar industry and grains so as to have operation of the units round the year. Side by side, they were given idea about the plant & machinery required, consumption of steam and power, requirement of manpower, cost of production and different techniques to achieve Zero Liquid Discharge.

5. One-week training programme on **"Chemical & Quality Control Techniques"** for officials of M/s Wave Sugar Industries Ltd. was commenced from 27th June 2022 at the National Sugar Institute, Kanpur. Theoretical as well as practical training is being imparted to the participants with focus on calculation of sugar recovery while undertaking diversion of sugar.

MoU SIGNED:

National Sugar Institute, Kanpur Director Prof. Narendra Mohan, exchanged the Memorandum of understanding (signed virtually on 14th June 2022) with Indonesian Ambassador in India for conducting training programmes and providing consultancy to Indonesian Sugar Industry in the presence of Foreign Ministers of the two countries, Dr. S Jaishankar, India and H.E. Ms. Retno Marsudi, Indonesia on 17th June 2022. Representing country is a great feeling and may god help us to take NSI to new horizons.

As per the MoU, National Sugar Institute, Kanpur shall help the Indonesian Institute in development of technology related to sugar & ethanol production, power generation, environment and quality control. National Sugar Institute, Kanpur shall also conduct faculty development programmes and other customized training programmes so that Indonesian institute can develop its capabilities to provide competent manpower to the sugar and allied industry.

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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 -** The isolation and purification was completed for crude vanillin obtained from experiments performed @ 10 g scale (in pressure reactor). Around 250 mg vanillin is obtained from 20 g treated raw material. Optimized reaction conditions for synthesis of vanillin from bagasse derived lignin have been established and preliminary results were compiled in form of a paper and communicated to ISSCT towards consideration for its presentation.

2. **Studies on production of chloromethyl furfural from bagasse derived cellulose in biorefinery approach-** The characterization of synthesized 5-(Chloromethyl) furfural (CMF) has been done by FT IR spectroscopy. The results are in conformity with literature values. The characterization results from NMR and Mass spectroscopy are awaited. Optimized reaction conditions for synthesis of 5-(Chloromethyl) furfural (CMF) and 5-(Hydroxymethyl) furfural (CMF) (HMF)from bagasse derived cellulose have been established and preliminary results were compiled in form of a paper and communicated to STAI for its presentation during the forthcoming convention.

3. **Studies on Sweet Sorghum Bagasse value addition –** The experiments related to synthesis of 5-(Chloromethyl) furfural (CMF) from sweet sorghum bagasse derived cellulose and vanillin from sweet sorghum bagasse derived lignin has been performed. Initial studies related to synthesis and of 5-(Chloromethyl) furfural and vanillin from sweet sorghum bagasse derived cellulose and lignin has been completed. After compilation of data, future strategy shall be planned.

4. **Studies on utilization of molasses for synthesis of 5-alkoxymethylfurfural ethers as promising biofuel candidates -** Some initial experiments (@ 0.5 g scale of molasses) related to synthesis of 5-alkoxymethylfurfural ethers have been performed. The procurements process related to required materials with reference to this study and others is under process. The reactions related to preparation of alkyl levulinates from the intermediate obtained from molasse were executed. The isolation, purification and identification of the products from the said reaction mixture is ongoing.

5. **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 study is almost completed. One paper is prepared and submitted for DSTA convention. Another one paper shall also be prepared for presentation on a reputed sugar industry platform.

6. **Comparative study of Five varieties of sweet sorghum for production of ethanol yield -** Out of nine only five sweet sorghum varieties only five, namely, Phule Vasundhra, CSH 22SS, SSV 84, SSV 74 and ICSSH-28 performed better as compared to other varieties. So only these varieties were considered for further trials and were sown on in March 2022. Gap filling was

done in April 2022. The crop once matured will be harvested and analyzed for the production of ethanol.

7. **Cane juice syrup study for self-life and production of alcohol -** Two Syrup samples were preserved in Bio-Chemistry division at room temperature, one collected from Dalmia Bharat Sugars Ltd., Jawaharpur- unit and other from Experimental Sugar Factory of the institute. Preserved Syrup showed no appreciable detoriation without addition of any enzyme even after 3-4 months. Study is still on going to observe the shelf life of the same. Data was presented in National Seminar organized by the institute in collaboration with UPSMA on "Modelling of Indian Sugar Industry in Diversification Era.".

8. **Comparative study on polarization by using lead, non-lead, non-lead clarificants and NIR polarimetry -** Procurement of chemicals for NIR polarimetry has been made. Trials of Carrez reagent for clarification of samples is being conducted. The studies on polarising samples in NIR region without using lead as clarifying agent are also being carried out.

9. **Study of B Heavy molasses for use as edible molasses -** Heavy metals analysis of 03 nos. B Heavy molasses samples was performed in Agriculture Chemistry division and the analytical data has been compiled with the previous analysis. More samples are being procured to repeat the analysis to obtain conclusive results.

10. **Use of Guljag Crystasulf for sugar cane juice clarification -** Two sets of experiments were conducted during the period by applying different doses of CRYSTASULF i.e. @ 500 ppm, 800 ppm, 1000 ppm & 1500 ppm to the raw juice & then milk of lime @ 1.2 % v/v was added. Excess alkalinity was further neutralized by adding CRYSTASULF. Then juice was subjected to heating to 101-102 deg.c. and flocculant @ 1 ppm was also applied to facilitate settling of juice. Analysis of juice before & after treatment was carried out for pH, Brix, Pol% Pty & RS% and the preliminary results are encouraging.

11. **Preservation of syrup and B-heavy molasses storage by the use of different chemicals -** 07 set of samples (blank or treated) were stored in custom made molasses tanks. Five samples were from Double Sulphitation Process and other two samples were from Defecation Process. Different does of commercially available enzymes were added to the samples. The samples were analysed for Brix, Pol, Purity, Viscosity, R.S., T.R.S., pH & VFA etc. on fortnightly basis. More experiment shall be carried out to assess rate of deterioration by keeping the molasses samples in water jacketed molasses tanks.

12. **Juice concentration by using Membrane Technology –** Based on the trials conducted at two commercial sugar samples, a paper entitled "Clear juice concentration with the help of reverse osmosis" was prepared and submitted for publication in upcoming STAI convention. During the trials, the clear juice could be concentrated from 12-13^0 brix to about 23-24^0 brix. However, certain drop in purity was observed, perhaps, due to higher retention & microbial activity.

RESEARCH PAPERS:

1. A paper entitled **"Hybrid Sulphitation Cum Re-Crystallization Process for Production of Superior Quality White Sugar"** by Narendra Mohan, V. P. Srivastava, S Mohan & Ashish Kumar was sent for publication in the proceedings of seminar organized by The Deccan Sugar Technologists' Association (India) seminar in collaboration with Vishwaraj Sugar Industries Ltd.

2. A research paper entitled **"Artificial Sweeteners – A Threat to Sugar Consumption"** by Sneha Agarwal & Narendra Mohan was sent for publication in 80th Annual Convention and International Sugar Expo 2022 of Sugar Technologists' Association of India (STAI).

