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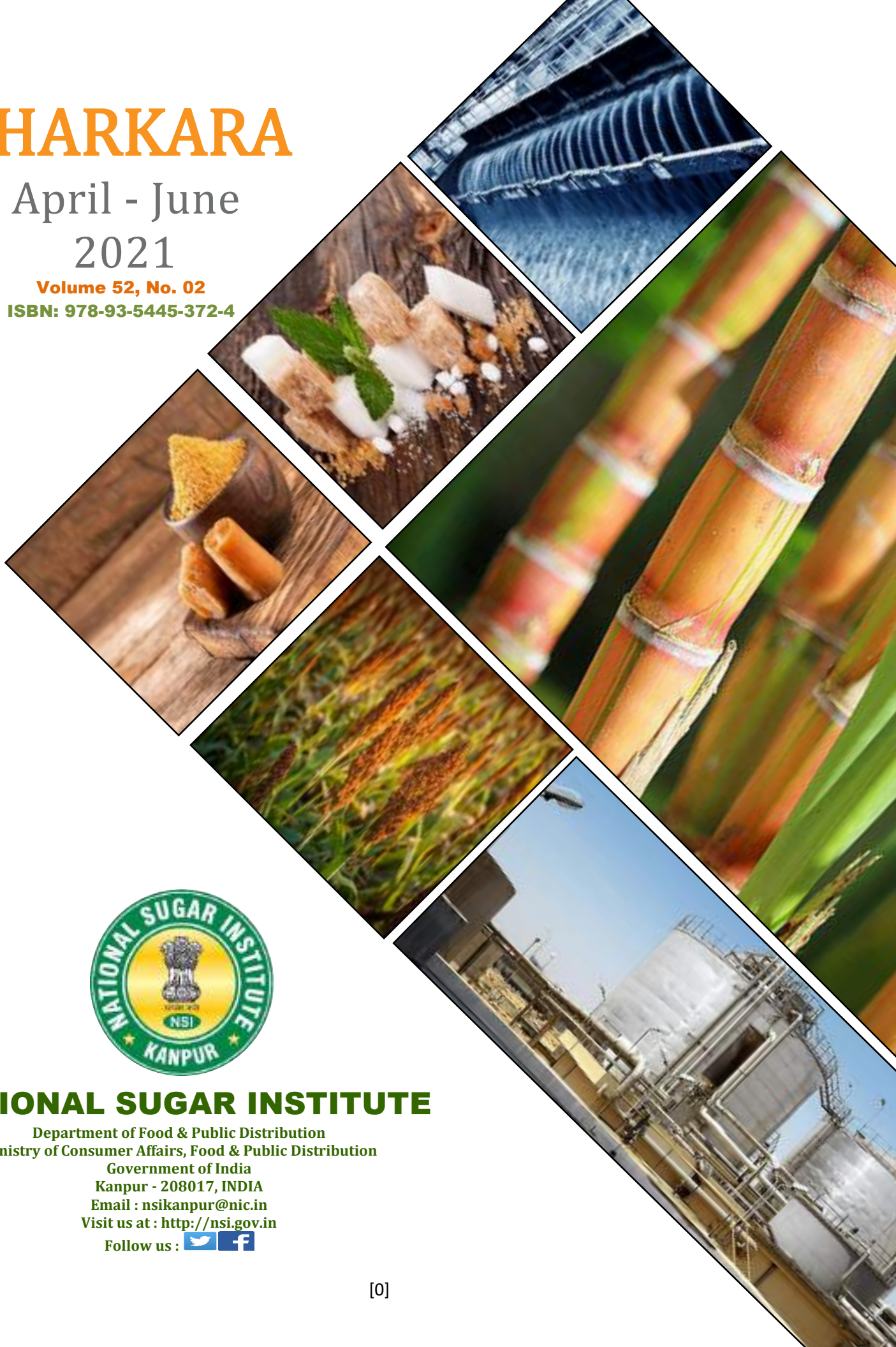

NATIONAL SUGAR INSTITUTE

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SHARKARA

VOLUME - 52, No .02

APRIL - JUNE, 2021

It contains……

CONTENTS PAGE NO.

From Director's Desk...

The sugar production in the country during the season 2020-21 is expected to remain about 30.8 MMT in-spite of possible all time high sugar exports to the extent of 6.5 MMT and diversion of substantial quantities of sugar through B Heavy molasses and cane juice/syrup route for ethanol production. Under these situations, the country is likely to end up with closing stocks to the extent of 95 MMT at the end of current sugar season 2020-21.

On the ethanol blending front also, till May 2021, the country has achieved a blending percentage of 7.66 and there are all possibilities to touch 8.00 or even more. Now with the recent amendments in the sugarcane control order and interest subvention scheme pronounced by the Government of India earlier, the ethanol production is expected to get a boost. Institute also remained active in interacting with the distillation industry to suggest them various models of sugar diversion and solving their issues with respect to use of syrup for ethanol production. A webinar on the subject matter concerning standardization of ethanol plant capacities and modelling of sugar diversion was also organized by the institute besides conducting and an interactive session with UPSMA to resolve issues related to diversion of cane juice/syrup.

Even during the challenging times due to second wave of Covid-19, the institute which remained proactive in conducting various webinars and brain storming sessions etc. on various important topics concerning sugar industry is now gearing up for the next academic session 2021-22, which, for the fresher shall commence from September 2021. The session had to be delayed due to Covid-19 situation in the country which necessitated postponement of entrance examination too to July 2021 now.

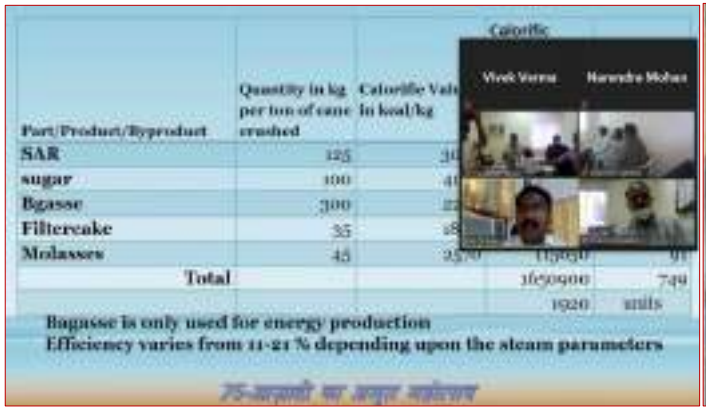
Wishing all of you to remain safe and healthy.