3. A research paper entitled **"A Study to Synthesize Practical Substitute of 5-HMF from Sugarcane Bagasse Cellulose: A Biorefinery Approach to Access Furanic Bifules and Value-Added Products"** by Narendra Mohan, Vishnu Prabhakar Srivastava, Chitra Yadav & Mamta Shukla has been sent for publication in 80th Annual Convention and International Sugar Expo 2022 of Sugar Technologists' Association of India (STAI).

4. A research paper entitled **"HACCP Implementation for Jaggery Processing"** by Ashok Kumar Garg, Anushka Akash Kanodia & Shruti Shukla has been sent for publication in 80th Annual Convention and International Sugar Expo 2022 of Sugar Technologists' Association of India (STAI).

5. A research paper entitled **"Preliminary Trials on Partial Cane Juice Concentration Through Reverse Osmosis Technology"** by Narendra Mohan, Ashok Kumar Garg, Anurag Verma & Priya Bajpai has been sent for publication in 80th Annual Convention and International Sugar Expo 2022 of Sugar Technologists' Association of India (STAI).

6. A research paper entitled **"MECHANICAL VAPOUR RECOMPRESSION – FUTURE TOOL FOR STEAM ECONOMY"** by Narendra Mohan, Mahendra Kumar Yadav & Amresh Pratap Singh has been sent for publication in 80th Annual Convention and International Sugar Expo 2022 of Sugar Technologists' Association of India (STAI).

7. A research paper namely **"Bio Ethanol – Saviour of Indian Sugar Industry"** by Narendra Mohan has been sent for presentation in XXXI Congress of the International Society of Sugar Cane Technologists (ISSCT) to be held from 20-23 February 2023 at the Hyderabad International Convention Centre, Hyderabad, India.

8. A research paper namely **"Importance of Diversification & Integrations in Sugar Industry"** by Narendra Mohan & Anushka Akash Kanodia has been sent for presentation in XXXI Congress of the International Society of Sugar Cane Technologists (ISSCT) to be held from 20-23 February 2023 at the Hyderabad International Convention Centre, Hyderabad, India.

9. A research paper namely **"A biorefinery method for production of chloromethyl-furfural (cmf) and Vanillin with simultaneous fraction of pentose syrup and lignin from sugar cane bagasse"** by Narendra Mohan, Vishnu Prabhakar Srivastava, Chitra Yadav, Mamta Shukla has been sent for presentation in XXXI Congress of the International Society of Sugar Cane Technologists (ISSCT) to be held from 20-23 February 2023 at the Hyderabad International Convention Centre, Hyderabad, India.

10. A research paper entitled **"Novel Steps for Evaporator Configuration to Reduce Steam Demand by Use of Mechanical Vapour Recompressor"** by Narendra Mohan, Mahendra Kumar Yadav & Amresh Pratap Singh was presented during the National Seminar **"Modelling of Indian Sugar Industry in Diversification Era"** at National Sugar Institute, Kanpur on 29th June 2022.

11. A research paper entitled **"Carbonation & Phosphatation Process: A Practical Approach"** by Narendra Mohan, Mahendra Yadav & Amresh Pratap Singh was presented during the National Seminar **"Modelling of Indian Sugar Industry in Diversification Era"** at National Sugar Institute, Kanpur on 29th June 2022.

12. A research paper entitled **"Diversification in Indian Sugar Industry: A Sustainable Sugar-Ethanol Model"** by Narendra Mohan & Anoop Kumar Kanaujia was presented during the National Seminar **"Modelling of Indian Sugar Industry in Diversification Era"** at National Sugar Institute, Kanpur on 29th June 2022.

13. A research paper entitled **"Synthesis of Silica Nanoparticles from Sugarcane Bagasse Fly"** by Shalini Kumari, Vishnu Prabhakar Srivastava and Narendra Mohan has been sent for publication in 80th Annual Convention and International Sugar Expo 2022 of Sugar Technologists' Association of India (STAI).

14. A research paper on "**Production of Activated Bio-Char from sugarcane Bagasse and its application in Decolourising sugar melt"** by Narendra Mohan, Sudhanshu Mohan and Shalini Kumari was published in International Journal of Science and Research in May 2022.

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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 1081 samples to the 229 sugar factories up to June 2022. The details are available on our website *http://www.nsi.gov*.

CONSULTANCY:

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.

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 Bajaj Hindusthan Sugar Ltd., Unit – Palia Kalan District – Lakhimpur, U.P.*
2	*M/s Dhampur Sugar Mills LTD., Unit – Dhampur, District - Bijnor, U.P.*
3	*M/s Dhampur Sugar Mills LTD., Unit – Rajpura, District - Sambhal, U.P.*
4	*M/s Dhampur Sugar Mills LTD., Unit – Asmoli, District - Sambhal, U.P.*
5	*M/s Bajaj Hindusthan Sugar Ltd., Unit – Palia Kalan, (Distillery) Lakhimpur, U.P.*
6	*M/s Kesar Enterprises Ltd., Baheri, District – Bareilly, U.P.*
7	*M/s Majhaulia Sugar Industries Pvt. Ltd., Majhaulia, W. Champaran, Bihar*
8	*M/s Avadh Sugar & Energy Ltd., Hargaon Distillery, Sitapur, U.P.*
9	*M/s M/s Seksaria Biswan Sugar Factory Ltd., Sitapur, U.P.*
10	*M/s M/s Wave Sugar Industries, Unit-Dhanaura Mandi, Amroha, U.P.*
11	*M/s Doon Valley Distillers (liquors Unit) Rajpur Road, Dehradun, U.K.*
12	*M/s Avadh Sugar & Energy Ltd., Unit- Seohara, Bijnor, U.P.*
13	*M/s Bajaj Hindusthan Sugar Ltd. Unit – Bilai, Bijnor, U.P.*
14	*M/s Uttam Sugar Mills, Unit – Barkatpur, Bijnor, U. P.*
15	*M/s Simbhaoli Sugar Mills Ltd., Unit – Simbhaoli, Ghaziabad, U.P.*

16	*M/s Dalmia Bharat Sugar & Industries Ltd., Distillery Unit – Ramgarh, Sitapur, U.P.*
17	*M/s Dalmia Bharat Sugar & Industries Ltd., Sugar Unit – Ramgarh, Sitapur, U.P.*
18	*M/s Dhampur Sugar Mills Ltd., Chemical Division Dhampur, Bijnor, U.P.*
19	*M/s Dalmia Bharat Sugar & Industries Ltd., Distillery, Nigohi, Shahjahanpur, U.P.*
20	*M/s Bajaj Hindusthan Sugar Ltd., Unit – Khambarkhera, U.P.*
21	*M/s Daurala Sugar Works, Unit – Daurala, Meerut, U.P.*
22	*M/s Magadh Sugar & Energy Ltd., Unit–New Swadeshi Sugar, Narkatiaganj, Bihar*
23	*M/s Triveni Engineering & Industries Ltd., Unit – Milak Narayanpur, Rampur, U.P.*
24	*M/s Bajaj Hindusthan Sugar Ltd., Unit – Kinauni, Meerut, U.P.*
25	*M/s EID Parry (India) Ltd., Unit – Sankili, Srikakulam, Andhra Pradesh*