(Narendra Mohan)
Director

OUR PROVISIONS:

WEBINARS ORGANIZED:

1. Under the Auspices of "**Aazadi Ka Amrut Mahotsav**", a National Webinar was organized on 10th May 2021 by National Sugar Institute, Kanpur on important topic "**Sugar Industry-Potential for Providing Bio-energy & Oxygen**". About 200 delegates from different sugar producing states participated. Director, National Sugar Institute highlighted the importance of the topic, particulary, with respect to possibilities of producing Oxygen in view of the current pandemic.Prof. D Swain, Prof. Sugar Engineering, NSI, Kanpur presented issues in utilizing existing MSDH facilities available in ethanol plants for utilization in production of oxygen. Presentations were also made on generating energy using waste streams in a molasses based distillery.



2. National Webinar on "**Standardization of Capacities of Ethanol Plant & Modelling of Ethanol Production**" was jointly organized by National Sugar Institute & SISSTA on 15th June 2021. The webinar was addressed by Joint Secretary (Sugar & Admn.), Director, NSI and other eminent experts.

Presentations were made on need for standardizing the ethanol plant capacities and on possible routes for sacrificing sugar to produce ethanol. Director, National Sugar Institute provided overview of revenue generation in various models including one based on feed stock from sugar factories and grain. Presentations were also made by M/s Excel Engineers & Consultants and M/s Covalent Projects & Engineering Pvt. Ltd., Pune. More than 200 delegates from various sugar producing states participated.

RELEASE OF BOOK:

Book entitled "**Sugar and Sugar Derivatives-Changing Consumer Preferences**" by Narendra Mohan and Priyanka Singh was released on 13th April 2021 at NSI Kanpur. Dr. Rajshekhar, Commissioner Kanpur Division graced the occasion. The book contains history of development of sugar production process, specification of various type of sugars, specialty sugars and other sweeteners. It also contains description of various artificial sweeteners available in the market and being used as a replacement of sugar.



ONLINE MEETING:

National Sugar Institute, Kanpur is to set up a **"WELLNESS CENTRE"** at its campus for providing healthcare facilities to the students. This was decided after an online meeting between the institute administration and officials of various sugar companies including sugar machinery manufacturers. The proposed "**WELLNESS CENTRE**" shall be a four bed air conditioned centre with OPD (outpatient department) facilities to students and staff.

BRAIN STORMING SESSION:

Brain Storming Session on "**After Co 0238- What Next**" was organized by the institute on 29th June 2021. It was inaugurated by Shri Sanjay R Bhoosreddy, Addl. Chief Secretary, Sugar Industry & Cane Development and Excise Deptt., Commissioner Cane & Sugar, U.P. who in his address called upon the scientists for development of newer high yielding and high sugared varieties and to maintain a varietal mix. Shri Narendra Mohan, Director, National Sugar Institute, Kanpur stressed for limiting the percentage of any variety up to 50% only, so that, dependency on a single variety may be reduced.

Shri V K Shukla, Addl. Cane Commissioner, U.P. also graced the occasion. Eminent experts including Dr. A D Pathak, Director, IISR, Lucknow, Dr. J Singh, Director, UPCSR, Shahjahanpur and Shri R L Tamak, ED & CEO, M/s DCM Shri Ram Ltd. presented their views on futuristic approach to develop newer sugarcane varieties. The experts in general expressed their opinion for limiting the area to a certain extent only as suggested by Director, National Sugar Instiute and to work for developing new varieties which can withstand the climate change.

EXPERT LECTURES:

1. Expert Lecture for the benefit of Alcohol Technology students delivered by Mr. Sanjeev Verma, Distillery Head, M/s DCM Shri Ram Ltd., Unit : Hariawan, Hardoi on 31st May 2021. Useful practical hints were provided by him for efficient operation of molasses based ethanol plant. He elaborated various factors for attaining higher fermentation and distillation efficiency, lowering generation of spent wash and requirement of steam per litre of alcohol produced. Mr Sanjeev Verma also discussed about treatment of MEE condensate and importance of water management system.

2. For the benefit of students and staff, Expert lecture on the topic "**Production of Refined/Chemical Free and Specialty Sugars**" was delivered by Mr. Panduranga Rao, Vice President (Technical), Shrijee Group on 4th June 2021. Marathon lecture covered various details of refining and particularly secondary de-colorization, PAC vs Ion Exchange (IER) etc.. He compared various techniques of secondary de-colorization viz PAC, GAC and IER for CAPEX and OPEX. Various specialty sugars viz. liquid sugar, brown sugar, icing sugar and demerara sugar were also discussed by him.

3. Director, National Sugar Institute, Kanpur delivered lecture on the topic "**Sugar Quality, Consumption & Supply Chain Management"** during the expert lecture series organized by M/s Shrijee Process Engineering Works Ltd., Mumbai. Organized online on 23rd June 2021, it was attended by more than 250 delegates. Director, National Sugar Institute, Kanpur discussed need for producing sugar by raw-refined route and adopting safe processing & packaging. He also presented details of various specialty sugars which can be produced and having good market for exports citing the example of Mauritius who is the market leader exporting such sugars to more than 50 countries. He also discussed about need for implementing Quality Management System in sugar factories.

4. Expert Lecture on the topic "**Efficient Milling Technologies**" was delivered by Mr. P S Srivastava, Eminent Sugar Engineer and Managing Director, Enmill Technologies on 24th June 2021. Mr. P.S. Srivastava who is also an alumnus of National Sugar Institute, Kanpur discussed recent development in milling technology with an aim to enhance extraction with lower power requirements. He discussed various configurations of mills and compared the power consumptions of three mill roller mills with pressure feeding devices with two-roller mills loaded with pressure feeding devices.

OUR RESEARCH AREAS:

RESEARCH:

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 - On interpretation of the FT IR spectrum of the reaction mixture, it has been observed that prominent peaks for the vanillin-based motif is missing and peaks for other phenolic aldehydes are present. Thus, there is a need to change the reaction condition to transform the lignin into vanillin based aldehydic motif. The experiments on these activities are under progress.