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 Kisan Sahkari Chini Mills Ltd., Sampurna Nagar, Lakhimpur Kheri, U.P.*
2	*M/s The Kisan Sahkari Chini Mills Ltd., Gajraula, Hasanpur, Amroha, U.P.*
3	*M/s Balrampur Chini Mills Ltd., Unit – Akbarpur, U.P.*
4	*M/s Avadh Sugar Energy Ltd., Unit - Seohara, Bijnor, U.P.*
5	*M/s Dalmia Bharat Sugar & Industries Ltd., Unit – Jawaharpur, Sitapur, U.P.*
6	*M/s Magadh Sugar & Energy Ltd., Sidhwalia, Gopalganj, Bihar*
7	*M/s The Seksaria Biswan Sugar Factory Ltd., Biswan, Sitapur, U.P.*
8	*M/s Dhampur Sugar Mills LTD., Unit – Asmoli, Sambhal, U.P.*
9	*M/s Dhampur Sugar Mills LTD., Unit – Meerganj, Bareilly, U.P.*
10	*M/s Dhampur Sugar Mills LTD., Unit – Mansoorpur, Muzaffarnagar, U.P.*
11	*M/s LH Sugar Factory Ltd., Pilibhit, U.P.*
12	*M/s Triveni Sugar & Engineering & Ind. Ltd., Unit – Sabitgarh, Bulanshahr, U.P.*
13	*M/s Wave Industries Pvt. Ltd., Bulanshahr, U.P.*
14	*M/s Triveni Sugar & Engineering & Ind. Ltd., Unit – Raninangal, Moradabad, U.P.*
15	*M/s Majhaulia Sugar Industries Pvt. Ltd., Majhaulia, W. Champaran, Bihar*
16	*M/s Kisan Co-operative Sugar Factory Ltd., Sarsawa, Saharanpur, U.P.*
17	*M/s Triveni Sugar & Engineering & Ind. Ltd., Unit – Khatauli, Muzaffarnagar, U.P.*
18	*M/s Govind Sugar Mills Ltd., Unit- Aira, Lakhimpur Kheri, U.P.*
19	*M/s Triveni Engineering & Ind. Ltd., Unit – Sabitgarh, Bulandshahr, U.P.*

20	*M/s Rasi Nutr Foods India Pvt. Ltd., Tamilnadu*
21	*M/s Kisan Sahkari Chini Mills Ltd., Unit – Kaimganj, Farrukhabad, U.P.*
22	*M/s The Kisan Sahkari Chini Mills Ltd., Unit – Sathiaon, Azamgarh, U.P.*
23	*M/s Maa Mahamaya Sahkari Shakahar Karkhana, Chhattisgarh*
24	*M/s Rana Sugar Sugars Ltd., Shahabad, Rampur, U.P.*
25	*M/s Balrampur Chini Mills Ltd., Unit – Balrampur, U.P.*
26	*M/s ISGEC Heavy Engineering Ltd., Noida, U.P.*
27	*M/s Novel Sugar Ltd., Barkhera, Pilibhit, U.P.*

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OUR OTHER ACTIVITIES:

1. Director, National Sugar Institute, Kanpur instructed departmental canteen to use eco-friendly & 100% bio-compostable crockery made of sugarcane bagasse. As per the new arrangements effective from 1st April, 2022, while the food products shall be served in the utensils made of sugarcane bagasse, the beverages are being served in the earthen pots. This will open new avenues for utilization of sugarcane bagasse.

2. Director, National Sugar Institute, Kanpur attended Symposium on Bagasse Drying which was organized by M/s Seksaria Biswan Sugars Ltd. at Lucknow as a Chief Guest on 8th May 2022. Good discussions on design features and ROI of such systems and brainstorming on reasons for inhibition in adopting such systems were made. The system installed is giving satisfactory results with final bagasse moisture being around 40% only.

3. On Dr. BR Ambedkar Jayanti, National Sugar Institute, Kanpur paid tributes to the son of soil who spread the message of equality and right to education. Dr. BR Ambedkar was an Indian jurist, politician, philosopher, anthropologist, historian, and economist who was a key architect of the Indian Constitution. Words are not enough to describe the role he played for building new India, said Director while addressing the institute employees.

4. Field exposure was given to the students of ANSI - Sugar Technology and Sugarcane Productivity & Maturity Management courses at the institute farm. Students learnt the importance of seed treatment and methods of planting.

5. Karnataka State officials and members of Governing Council of S. Nijlingappa Sugar Institute were visited, to seek support of National Sugar Institute, Kanpur in training of in-service personnel and modernization of sugar factories and allied industries.

6. **"National Technology Day"** was celebrated at the National Sugar Institute, Kanpur on 11th May 2022. Director NSI highlighted the technological advancement in the Indian sugar Industry during the post-independence era. From steam consumption to the extent of about 60% on cane we have reached to about 36% on cane and the sugar factories are not self sufficient in fuel but due to saving of bagasse power export is being taken up. While sugar quality has improved significantly, the sugar losses during processing have also come down from +2.50 % on cane to about 1.8% on cane.

7. An online meeting was held between NSI, Kanpur and ICAR-Indian Institute of Maize Research, Ludhiana to work together for identifying suitable maize hybrids for ethanol production and also for assessing various process parameters to attain higher ethanol yield. The action plan was worked out during the meeting.

8. A team of Ministry Officials under the leadership of Shri Dhirendra Kumar, Director, Department of Food & Public Distribution at National Sugar Institute, Kanpur on 13th May 2022, to observe the status of **"Swachhta Activities"**. They also distributed towels to multi-tasking staff.

9. Meeting with officials of M/s Hydranautics (a Nitto group, Japan company) for conducting further trials of Reverse Osmosis technique for juice concentration in place of existing evaporation technique was organized on 18th May 2022.

10. Badminton court re-opened at Hostel No. 2 of National Sugar Institute, Kanpur on 29th May 2022. Few matches between NSI officials and students of different courses were played.

11. **“World Environment Day -2022”** was celebrated at the institute on 5th June 2020. Director, NSI addressed on possibilities of **"Green Hydrogen"** from sugar industry as the future fuel. Tree

plantation drive was jointly conducted with Jyoti Mahila Samiti followed by distribution of saplings and cloth bags.

12. National Sugar Institute, Kanpur got success in producing another value-added product from the waste of the sugar industry i.e. **"Nano Silica Particles"** from fly ash of the boilers in sugar factories. Nano Silica Particles have wide applications in paints, lithium batteries, as adsorbent in pollution treatment, in bio-technology & bio-medical application and as Nano fertilizer for crop improvement.

13. राष्ट्रीय शर्करा संस्थान द्वारा दिनांक २१ जून २०२२ को "**अंतरराष्ट्रीय योग दिवस – 2022**" का आयोजन किया गया जिसमें संस्थान के अधिकारियों एवं कर्मचारियों ने बढ़-चढ़ कर भाग लिया ।

14. Team of M/s Ponni Sugars (Erode) Limited, Tamil Nadu led by Senior Vice President (Operations) on 25th June 2022, visited to National Sugar Institute, Kanpur to seek support for producing value added items from by-products of sugar industry.

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HAPPENING IN THE SUGAR INDUSTRY:

Nitin Gadkari urges heavy vehicle owners to use alternative fuels like ethanol:

Union Minister Mr. Nitin Gadkari on Monday urged heavy vehicle owners to use alternative fuels like ethanol, green hydrogen and methanol to curb pollution, reports Business Standard. Speaking at an event organised by the Hydraulic Trailer Owners Association, the road transport and highway minister said that pollution is a big concern and I request the heavy vehicle owners to shift to alternative fuels like ethanol, green hydrogen and methanol as they reduce pollution. These are cost-effective as well as import substitutes, he said.

Sugarcane farmers threaten to launch an agitation for pending cane dues:

Sugarcane farmers launched protest against Mahmudabad co-operative sugar mill in Sitapur district over the delay in sugarcane payments reports Newsclick. The mill has not yet cleared the pending cane dues worth Rs 15 crore though the crushing season ended earlier this month, said farmers. As per the rules, the farmers should get their payments within 14 days of the purchase of the cane.

Sugar prices likely to increase in Philippines:

The sugar prices in the country are likely to increase further, said the chairman of the House of Committee on Ways and Means, reports Business Mirror. Albay Rep. Joey Sarte Salceda said, "World sugar prices went as high as 29.3 cents per pound during the recovery period post-GFC [global financial crisis]. Since oil prices have shown a momentum similar to what it did after the 2008-2009 crisis, there is little reason to believe world sugar prices will also approach the levels it did then."

Uttar Pradesh government committed to promote economic interests of sugarcane farmers: Minister:

Within 100 days after returning to power our government under the leadership of Yogi Adityanath has paid Rs 12,530 crore of cane dues to the farmers which is 55 per cent more than the target, said Sugarcane minister Laxmi Narayan Chaudhary, reports The Times of India. He said that till date the government has paid more than Rs 1,76,686 crores to the cane farmers

Ethanol becoming a success story for Indian sugar industry:

Ethanol is evidently being a game-changer for the Indian sugar industry with the aim to enhance India's energy security. The target of 10% blending under the Ethanol Blending Programme (EBP) has been achieved much ahead of the targeted timelines of November, 2022 by the Public Sector OMCs. This achievement has augmented India's energy security, translated into a forex impact of over Rs.41,500 crores, reduced GHG emissions of 27 lakh MT and also led to the expeditious payment of over Rs.40,600 crores to farmers.

With all the initiatives taken by the Government, the EBP Programme is on track to achieve the target of 20% blending by 2025-26 with the sugar industry spearheading the program.

Ethanol blending cheers sugar producers, already lifted by rising demand:

A government decision to bring forward the ethanol blending target of 20% to 2025-26 from 2030 has brought additional cheer to sugar producers, already heartened by rising demand. Ethanol is made from sugar, molasses or grain and like much else, the target of increasing ethanol blending with petrol had to be postponed during the pandemic. Now, under the renewed target, 10% blending of fuel-grade ethanol with petrol should happen this year, increasing gradually each year thereafter and reaching 20% by 2025-26. India's sugar industry had been experiencing tepid growth for years. Between FY14 and FY21, growth was just 3.6%. This situation worsened during the pandemic as demand suffered and inventory levels with sugar producers reached record highs. As the economy has opened up, increasing demand for sugar has helped matters. And the government's decision to bring forward the ethanol blending target provided the icing. To achieve this 20% blending target, India needs an ethanol production capacity of over 10 billion litres. This is an opportunity for sugar producers to step in. An industry representative said the government fixes the price at which it will purchase ethanol once every year and has offered a guarantee that all ethanol produced will be purchased at this price, removing uncertainties and making it easier for sugar companies to plan capital expenditure.Year of all-time highs

Addition of Renewables, Promotion of Energy Efficiency, and use of biomass & green hydrogen are key to Energy Transition:

Union Minister of Power and New & Renewable Energy, Shri R.K. Singh has asked the Chief Ministers of all States, and Lieutenant Governors of Union Territories to set up State Level Steering Committees for Energy Transition. These Steering Committees will work under the chairmanship of the Chief Secretaries of the respective States/Union Territories. The Principal Secretaries of Power and New and Renewable Energy Departments, Transport, Industries, Housing and Urban Affairs, Agriculture, Rural Development and Public Works Departments, etc. will act as members of these Committees.

DTI and Cellucomp introduce packaging material produced from sugar beet pulp:

The Danish Technological Institute, partnering with Scottish CelluComp, have developed Curran, a fibre-based material for packaging made of micro-fibrillated cellulose from sugar beet pulp and an ultra-thin biodegradable coating.

ब्राजील: जून के अंत तक गन्ना पेराई अनुमान से 7.9 प्रतिशत नीचे-

उद्योग समूह Unica के आंकड़ों के अनुसार, ब्राजील की केंद्र-दक्षिण में गन्ना पेराई जून के अंत में बाजार की उम्मीदों से नीचे आई, साथ ही चीनी उत्पादन पिछले साल से गिर गया क्योंकि मिलों ने एथेनॉल उत्पादन पर जोर दिया है । जून की दूसरी छमाही में कुल 41.87 मिलियन टन पेराई हुई, जो एक साल पहले की तुलना में 7.9% कम है, जबकि एसएंडपी ग्लोबल कमोडिटी इनसाइट्स (S&P Global Commodity Insights) द्वारा किए गए विश्लेषकों ने पेराई 42.63 मिलियन टन तक पहुंचने की उम्मीद की थी।

नेपाल: चीनी तस्करी का मामला सामने आया-

कोल्हबी नगरपालिका के धोधरपा से चीनी लदी एक पिकअप वैन को जिला पुलिस कार्यालय बारा ने बुधवार की रात सीज कर दिया। लोकल मीडिया रिपोर्ट के मुताबिक, पुलिस का कहना है की सरकार को सीमा शुल्क का भुगतान किए बिना देश में

तस्करी कर लाए गए 49 बैग चीनी को जब्त कर लिया गया है। बारा के पुलिस अधीक्षक दिलीप सिंह देउबा ने बताया कि, उन्हें सूचना मिली थी कि बुधवार रात भारत से चीनी की तस्करी कर कोल्हावी बाजार में लाया जा रहा है। उन्होंने कहा कि सूचना मिलते ही तैनात पुलिस टीम ने पिकअप वैन को अपने नियंत्रण में ले लिया है।

दक्षिण अफ्रीका का चीनी उद्योग समस्याओं से घिरा-

उत्पादन, निर्यात और रोजगार के सृजन के संदर्भ में मापा जाने पर दक्षिण अफ्रीका का कृषि क्षेत्र सामान्य रूप से सकारात्मक वृद्धि प्रदर्शित करता है। 2020 में, इस क्षेत्र में साल-दर-साल 13,4% की वृद्धि हुई, और 2021 के पूर्वानुमान भी काफी अच्छे है।कोरोना महामारी की के बाद से प्राथमिक कृषि रोजगार अपेक्षाकृत स्थिर रहा है, जिसमें 2021 की चौथी तिमाही में 868000 लोग कार्यरत हैं, और 2021 में निर्यात भी 12.4 बिलियन अमरिकी डॉलर के रिकॉर्ड स्तर तक पहुंच गई है। इस सकारात्मक तस्वीर के बावजूद चीनी उद्योग को कठिनाइयों का सामना करना पड रहा है।