2. Studies on synthesis of lactic acid from sugarcane bagasse hemicellulose – Experiments have been performed for the production of lactic acid from pure xylose. In order to determine the concentration of lactic acid in reaction mixture is in under progress.

3. Studies on pot-efficient synthesis of alkyl-levulinates (Als) using sugarcane bagasse derived cellulose – The isolated yield of product obtained after purification is 5% on dry bagasse basis. In order to compile the results towards filing patent, literature study on available patents on this product is under progress. The draft application for filing patent on the developed methodology is also under progress.

4. Studies on Production/isolation of C5 – Sugar Alcohol/Sugar using by-product resources of sugar industry - The experiments related to synthesis of xylitol and its determination/identification in reaction mixture have performed by using the procured microbial species (P. farinose NCIM 3461; C. Tropicalis NCIM 3119) and bagasse derived hemicellulose, however results obtained under these studies till date are not fruitful in terms of synthesis of xylitol.

5. Standardization of method for determination Preparatory Index – Cane preparation contributes substantially towards the mill efficiency, mill capacity, bagasse moisture etc. It's assessment is a regular practice in the cane sugar industry for measuring the degree of cane preparation. Some methods, that are in regular practice are based either on measurement on bulk density or extent of cell breakage etc.

In literature survey, it has been found that preparatory index is determined by ICUMSA method, Modified Aldrich & Rayner method and Australian method. Institute carried out the study and analysis of four sets was conducted by all these methods. For the purpose, prepared cane was taken from NSI, Experimental Sugar Factory. Apart from other analysis, preparatory index was observed to be in the range of 70% to 92 % and fiber % cane by direct method was in the range of 11.5% to 15.20%. Further experiments shall be carried out on laboratory shredded cane to arrive at the conclusion.

Based on the experiments conducted and results found in research lab, a research paper is being prepared for publication.

6. To study the impact on performance of mechanically coupled twin induction motor drives for Shredder/Fibrizer having unequal sharing of load and to design & develop dedicated drive for the application - Conventionally, the prime mover for the cane preparatory devices (Kicker/Chopper/Leveler/Shredder/Fibrizer) has been a slip ring induction motor (SRIM). Though the conventional system is appreciably inefficient as a lot of electrical power is dissipated and wasted (to the tune of 8-10% of the actual load) in slip resistance throughout the operation, but this set-up is being running in the industry since decades due to its simplicity and as the other better methods were not in practice when this kind of arrangement was introduced in the industry.

Recently, in few of the factories VFD based Induction motor drive have been installed on each of the mechanically coupled motor of Shredder/Fibriser. The problems associated with the conventional system such as issues of load balancing, inefficient use of drives and lowering of the speed of the motor during peak load conditions have been addressed. But in this newly introduced system, the two drives use individual 6-pulse/12-pulse rectifier circuit because of its simple and low cost structure followed by a 2-level inverter. This leads to injection of harmonics in the input current and may result in rise of problems such as “motor bearing failure” and “motor winding insulation breakdown” because of circulating currents and dielectric stresses.

The present study is being done to quantify the losses associated with the conventional drives, expected issues in the recently introduced VFD based drives and to design and develop prototype of the proposed and improved topology. The expected advantages are -

(1) Saving of power to the tune of 10-15% of the power used for cane preparation.
(2) Smooth operation of electrical installation due to reduced harmonics.
(3) Reduction in Common Mode Voltage (CMV) problems.
(4) Improvement in power factor.

Problems related to point no. (1) and (4) are practically studied, verified and quantified in various sugar mills. The phase shift transformer for realizing 18-pulse in the input current was designed and got developed. The development of other converter and control part is under progress.

7. Utilization of Potash Rich ash for production of valuable bio fertilizer - Bio-fertilizers were prepared by the waste obtained from the boilers in distilleries i.e. potash rich ash which can be used as a suitable carrier for inoculants. Therefore, ash instead of land filling may be used as carrier for production of bio-fertilizers and can generate further revenue for sugar industry. So attempts were made to assess the screening and characterization of isolates from soil and root nodules with multiple beneficial properties like nitrogen fixation, mineral phosphate

solubilization and production of plant growth promoting substances. These prepared bio-fertilizers are applied on sugarcane crop which is ongoing field experiment. The eight different treatments on sugarcane crop are shown below

Treatments	Details of treatments nutrients $Kgha^{-1}$
T_1	Control
T_2	RDF 100% (Recommended dose of fertilizer of sugarcane)
T_3	RDF 100% + PSB
T_4	RDF 100% + Azatobacter
T_5	RDF 100% + PSB + Azatobacter
T_6	Azatobacter
T_7	PSB
T_8	Azatobacter + PSB

The effects of bio-fertilizers on plant growth of sugarcane will be elucidated after the crop harvest.

8. Comparative study of Nine varieties of sweet sorghum for production of ethanol yield - Nine sweet sorghum varieties tested under the collaborative research work with Indian Institute of Millets Research, Hyderabad) for sub tropical region of the country for check the potential of ethanol yield and out of nine only five, namely, Phule Vasundhara, CSH 22SS, SSV 84, SSV 74 and ICSSH-28 performed better as compared to other varieties. Now seeds of these varieties received for further trials and sowing will be done during the last week of July, 2021 to asses the yield and ethanol production.

RESEARCH PAPERS/BOOK CHAPTERS:

1. A research paper on "**A Case Study on Augmentation of Ethanol Based Hand Sanitizer Production Capacities in India**" is published in Indian Sugar- April 2021, by Narendra Mohan and V.P. Srivastava.

2. A research paper on "**Bio-Energy from Indian Sugar Industry: A Sustainable Renewable Energy Future**" by Narendra Mohan & Anoop Kumar Kanaujia, published in International Journal of Engineering Research & Technology (Volume 10, Issue 05 May 2021).
3. A research paper on "**Utilization of Bagasse for Production of Various Valueadded Products**" by Narendra Mohan & Anushka Agarwal, published in Sugar Cogeneration Handbook, Cogeneration Association of India (pp 58-65).

4. A research paper entitled "**Oxygen Production in Sugar & Ethanol UnitsOpportunities & Challenges**" by N. Mohan & D Swain has been published in Emerging Technologies and Innovative Research (JETIR) journal, volume 8, issue 6.