सरकार की प्राथमिकता किसानों को समय पर गन्ना मूल्य भुगतान करना है-

योगी आदित्यनाथ सरकार ने कहा कि, सरकार ने इस साल मार्च में सत्ता में लौटने के पहले 100 दिनों के दौरान कुल 12,530 करोड़ रुपये के गन्ना भुगतान का भुगतान किया है, जो लक्ष्य से लगभग 55 प्रतिशत अधिक है। गन्ना मंत्री लक्ष्मी नारायण चौधरी ने कहा कि, राज्य सरकार ने अब तक 1,76,686 करोड़ रुपये से अधिक का भुगतान किया है। गन्ना किसानों की आय बढ़ने पर जोर देते हुए चौधरी ने कहा कि, सरकार की प्राथमिकता किसानों को समय पर गन्ना मूल्य भुगतान करना है। उन्होंने कहा, राज्य सरकार गन्ना किसानों के आर्थिक हितों और उनके सर्वांगीण विकास को बढ़ावा देने के लिए प्रतिबद्ध है।

उत्तर प्रदेश: गन्ना उत्पादकता में शामली जिला राज्य में अव्वल-

शामली की तीनों चीनी मिलों ने किसानों का बकाया समय पर नहीं चुकाने के बावजूद एक बार फिर से जिले ने सबसे अच्छी गन्ना उत्पादकता हासिल की है। द टाइम्स ऑफ इंडिया में प्रकाशित खबर के मुताबिक, उतर प्रदेश गन्ना आयुक्त के कार्यालय से प्राप्त आंकड़ों के अनुसार, शामली ने इस वर्ष औसतन 1,014.1 क्विंटल प्रति हेक्टेयर फसल उत्पादन दर्ज किया , जबकि मुजफ्फरनगर दूसरे और मेरठ तीसरे स्थान पर रहा।

द्वारिकेश शुगर द्वारा 175 KLPD क्षमता का डिस्टलरी प्लांट शुरू -

द्वारिकेश शुगर द्वारा बरेली जिले के अपनी फरीदपुर इकाई में 175 किलो लीटर प्रतिदिन (KLPD) डिस्टिलरी शुरू हुआ। यह प्लांट 24 जून 2022 को चालू किया गया और एथेनॉल का उत्पादन करने के लिए गन्ने का सिरप और 'बी' हैवी मोलासेस का उपयोग फीडस्टॉक के रूप में करेगा। कंपनी की कुल डिस्टिलरी क्षमता अब 337.5 किलो लीटर प्रतिदिन हुई है। कंपनी ने कहा कि, अब एथेनॉल का उत्पादन दोगुना होगा, वहीं चीनी का उत्पादन संतुलित होगा।

Sugar production in Egypt is expected at 2.8 million tonnes in 2022

There is sufficient sugar stock in the country that can cater to the domestic need for six months, said an official from the Egypt government. The sugar output in the country is expected to be lower from 3 million tonnes in 2021 to 2.8 million tonnes in 2022, said Mostafa Abdel Gawad, head of the Sugar Crops Council.

Pakistan halts decision to import 600000 tonnes of sugar

Stating that importing sugar will be more expensive than domestically produced sugar, the federal government has decided to cancel the importation of 6,00,000 tonnes of sugar, reports local media. To fulfill the requirement, the government has resorted to locally produced sugar instead of

importing the commodity from other countries.
The cost of imported sugar would be around Rs 110 (Pakistan currency) per kg while the locally produced sugar costs Rs 90 per kg, according to the Trade ministry.

Water shortage may impact sugarcane and other crops in Pakistan

Residents of Sindh and other parts of Pakistan are living under extremely hot weather conditions with mercury surpassing 50 degrees Celsius, and water woes are making the situation worse as clean drinking water and water for the crops are diminishing.

Uganda: Shortage of cane leads to closure of sugar mill

Inadequate supply of sugarcane has led to the closure of the Atiak sugar mill in the Amuru district. The sugar mill began operations in 2020 to produce brown sugar using cane from Amuru and Lamwo districts but has to close operations temporarily due to a lack of sugarcane.

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RESEARCH ARTICLE:

SUGAR QUALITY REQUIREMENTS: CHANGING MARKET DYNAMICS

by

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Abstract

Indians are tagged to have a sweet tooth and sugar is one essential commodity which is essentially a part of diet. Yet due to myths associated with sugar consumption and health and propagated on social media, there are certain voices against sugar consumption & extent of intake. The outbreak of covid and advisory issued by WHO also impacted sugar consumption and there is growing demand for natural and healthier food products, including sugar, packed under safe environment. The author here in has discussed all such issues and sugar qualities required to be produced for meeting requirements of various sectors in India. Proposed changes in the processing technology have also been discussed.

Keywords: Sugar consumption, safe food, processing and natural cane sugar.

Introduction

India is the second biggest global entity as regards sugar production (sometimes even no. 1, as anticipated this year and next year also) and is the biggest consumer as well. Overcoming the periodic ups and downs of sugar production, India is now consistently surplus in sugar production from last couple of years. Imbalances in demand supply, issues related to sugar consumption and health, changing consumer preferences, particularly those of industrial consumers and growing awareness about quality has necessitated review of the sugar production strategy by the Indian sugar industry.

At the outset, it is of utmost important that the Indian sugar industry should take up sugar production by environment friendly process which may yield sugar meeting the requirements of various sectors i.e. common consumer, various industrial users and for exports too. The industry is required to think about replacing the existing process of plantation white sugar production with environment friendly process with focus on production of healthier and natural sugars with vigorous marketing so as to create awareness about the nutritional benefit and importance of balanced diet. The process is required to have flexibility to produce different sugar qualities as per the demand of various sectors.

Author has discussed in subsequent paragraphs details about sugar consumption patterns in India, major sectors of industrial consumption and proposed process as substitute of existing Double Sulphitation process of plantation white sugar production.

Quality Changes in Sugar and Production of Speciality Sugars

Over the years, common consumer preferences and perception about the sugar quality has changed significantly. The consumer is now better aware about the quality parameters, source of production, safe processing and packaging. Amidst the covid pandemic, these considerations have gained paramount importance attracting the attention of even common consumers. Since, out of the total sugar consumption, about 60% sugar in India utilised by the bulk consumers which include beverage, pharma, bakery, confectionary and sweets industry, the quality parameters become more specific and stringent. In most of the countries such sugars are produced at added cost and also fetch price premium.

As regards Indian Sugar Industry the quality of sugar has undergone a measurable change. At the time of independence, when sugar colour series of 22,23,24 etc. were prevalent, now superior quality sugar is produced and is traded in 30 and 31 colour series and there is serious discussion on taking it forward by introducing 32 colour series. The number indicates the colour value of sugar, higher the number, better is the sugar quality. Due to continuous surplus sugar production, the country has also resorted to exports under favourable conditions and thus quality considerations are to be kept in mind while producing sugar for this purpose. It is pertinent to mention that mostly raw sugar is traded in the international market.

It is not out of place to mention that apart from pol% and moisture%, the appearance of sugar as colour value is considered as an indicator about the quality of sugar. In India, it is measured in solid state as modulated reflectance value, while in most of the other sugar producing countries, it is measured in solution as ICUMSA value. Higher the reflectance value better is the sugar quality whereas lower is the ICUMSA value superior is the quality of sugar.