5. A research paper entitled "**Optimization for Achieving Higher de-colorization Efficiency in Sugar Refineries"** by N. Mohan & Mahendra Kumar Yadav has been published in Emerging Technologies and Innovative Research (JETIR) journal, volume 8, issue 6.

6. A research paper on "**Sugar Industry: Importance of By-Product Valorization**" by N. Mohan & Anushka Agarwal has sent for publication in Cooperative Sugar Journal.

7. A research paper entitled "**A Study on the Potential Use of Solar Energy in Sugar Industry**" by Narendra Mohan & Vinay Kumar is published in Sharkara (April-June 2021), National Sugar Institute, Kanpur.

8. A research paper titled "**Bio-ethanol for economic and environmental sustainability**" by Narendra Mohan has been published in Indian Sugar Journal, volume LXXII, pp 23-33.

SALE OF SUGAR STANDARDS:

Sale of sugar standard grades commenced from 1st October 2020 for the sugar season 2020-21. Standard grades can be procured online also. The details are available on our website http://www.nsi.gov.in. Total 221 Nos. of Sugar Factories procured 1111 Nos. Standards till June 2021.

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BUREAU OF SUGAR STANDARDS:

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

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

Price schedule for the sugar season 2020-21:

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

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

OUR ADVISORY:

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

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

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

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

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 from the following on various technical matters relating to diversion of B Heavy molasses, validation of ETP's, preparation of DPR's for various projects and on misc. other technical issues etc. It was extended too in some of the cases during the period.

1	M/s Nanglamal Sugar Complex, Nanglamal, District – Meerut, U.P.
2	M/s The Bargarh Cooperative Sugar Mills Limited, District – Bargarh, Odisha.
3	M/s Dalmia Bharat Sugar & Industries Limited, Distillery Unit – Nigohi, District – Shahjahanpur, U.P.
4	M/s The Haryana Cooperative Sugar Mills Limited, District – Rohtak, Haryana.
5	M/s Dhampur Sugar Mills Limited, Unit – Asmoli, District – Sambhal, U.P.
6	M/s Dwarikesh Sugar Industries Limited, Unit – Dwarikesh Nagar, District – Bjinor, U.P.
7	M/s Avadh Sugar & Energy Limited, Unit – Hargaon, District – Sitapur, U.P.
8	M/s Harinagar Sugar Mills Limited, Harinagar, District – West Champaran, Bihar.
9	M/s Triveni Engineering & Industries Limited, Unit – Khatauli, District – Muzaffarnagar, U.P.
10	M/s Saraswati Sugar Mills Limited, Yamunagar, Haryana.
11	M/s Parle Biscuits Pvt. Ltd., Bahraich, U.P.
12	M/s Triveni Engineering & Industries Limited, Unit – Sabitgarh, Bulandshahar, U.P.

ANALYTICAL SERVICES:

Besides analysis of sugar & sugar house products, Ethanol and effluents, institute started offering testing of Ethyl Alcohol based Sanitizer in its sophisticated, most modern NABL accredited analytical laboratory. Analytical services were rendered to following:

1	M/s Gobind Sugar Mills Limited, Aira, District – Lakhimpur – Kheri, U.P.
2	M/s The Kisan Sahkari Chini Mills Limited, Kaimganj, District – Farrukhabad, U.P.
3	M/s Kisan Sahkari Chini Mills Limited, Sultanpur, U.P.
4	M/s The Kisan Sahakari Chini Mills Limited, Anoopshahr, District – Bulandshahr, U.P.
5	M/s Rudra Bilas Kisan Sahakari Chini Mills Limited, Bilaspur, District – Rampur, U.P.
6	M/s The Ganga Kisan Sahakari Chini Mills Limited, District – Muzaffarnagar, U.P.
7	M/s Sarjoo Sahakari Chini Mills Limited, Belrayan, District – Lakhimpur Kheri, U.P.
8	M/s Dalmai Bharat Sugar & Industries Limited, Unit – Jawaharpur, Sitapur, U.P.
9	M/s Balrampur Chini Mills Limited, Unit – Kumbhi, District – Lakhimpur Kheri, U.P.
10	M/s Dhampur Sugar Mills Limited, Unit – Asmoli, District – Sambhal, U.P.
11	M/s Dhampur Sugar Mills Limited, Unit – Rajpura, District – Badaun, U.P.
12	M/s Dhampur Sugar Mills Limited, Unit – Dhampur, District – Bijnor, U.P.
13	M/s Dhampur Sugar Mills Limited, Unit – Meerganj, District – Bareilly, U.P.
14	M/s Kisan Sahkari Chini Mills Limited, Sampurana Nagar, Distt – Lakhimpur Kheri, U.P.
15	M/s Balrampur Chini Mills Limited, Unit – Babhnan, District – Gonda, U.P.
16	M/s Avadh Sugar & Energy Limited, Unit – Seohara, District – Bijnor, U.P.
17	M/s The Kisan Sahkari Chini Mills Limited, Mahmudabad, District – Sitapur, U.P.
18	M/s Balrampur Chini Mills Ltd., Unit – Akbarpur, District –Ambedkarnagar, UP
19	M/s Balrampur Chini Mills Ltd., Unit – Gularia, , District – Lakhimpur, UP
20	M/s Balrampur Chini Mills Ltd., Unit – Balrampur, District –Balrampur, UP
21	M/s Balrampur Chini Mills Ltd., Unit – Tulsipur, District –Balrampur, UP

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OUR OTHER ACTIVITIES:

1. Mr. Sanjay Awasthi, President, The Sugar Technologists' Association of India & Business Head (Sugar), ISGEC, India completed his Fellowship of National Sugar Institute carrying out research on "**Bio-gas from Filter Cake/Press Mud**" under Shri Narendra Mohan, Director, National Sugar Institute.