Types of Speciality Sugars

Although there may be many types of speciality sugars available in the market, few traded mostly are:

1. Brown sugars which may light or dark brown
2. Liquid sugars

3. Confectioner sugars (Powder sugar or Instant sugar)
4. Cube sugars
5. Candy sugar
6. Fondant sugars (Dry fondant sugar by co-crystallization, Dry fondant sugar by micro pulverization, ready to use Icing Sugar)
7. Amorphous sugars
8. Pharma sugars
9. Low GI sugars
10. Flavoured sugars

Sectors Influencing Sugar Consumption & Production of Speciality Sugars

Factors such as busy lifestyle and changes in dietary preferences are driving demand for baking ingredients due to increased consumption of bakery items. Furthermore, changes in people's routines in developed countries as well as increased demand for ready-to-eat convenient goods are expected to boost demand for specialty sugars. Increasing consumption of bakery and confectionery products is expected to provide growth opportunity for the sales of specialty sugar in the food & beverage industry.

High demand for bakery products is among the key driving factors for the market. The beverage industry is also offering more products that are made using specialty sugars. Robust growth of the bakery and confectionery industry across the globe is likely to accelerate the sales volume of specialty sugars over the coming years, and its market value is projected to expand at a CAGR of around 7% through 2031. Due to increase in the number of artisan bakers, demand for caster sugar has risen in the last decade. However, the bakery industry remains the largest consumer of specialty sugars across the globe, accounting for approximately 30% of overall market value.

Impact of Increased Consumption of Bakery Products on Sales of Speciality Sugars

Rise in demand for western bakery products in emerging economies like India is likely to be a major driver for the specialty sugars industry. Growth of the indigenous bakery products industry in emerging markets such as Asia Pacific and Latin America is expected to be a major factor for market expansion. Due to rising customer interest, household bakery product manufacturing in emerging economies including India is expected to increase significantly, resulting in a healthy increase in specialty sugar demand in the times to come.

Impact of Expanding Retail Sector on Specialty Sugars

Changing retail climate has been one of the most important factors for rising demand for specialty sugar in recent years. Because of growing retail sector and advent of shopping malls, specialty sugars such as icing sugar, powdered sugar, low G.I. sugar, liquid sugar, brown sugar and baker's special sugars are attracting the consumers. Hypermarkets and supermarkets dominate the confectionery industry, and this trend is expected to continue for the future also. Availability of varieties in hypermarkets and supermarkets may be the primary reason for their supremacy in the confectionery industry in developed and emerging economies.

Such markets have a lot of room and a lot of foot traffic. As a result, they have a bigger share of the distribution than other retailers. Despite the global economy being wrecked by the COVID-19 crisis, e-Commerce has thrived and placed itself on an extremely promising growth trajectory.

Cold Drinks and Sugar Consumption

The consumption of cold drinks has seen upsurge in India during the ten years or so because of change in lifestyle, increasing urbanization and changing food habits. The availability of cold drink bottles from small to large packs has also escalated the consumption of cold drinks. Soft drinks are now commonly sold in 600 ml bottles, which means people are consuming up to 16 packets (teaspoons) of sugar with each large sugary drink consumed.

Consumption of Sugar in Chocolates

The markets are now flooded with various chocolate qualities and every type of chocolate has a different sugar content. Dark chocolate, which is high in cocoa, contains much less sugar than milk or white chocolate. The following table shows the amount of sugars in 10 g of chocolate, i.e. a standard portion.

Type of chocolate	g of sugars in 10 g of chocolate (= 1 big square or 2 small squares)
Dark chocolate 70%	2.1
Dark chocolate 40%	4.0
Milk chocolate	5.0
White chocolate	5.7

One portion of dark chocolate contributes 4%, milk chocolate 10% and white chocolate 11% to the maximum amount of sugars recommended per day for an average person (strongly recommended by the World Health Organisation). Interestingly, eating a reasonable quantity of chocolate every day can be part of a healthy diet.

Consumption of Sugar in Ice-creams

Ice cream is another food product which has sizable consumption. Ice-creams in general, contain sucrose ('sugar'), invert sugar, Corn Starch Hydrolysate Syrup (CSS), high maltose syrup, fructose or high fructose syrup, maltodextrin, dextrose, maple syrup or maple sugar, honey, brown sugar, and lactose. Because these sweeteners contribute metabolisable energy to the diet, sometimes they are called 'nutritive' or 'caloric' sweeteners. The most common choice of nutritive sweetener is a combination of sucrose (10-12%) and CSS (3-5%).

Below is a table showing various suggested mix compositions for ice cream.

Composition (%)							
Milk fat	10. 0	11.0	12.0	13.0	14.0	15.0	16.0
Milk solids-not-fat	11.0	11.0	10.5	10.5	10.0	10.0	9.5
Sucrose	10.0	10.0	12.0	14.0	14.0	15.0	16.0
Corn syrup solids	5.0	5.0	4.0	3.0	2.0	–	–
Stabilizer[a]	0.35	0.35	0.30	0.30	0.25	0.20	0.15
Emulsifier[a]	0.15	0.15	0.15	0.12	0.10	0.10	–
Total solids	36.5	37.5	38.95	40.92	40.35	40.3	41.65

[a]Highly variable depending on type; manufacturers recommendations are usually followed

Sugar Consumption Patterns in India

At the global level, overall sugar consumption has been growing by just below 2.0% a year but there has been a flat or slow growing direct or table-top consumption and the rapid growth in industrial (or indirect) consumption through sugar-containing products.

The reasons behind continuing growth in industrial consumption at the expense of direct use of sugar have been:

- demographic changes,
- income growth,
- and growth in the share of urban populations leading to a higher use of convenience food, sugar rich confectionery and soft drinks as discussed in earlier paragraphs also.

Coming to India which is the world's largest sugar consumer, the total sugar use in the country grew from 17.527 mln tonnes in 2005 to about 26.0 million tonnes in 2020. Per capita consumption also improved from 16.3 kg in 2006 to about 20.0 kg in 2019-20 which indicates that consumption dynamics are driven by both population and income growth besides growing urbanization and life style have a pronounced effect on it.

It is pertinent to mention that there are more than 500 operational sugar factories in India, mostly producing direct consumption plantation white sugar, although the country has now 60 sugar refineries which contribute to some extent in catering to the industrial requirements, particularly of, beverage, pharmaceutical and confectionery sectors. Keeping in view the sector specific requirements, production of Sulphur-less, Cube, Candy, Pharmaceutical, Organic, Icing, Castor, Damerara other Brown sugars and liquid sugar etc. is gaining favour. Looking to the international market prices of sugar, support of government from time to time, Indian sugar industry is now exporting sugar mainly as raw sugar to various countries viz. Indonesia, Egypt, Malaysia and Iran etc. The country is all set to export about 10.0 MMT of sugar during the current sugar season 2021-22.

The industrial users' share in total sugar consumption has shown a further increase to around 60%. As per surveys conducted earlier and reports available, bulk consumers contribute for 58-62% of total sugar consumption in the Indian market. Figure 1 gives a broad detail of the sugar consumption structure as per the sector specific requirement in Indian context.