2. राष्ट्रीय शर्करा संस्थान मे "विश्व पर्यावरण दिवस" दि 25 जून 2021 को वृक्षारोपण कार्यक्रम "वृक्ष हरा, खुशहाल धरा " थीम के साथ संपन्न हुआ। इस अवसर पर संस्थान मे एक "हर्बल वाटिका" बनाने का निर्णय लिया गया और इसकी शुरुआत गिलोय, परिजात, अश्वगंधा, तुलसी एवं एलोवेरा की पौध लगा कर की गयी। उन्होने चीनी मिलों का भी आव्हान किया कि वह अपने यहाँ सॉलिड व लिक्विड waste के निस्तारण हेतु आवश्यक कदम उठा पर्यावरण की रक्षा सुनिश्चित करें।



3. Director, National Sugar Institute addressed the Indian and Overseas Students on the occasion of "World Food Safety Day". He discussed about safe & hygienic processing in sugar factories looking to growing consumer awareness about the safe food particularly with the outbreak of Covid-19 pandemic. He briefed the students about the quality parameters and also about various certifications viz. GMP, HACCP, BRC and FSSC 22000.


4. Director, National Sugar Institute, Kanpur participated in the 32nd session of ICUMSA organized from 14th to 16th June on virtual platform. He presented his views on necessity of use of non-lead clarifying agents and for conducting studies on polarising raw sugar and molasses samples in NIR region. He also shared his experiences on polarising molasses samples at 589 nm wavelength and offered institute assistance in carrying out collaborative studies.

5. राष्ट्रीय शर्करा संस्थान कानपुर द्वारा योग दिवस की अवधारणा के साथ मनाया गया। संस्थान के " योग करो घर पर रहो" निदेशक श्री नरेंद्र मोहन ने स्वयं योग करते हुए संस्थान कर्मियों एव छात्रों को अपने परिवार के साथ योग करने हेतु प्रोत्साहित किया। उन्होंने कहा की योग द्वारा कोई भी व्यक्ति मानसिक एवं शारीरिक विकास कर एक निरोगी जीवन व्यतीत कर सकता है अतः मानव जीवन मे योग हमेशा ही महत्त्वपूर्ण है।



6. राष्ट्रीय शर्करा संस्थान कानपुर मे राजभाषा हिंदी को सरकारी कामकाज मे बढ़ावा देने हेतु कार्यशाला का ऑनलाइन आयोजन दि 22.6.2021 को किया गया। कार्यशाला मे राजभाषा के अधिकतम प्रयोग हेतु गहन चर्चा की गयी। कार्यशाला मे संस्थान द्वारा आयोजित किये जा रहे वेबिनारों को द्विभाषी करने पर भी जोर दिया गया। कार्यशाला मे संस्थान के बीस अधिकारियों एवं कर्मचारियों ने भाग लिया।

7. Meeting of Institute officials was held with UP Sugar Mills Association (UPSMA) member factories on 25th June 2021 to clarify their doubts on diversion of sugarcane juice/syrup for production of ethanol. Matters regarding brix of syrup i.e. 30-35^0 or around 60^0, recycling of extent of spent wash and its possible effect on fermentation, treatment of spent wash, re-configuration of Evaporators because of diversion of syrup and lesser production of massecuite at Sugar Mill were discussed in detail. Shri Narendra Mohan, Director, National

Sugar Institute and Dr. (Mrs.) Seema Paroha, Prof. Biochemistry answered the various queries of the millers. Shri C B Patodia, President, UPSMA were also present during the discussion and gave his views on the subject matter.

8. In pursuit of developing low cost, environment friendly products from sugar cane bagasse which can be made even at micro or small level, NSI, Kanpur developed many utility and decorative items viz. flower pots, pots for indoor plants, key holders and pen stands etc. Production of such type items may be taken up particularly by "Self Help Groups" dominated by women in the vicinity of sugar factories.

9. For refreshing the knowledge of in-service personnel, National Sugar Institute, Kanpur, India is organizing an "EXECUTIVE DEVELOPMENT PROGRAMME-2021" on virtual platform from 12-16th July 2021. Keeping in view the curriculum of the programme and its utility to the sugar and allied industry, sugar and allied industry was requested to make registrations in large nos. to take benefit of the programme which is to be addressed by eminent experts from India and Abroad.

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HAPPENING IN THE SUGAR INDUSTRY:

USA – Louisiana likely to secure new US$70 million cane bagasse-based pellet plant.
Renewable fuel firm Delta Biofuel is considering building a US$70 million cane bagasse-based pellet plant in Iberia Parish, Louisiana. The state is offering tax breaks and other perks to seal the deal.

Europe's soft drinks industry commits to further 10% reduction in added sugars.
UNESDA, the association representing Europe's soft drinks industry, announced on 29th June that it's committed to reducing added sugar by a further 10%, reported Forbes.

Sweeteners saccharin, sucralose, and aspartame can cause sepsis and other infections.
Researchers at Anglia Ruskin University have discovered that common artificial sweeteners can cause previously healthy gut bacteria into harmful microbes that could cause serious health issues, including sepsis and multiple-organ failure.

Thailand – Loss-making Kumphawapi sugar factory shut down.
The closure of "Kumphawapi Sugar Factory", Kumphawapi District, Udon Thani Province, the first old factory in the Northeastern region was announced on 8th June. The plant has been operating for over 70 years.

India – 16 new ethanol plants for Uttar Pradesh.
Ethanol production capacity is set to be boosted with 16 new plants to be set up during the 2021-22 fiscal year, attracting investment of INR12.5044 billion (US$168 million), according to local press reports.

Vietnam imposes anti-dumping duty of 47.64% on Thai sugar.
Vietnam has imposed anti-dumping duties of 47.64% on some sugar products from Thailand for five years, replacing the temporary tariffs imposed in February, Vietnam's Ministry of Industry and Trade said on 16th June, reported Reuters.

UK-Australia free trade deal threatens sugar beet sector's competitiveness.
British sugar beet growers have expressed concerns over the recently announced UK-Australia free trade deal.

Ethiopia – Ernst & Young to advise on privatization of 10 sugar factories.
The government of Ethiopia is set to hire Ernst & Young Global Ltd as a consultant in its bid to privatize 10 out of the 13 state-owned sugar factories.

South Africa – Sugar tax cost the industry the loss of 10% of its workforce.
South Africa's sugar tax led to the loss of thousands of jobs and hundreds of millions of rands in investment within a year, according to a report commissioned by the National Economic Development and Labour Council.