Proposed Process for Sugar Production

As discussed in earlier paragraphs, keeping in view the consumption patterns, sugar of qualities as required for different end usage are to be produced. This along with environment and consumer friendly packaging shall lead to higher price realisation with the step ahead towards branding of India sugar. Indian Sugar Industry mostly employs well known Double Sulphitation process for manufacture of direct consumption plantation white sugar. Previously, Double Carbonation & Double Sulphitation process was also used for the purpose of producing plantation white sugar but has given way due to various technical and commercial reasons. However, in either of the two processes, use of sulphur is inevitable. At present, the consumption of sulphur in India for the production of direct consumption plantation white sugar is estimated to be more than 18,000 MMT per annum.

The Indian sugar factories, keeping in view the requirement of sulphurless sugar, have taken up production of refined sugar majorly by conventional Phosphatation processes or is producing superior quality sulphur-less sugar by avoiding secondary de-colorizing process as adopted in sugar refineries. The conventional Double Sulphitation process has the limitation of yielding desired

quality of sugar i.e. being sulphur-less, lesser ash & invert sugar content and also is of relatively higher colour. The process is also not considered as environment friendly, results in higher inversion losses during processing and also results in corrosion of process equipment and machinery structure. To save foreign exchange required for procurement of sulphur from foreign countries and to produce sulphur-less sugar, experiments/ trials were made early in 1960's to evolve new methods of sugar manufacture in which use of sulphur is eliminated & those can be easily applied in the Indian Sugar factories.

Considering the requirement of sugar for various sectors and to provide nutritive, healthier and natural cane sugar for common consumers. A new process has been envisaged which shall offer flexibility to produce sugar or other required qualities by diverting a stream so as to produce such sugar including the speciality sugars as discussed in the earlier paragraphs. The motive behind the process is to provide healthier option to the common consumers who seldom talk about implications of sugar consumption on health.

For producing the envisaged nutritive, healthier and natural sugar for mass consumption the process shall be comparable with those applied for producing very low colour and very high pol raw sugar with certain modifications. The drying and packaging shall have to be meticulously planned to avoid deterioration upon storage. The figure 1 gives an over view of the envisaged process. It is expected that adoption of the process shall result in saving 18,000 MMT each per annum, besides catering to the need of all sectors.

Direct Consumption of Raw Sugar

The author from the last several years is discussing about the importance of raw sugar and its use for direct consumption. In the present scenario when we aspire for products which are healthier, natural, safe and made out of minimum use of chemicals, raw sugar scores over plantation white sugar. Thus, while changing the processing technology, the raw sugar produced may partly be consumed directly, partly exported (if required) and rest may be melted to produce superior quality white sugar for use by other sectors who demand for such sugar quality.

We must not forget about the sugar qualities which use to prevail in the Indian market about 4-5 decades back and affinity of Indians towards Jaggery, Bura and Khand etc. considering them to be more healthier. At present also, the choice is shifting for brown sugars and organic sugar etc. on similar considerations. Many Africans and other countries freely use raw sugar of 300-500 IU's. The drying and packing technology has changed significantly and there seems to be little apprehensions

on the shelf life of one year or so. Importantly, such sugar may produced at lower cost with higher sugar recovery, benefitting the millers too.

Conclusion

The requirement of sugar quality is now sector specific and has to be planned accordingly. Adoption of a business strategy is required for the purpose which besides removing the doubts in the mind of consumers as regards sugar being sole culprit for various health issues will also result in selling the sugar at premium prices, thus earning higher revenues. If efforts are made sincerely in this direction, it would be possible to offer a healthier sugars for the consumption of common consumers while catering to other sectors also as per requirement.

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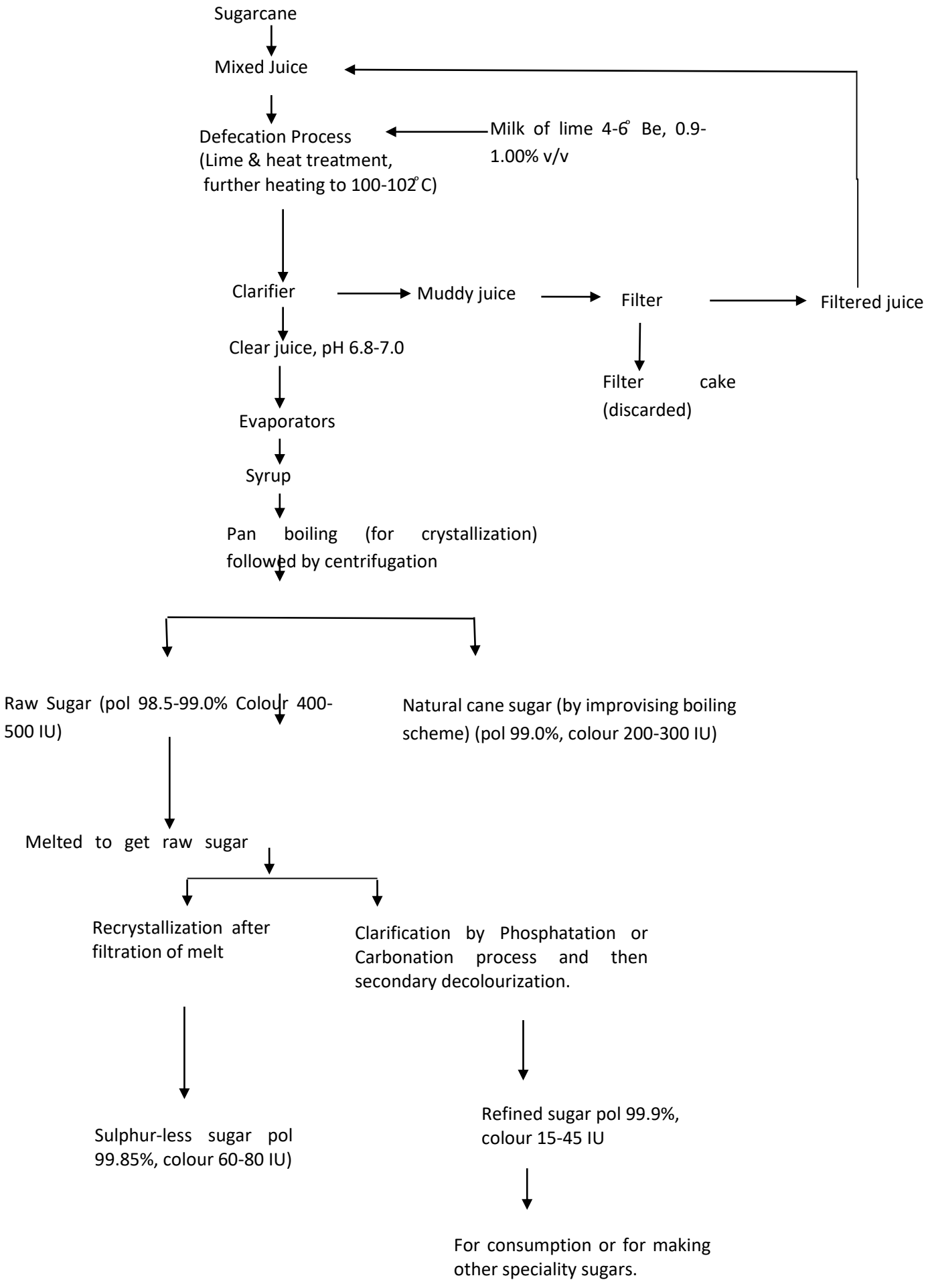

Fig. 1: Flow diagram of Envisaged process

ABSTRACTS

AN OVERVIEW OF PRODUCTION OF RAW SUGAR by Deep Malik, Dy Head (Technical & Sugarcane), ISMA, APRIL-2022

Raw sugar can be defined as partially washed / unwashed, centrifugal sugar with a minimum polarization of 96.5ºZ; surrounded by the original film of molasses. It can be manufactured from either sugarcane or sugar beet; if required may be further refined or reprocessed for making it superior quality sugar in the same or the other facility. In general, it should be free from dirt and extraneous matter and from fermented, musty or other undesirable odour. In this paper, some facts with figures regarding raw sugar production have been discussed, as compared to the production of Plantation white sugar under similar circumstances.