Cristal Union returns to profit in 2020/21.
France's second-largest sugar maker Cristal Union made a €69 million (US$84.5 million) profit in the year to Jan. 31 in 2020/21, its chief executive told Reuters on 26th May.

Nigeria – Flour Mills to invest US$300 million in new sugar plant plus cane plantation.
Flour Mills of Nigeria (FMN), Nigeria's integrated food business and agro-allied group, recently announced an initial investment of US$300 million to build a new sugar factory in Nasarawa State along with the development of a cane plantation covering 15,000 hectares.

France – New beet washing station at Tereos' Connantre plant – costing €17 million.
A new sugar beet washing station was installed at Tereos' Connantre plant on 17th and 18th May. Costing €17 million, it will be able to process 27,000 tonnes of beets per day – a record in France.

Kenya: Government blamed for sugar sector collapse.
The Kenyan government is entirely responsible for problems facing the sugar industry, according to the Kenya Association of Manufacturer's (KAM) Sugar Sub-Sector report.

Südzucker forecasts increased profits for 2021/22 as sugar market strengthens.
After three difficult years, Südzucker, Europe's largest sugar producer, gave an upbeat outlook for its new financial year with a stronger EU sugar market expected to improve its performance This was announced by the company's board of directors on May 20th at the annual press conference.

Tanzania – US$ 246 million investment at Kilombero Sugar will double production.
Kilombero Sugar Company, in which Illovo Sugar Africa holds a 75% stake and the government a 25% interest, will get an injection of TZS571.6-billion (US$246.5 million) to expand factory capacity.

UK – Sugar beet growers get emergency authorisation for the neonic acetamiprid.
Health and Safety Executive has issued emergency authorisation for the use of InSyst (acetamiprid) on sugar beet following an application by the NFU and British Sugar.

India – Praj to expand Godavari's ethanol plant capacity by 50% to 600,000 litres/day.
Praj Industries has secured an order from Godavari Biorefineries Ltd (GBL) to expand the capacity of its ethanol plant in Karnataka from 400,000 litres/day to 600,000 litres.

India on course to export 6 million tonnes sugar targeted for 2020/21.
India has contracted to export 5.6 million tonnes of sugar so far in the current 2020-21 (Oct-Sept) season, and is expected to conclude deals for shipment of the rest 400,000 tonnes soon, trade body All India Sugar Trade Association (AISTA) said on 11th May.

China – Sugar imports are expected to remain high for the next 10 years.
Sugar imports are expected to remain high for the next 10 years, reaching 5.52 million tonnes in 2030, growing at an annual pace of 5.8%, according to a report released by China's Ministry of Agriculture and Rural Affairs.

Egypt close to self-sufficiency in sugar production.
Egypt is likely to become self-sufficient in sugar production by 2022 according to the Minister of Supply and Internal Trade Ali El Moselhy.

Nigeria – Dangote Sugar shuts down its sugar business in Niger State.
Dangote Sugar Refinery Plc recently announce the closure of its sugar business in Niger State – under the Dangote Niger Sugar Limited, over a land acquisition dispute which has dragged on, according to local press reports.

Ukraine – 2021/22 sugar output forecast to increase by 23%.
Sugar production for 2021/22 is forecast to increase by 23% to 1.4 million tonnes to the 2020/21 estimate, according to the latest report from USDA's FAS.

Morocco – Sugar subsidy via Compensation Fund declines further in 2020.
Morocco's subsidy for sugar has been declining over the past few years. In 2020, the subsidy for sugar dropped to MAD 3.246 billion (US$ 363 million) from 3.37 billion in 2019.

Kenya – Growers welcome 8% price rise for their sugarcane.
Sugarcane farmers have welcomed the move by the government to increase cane prices delivered to millers by 8%, according to local press reports.

ISMA Expects 10% Sugar Production in FY22 to be Used for Fuel Blending.

Close to 10% of the sugar produced in the country in 2021-22, or 3.4 million tonnes, is likely to be used for manufacturing of ethanol for blending with petrol, according to Indian Sugar Mills Association (Isma). With this, ethanol production in FY22 is expected to increase by 35% from the previous year to 4,500 million litres, while availability of sugar will be 31 million tonnes. "After accounting for the reduction in sugar production due to diversion of cane juice and B-molasses to ethanol, ISMA estimates sugar production in FY22 at around 310 lakh tonnes".

Global sugar production 2021-2022 is forecast up 6 million tonnes — USDA.

Global sugar production is forecast up 6 million tonnes to 186 million tonnes as higher production in the EU, India, and Thailand will more than offset the decline in Brazil. It is reported by the US Department of Agriculture (USDA) in its May report. Consumption is forecast to rise to a new record due to growth in markets such as China and India. Exports are forecast up as the increase from Thailand along with strong exports from India will more than offset lower exports from Brazil. Stocks are forecast lower as stocks in Thailand are drawn down in favor of higher exports.

Mexico sugar production is forecast slightly lower in 2021-2022 — USDA

Mexico sugar production is forecast slightly lower to 6,2 million tonnes due to lower sugarcane yields as a result of ongoing drought and poor soil quality. It is reported by the US Department of Agriculture (USDA) in its May report. Consumption is gradually decreasing due to a weak economy and high inflation. Exports are forecast higher, with shipments to the United States projected at the expected level of U.S. Needs, as defined in the amended Suspension Agreements.

Gail India Ltd to set up ethanol plants

Many companies are showing interest to set up ethanol plants in India after the government emphasized its production. Now, Gail (India) Ltd is planning to invest in ethanol plants to help boost the output.

HPCL to set up ethanol plant in Himachal's Una

The Hindustan Petroleum Corporation Limited (HPCL) has decided to set up a grain based ethanol plant here in the Una district with a capacity of 125 KL per day, informed Himachal Pradesh Chief Minister Jai Ram Thakur

Cane Commissioner gives instructions to sugar mills to prepare concrete action plan for upcoming seasons

A Review meeting regarding Cane Preparation and implementation of Development programms in 14 sugar mills areas having cane intensity like Kundarki, Itimaida, Rudauli, Munderwa, Haidergarh, Pratappur, Pipraich, Sathion, Ghosi, Deoband, Gangnauli, Gagalhedi, Visauli and Neoli was held in the Commissioner's office.

Brazil sugar production 2021-2022 is forecast to drop 5% — USDA

Brazil sugar production is forecast to drop 5 percent to 39.9 million tons due to a reduced volume of sugarcane for crushing. It is reported by the US Department of Agriculture (USDA) in its May report. Unfavorable dry weather and incidence of fire outbreak in the fields has lowered volumes. In addition, steady grain prices have encouraged the shift of marginal sugarcane areas to soybeans and corn.

उत्तर प्रदेश में लगेंगी 16 नई डिस्टिलरी-

उत्तर प्रदेश में इथेनॉल के उत्पादन की क्षमता में उल्लेखनीय वृद्धि की जा रही है, क्योंकि वित्तीय वर्ष 2021-22 के दौरान 16 नई डिस्टिलरीज स्थापित की जानी हैं। मीडिया रिपोर्ट के मुताबिक, यह नई डिस्टिलरीज 1,250.44 करोड़ रुपये का नया निवेश लाएगी। इसके अलावा, 11 चीनी मिलों ने भी दैनिक गन्ना पेराई क्षमता बढ़ाने के लिए बड़ा निवेश किया है।

इथेनॉल को बढ़ावा: नितिन गडकरी ने कहा फ्लेक्स-फ्यूल इंजन पर फैसला जल्द

केंद्रीय सड़क परिवहन और राजमार्ग मंत्री नितिन गडकरी ने रविवार को कहा कि, सरकार फ्लेक्स-फ्यूल इंजन पर निर्णय लेगी क्योंकि वह इन इंजनों को ऑटोमोबाइल उद्योग के लिए अनिवार्य बनाने पर विचार कर रही है। उन्होंने कहा की, इस कदम से किसानों की आय में बढ़ोतरी होगी और भारतीय अर्थव्यवस्था को भी बढ़ावा मिलेगा।

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RESEARCH ARTICLE:

"A Study on the Potential Use of Solar Energy in Sugar Industry"

by

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ABSTRACT:

The thermal (steam) and electrical power requirements of sugar industry are met through in-house co-generation plant. The fuel used for the co-generation power plant is bagasse, a residue after the juice is extracted from the sugarcane. Of late, many other value added and more economical alternative uses of bagasse have been reported. There has been tremendous reduction in the cost of solar power installations and the related equipment over the last two decades. Due to the scope of other viable alternative uses of bagasse, the bottlenecks related to the power tariffs and its payments for co-generation power exported to grid, the reduction in the cost of solar installations and the various encouraging schemes of government in the field of solar installations, it is imperative to assess the feasibility of implementation of solar installations in sugar industry. In this paper, a study is presented on the solar energy, both thermal as well as electrical, and its potential use in sugar industry.

Keywords : Solar energy, concentrated solar power.

1. Introduction:

Sugar mills meet their heating and electrical power requirements by producing their own steam and electricity through co-generation plant. For this, they use the bagasse, which is normally about 30% of the weight of the crushed sugarcane, as fuel in the boilers which are specially designed for this purpose. The bagasse obtained after cane crushing is normally more than adequate to meet the in house demand. Hence the excess bagasse is used to produce power to supply to the external grid. But, recently, many other products from bagasse have been reported to be economically viable and more profitable then to use as fuel. Some of the example of uses are in manufacturing particle board, eco-friendly crockery, xylitol, dietary fibre, etc. Increasing demand for raw material for these materials and the recent drive against deforestation has also increased the demand for bagasse as a raw material for other industries. Also, due to the increase of public awareness on environmental protection, the utilities have been forced to use renewable sources with hybrid power system and to modify their operation strategies in order to reduce the pollution and atmospheric emission of power plants. From the year 2007-08 to 2016-17, the compound annual growth rate (CGAR) vis-à-vis increase in consumption rate for various fossil fuels was 1.77% and 2.43

respectively and increase in production rate and consumption rate of electricity had been 4.05% and 7.82% respectively [1]. Keeping in view the higher consumption growth rates than the production of the fossil fuels (though the overall available reserves are fixed), and the increase in demand of electricity as well as the need to divert the bagasse for production of other useful materials, the study of implementation of non-conventional methods, particularly the solar energy in sugar industry, is imperative. In the present paper a study is presented to evaluate the potential of use of solar energy, both thermal as well as electrical, in sugar industry. For thermal energy application of concentrated solar thermal is considered for boiler feed water heating and for electrical energy roof top installation of PV panels is considered for power generation and utilization thereby saving the bagasse.

2. Solar Energy – potential and exploitation:

Since solar radiation is intermittent, solar power generation is combined either with storage or other energy sources to provide continuous power. Also, for small distributed producer/consumers, net metering makes this easy and transparent to the consumer as far as the associated tariffs are concerned. So far India is concerned, it lies in the sunny belt of the world. The scope for generating power and thermal applications using solar energy is huge. Most parts of India get 300 days of sunshine a year, which makes the country a very promising place for solar energy utilization [2].

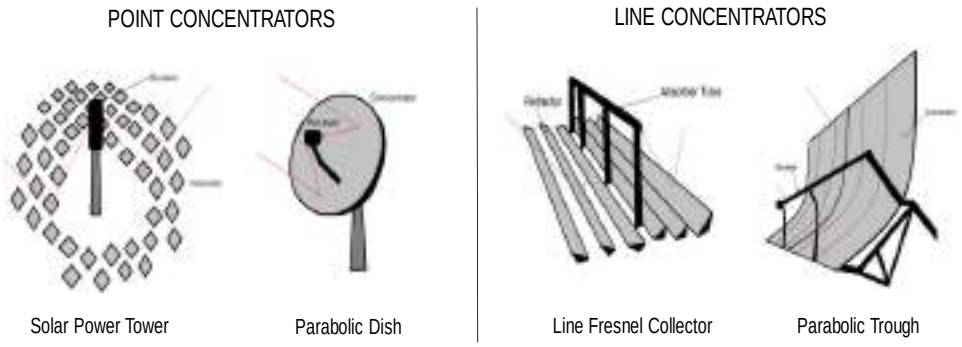
Solar power sector in India has emerged as a fast upcoming section in the last few years. It supports the government agenda of sustainable growth, while, emerging as an integral part of the solution to meet the nation's energy needs and an essential player for energy security. The National Solar Mission (NSM), launched on 11th January, 2010, had set a target for development and deployment of 20 GW Solar Power by the year 2022. The Cabinet in its meeting held on 17.6.2015 had approved revision of the target from 20 GW to 100 GW. However, the target reached upto 40 GW by the end of last financial year 2020-21. Notwithstanding that, from April 2014 to January 2021, the installed solar energy capacity has increased 15 times. Globally, today India stands 5th in Solar Power capacity [3].