Procedures and Terms used in Global Sugar Trade & Logistics, by AK Sharma, Rajesh Kumar, LS Gangwar and Brahm Prakash ICAR-Indian Institute of Sugarcane Research, Lucknow, ISMA, June-2022

The challenges in the international trading system have been building over decades. Market distortions remain significant in key areas of global trade. Current concerns about the trading system focus both on areas where multilateral trade rules exist but where fair international competition is hindered by continuing high barriers and state support, and on areas where trade rule-making has not kept pace with changes to the global economy.

Weed control in sugar beet with autonomous hoeing and precision spot spraying by Johannes Steinfort, Peter Risser, International Sugar Journal April-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. Under these circumstances, the use an intelligent spot-spray system such as the one developed by Amazone.

Assessment of microbial degradation in factory mixed juice and filtrate by C Shi, CH Bakir, DW Rackemann, WOS Doherty, International Sugar Journal April-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.

ICUMSA 45 – There's more to white sugar than colour, by Karen Pardoe, International Sugar Journal, June 2022

ICUMSA 45 is a term that is frequently found in trade descriptions of white sugar, but its meaning is not clear. There is an implication that the term refers to a certified product or quality, but the use of the ICUMSA 45 term is not well-defined or consistent. A review of relevant and recognised international standards describing white sugar (Codex, EU regulation) clearly shows that there is not a product defined as ICUMSA 45. Recommended methods to determine white sugar quality are most often those defined by ICUMSA, but ICUMSA does not certify products.

How is the value of products derived from sugar beet and sugar cane shared between growers and factories throughout the world? Situation in 2022 and main developments compared with 2015, by Timothé Masson, International Sugar Journal, June 2022

An equitable payment system between sugarcane and sugar beet growers and the factories that process the crops underpins the sector's viability. This study illustrates the diversity of payment systems that proliferate in both the cane and beet industries, with particular reference to those employed in 29 WABCG (World Association of Beet and Cane Growers) member countries.

These vary from the government moderated systems (e.g. Morocco, Turkey, India) to where growers directly participate with sugar companies to fix their crops' price (Australia, Nicaragua, UK). With advances in process conversion technologies which have helped realise increased revenues for factories from

Innovation for Sustainability of the Sugar Agro-Industry By Sushil Solomon, Glaucia Mendes Souza, Raffaella Rossetto & Noé Aguilar-Rivera, Springer, 26 April 2022

The World Commission on Environment and Development (WCED) defines sustainable development is that which meets the needs of the present without compromising the possibility of future generations to meet their own needs. In order to make the sustainable development concept effective, it is necessary to consider it the confluence of social, environmental, and economic issues—the triple bottom line.

Indian Sugar Industry: Towards Self-reliance for Sustainability by S. Solomon & M. Swapna, Springer, 15 April 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.

Sensor-Based Technologies in Sugarcane Agriculture by Angel Pontin Garcia & Claudio Kiyoshi, Springer, 15 April 2022

The sensors allow the delivery of real-time information on a range of production systems,

making each day relevant to the development of autonomous agricultural machinery. The sensors implementation in sugarcane operations is no exception. The objective of this work was to present the technological evolution and the state of the art of the sensors used in the monitoring, decision-making and management process for sugarcane cultivation. This review addresses the sensors involved in the agricultural operations of sugarcane production. For soil preparation and properties, the sensors involved in the diagnosis of compacted areas, depth of the soil preparation tool and monitoring the traction force.

Management of Aphanomyces root rot disease in sugar beet – a review by Laura Grenville-Briggs, Valentina Rossi, INTERNATIONAL SUGAR JOURNAL, 1 JUN 2022

Sugar beet (Beta vulgaris L.) is an important cash crop and is one of the main sources of sucrose, accounting for more than 30% of sugar production worldwide. Sugar beet production is often threatened by soil-borne pathogens, which can attack the roots at all stages of sugar beet development, disrupting entire sugar beet fields and causing severe yield losses. One of the most problematic root diseases in sugar beet is Aphanomyces root rot, caused by the oomycete Aphanomyces cochlioides. This pathogen is globally widespread and is responsible for drastic economic damage in all major sugar beet producing countries.

How is the value of products derived from sugar beet and sugar cane shared between growers and factories throughout the world? Situation in 2022 and main developments compared with 2015 by Timothé Masson INTERNATIONAL SUGAR JOURNAL, 5 JUN 2022

An equitable payment system between sugarcane and sugar beet growers and the factories that process the crops underpins the sector's viability. This study illustrates the diversity of payment systems that proliferate in both the cane and beet industries, with particular reference to those employed in 29 WABCG (World Association of Beet and Cane Growers) member countries. These vary from the government moderated systems (e.g. Morocco, Turkey, India) to where growers directly participate with sugar companies to fix their crops' price (Australia, Nicaragua, UK).

Incidence and economic effects of ratoon stunting disease on the Queensland sugarcane industry by A Jakins, A Schembri, B Quinn, B Spannagle, C Ngo, D Baxter, D Burgess, F Millar, INTERNATIONAL SUGAR JOURNAL, 4 MAY 2022

Ratoon stunting disease (RSD) has had a significant influence on productivity and profitability in the Australian sugarcane industry for at least the last 76 years. There have been few attempts to objectively quantify the incidence and economic influence of the disease across the industry. Most Cane Productivity Service (CPS) groups routinely monitor RSD in plant sources and, in some cases, in commercial crops. Surveys by 12 Queensland CPSs were conducted in 2017-2020 with sampling of different proportions of commercial crops (5-25% of farms) in each region.

Seed-based in vitro propagation to accelerate variety development by Clair

Bolton, George Piperidis, Jason Eglinton, Lihan Zhao, INTERNATIONAL SUGAR JOURNAL, 2 APR 2022

To shorten the current lengthy selection process in sugarcane breeding and to accelerate genetic gain, Sugar Research Australia is implementing a range of novel breeding strategies and selection tactics. One strategy is to rapidly evaluate the progeny of elite crosses in replicated trials without passing through the traditional Stage 1 trials. However, insufficient planting material hinders its adoption. A seed-based in vitro propagation system has been developed for sugarcane in which sodium hypochlorite (bleach) and plant preservative mixture (PPMTM) were used in the sterilisation of seeds and seedlings, as well as in the treatment of infected seedlings.

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Editor

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