Only three renewable energy sources, viz. biomass, geothermal and solar, can be utilized to yield sufficient heat energy for power generation [4]. Biomass is already used in sugar industry by using bagasse as fuel in co-generation plants. Solar energy is yet to be explored for implementing in the sugar industry both for thermal and power applications. The reason might be its self-reliance for the thermal (steam) and power requirement which it meets from bagasse based co-generation.

Most of the parts in the country are having good sunshine with daily average solar energy incident of 4 to 7kWh/m^2. Rajasthan and Ladhak are among the highest irradiance receiving states/UTs and Chhattisgarh, NE states, Uttrakhand and J&K are the lowest irradiance receiving states/UTs [3]. Therefore, most of the sugar producing states, although not in high intensity area, still are in between 5.0 -5.5 kWh/m^2/day which is considered economical to harness and utilize the solar energy. *Solar thermal* technology, and solar photovoltaic (*PV)* are two different forms of solar technology which are used to harness and exploit solar energy.

2.1 Solar Thermal (concentrated solar power) and its potential use in sugar industry

Concentrating solar power (CSP) systems use lenses or mirrors and tracking systems to focus a large area of sunlight into a small beam. The concentrated heat is then used as a heat source for a conventional power plant. A wide range of concentrating technologies exists; the most developed are the parabolic trough, the concentrating linear fresnel reflector, the Sterling dish and the solar power tower. Various techniques are used to track the Sun and focus light. In all of these systems a working fluid is heated by the concentrated sunlight, and is then used for power generation or energy storage [5]. The different types of concentrators and some installations are shown in Fig. 1. Further, the scope of hybrid biomass-solar power generation is also reported in some industries. These plants mainly focus on the integration of biomass combustion boiler



a.

M/s. Kasturi Estates Pvt. Ltd., Chennai, Tamil Nadu

M/s. Mondelez India Foods Pvt. Ltd., A.P.

b.

Fig. 1. Concentrated Solar Thermal; **a.** Types of Concentrated Solar Panels, **b.** Various installed projects

with solar thermal power plant [6]. The same can also be explored for implementation in the sugar industry.

One of the uses of the concentrated solar thermal technology may be to heat the boiler feed water. The calculations based on certain practical assumptions for a 5000TCD plant, for utilizing solar thermal for boiler make up water in raising its temperature from 25 to 90° and thereby saving a substantial amount of existing fuel i.e. bagasse is shown below along with the ROI of the system is shown in the table-1 below –

Table-1

Particular	Unit	Qty
Plant Capacity	TCD	5000
Steam Consumption	TPH	104
Feed water requirement	TPH	107
Makeup Water Requirement	TPH	11
Inlet Temperature	deg C	25
Outlet Temperature	deg C	90
Heat requirement/hr	kcal	697396
Heat requirement/day	kcal	16737500
Boiler Efficiency	%	70
Bagasse Calorific Value	kcal/kg	2270
Bagasse Required/day	kg	10533
Surplus Power/day	kWh	4681
Season days	Days	160
Surplus Power/year	kWh	749039
Cost of Surplus Power	Rs(lakhs)	36
Cost of Project	Rs(lakhs)	350
ROI	Years	9 -10

Solar drying is a method of dehydration used to dehydrate food products which means reducing the moisture content from the food to improve its shelf life by preventing bacterial growth. It is still used in domestic up to small commercial size drying of crops, agricultural products and foodstuff such as fruits, vegetables, aromatic herbs, wood etc. contributing thus significantly to the economy of small agricultural communities and farms [7]. Presently, this type of drying is limited to food industry and to dry some agricultural products. In their study in [8], the authors have shown that using solar dryers if the bagasse moisture is reduced to 50%, 40% and 30% then for a power output of 100MW, the weights of bagasse fired was found to be 37 ton/h, 32 ton/h and 30 ton/h respectively and the amount of emissions are found as 90 kg/h, 80 kg/h and 70 kg/h corresponding to these cases [8]. Therefore, the concept can be extended for bagasse drying in sugar industry. However, the requirement of huge sized structure and the process being a slow drying process, may be the limiting factor for the implementation.

2.2 Solar Photo Voltaic (PV) and its potential use in sugar industry

A solar cell, or photovoltaic cell (PV), is a device that converts light into electric current using the photoelectric effect. The photovoltaic cell is a solid-state device composed of thin layers of semiconductor materials which produce an electric current when exposed to light. Photovoltaic power generation employs solar panels comprising a number of cells containing a photovoltaic material. Materials presently used for photovoltaic include mono-crystalline silicon, polycrystalline silicon, amorphous silicon, cadmium telluride, and copper indium selenide/sulfide. Due to the growing demand for renewable energy sources, the manufacture of solar cells and photovoltaic arrays has advanced considerably in recent years. Concentrating photovoltaic's (CPV) is another new method of electricity generation from the

sun. Solar tracker are also used to keep the focal point upon the cell as the sun moves across the sky. Tracking can increase flat panel photovoltaic output by 20% in winter, and by 50% in summer [2].

By drawing a comparison between the cost of material and conversion efficiency, power projects for sugar plant is decided and the cost of such projects range comes around Rs. 4.5 Crore per MW, after accounting the subsidy element from the government. Mainly, two types, grid-connected solar parks and roof-top solar technologies are prevailing in the area of solar PV systems as shown in figure 2.

a. **b.**

Fig.2 .; **a.** Bhadla Solar Park, Rajasthan, **b.** *(top)* Roof-top PV installation, Tezpur University, Assam: *(bottom)* Roof-top PV installation, National Sugar Institute, Kanpur, Uttar Pradesh

For the grid-connected Solar PV Power Projects, Ministry of New & Renewable Energy (MNRE) has issued the guidelines for Tariff Based Competitive Bidding Process for Procurement of Power from Grid Connected Solar PV Power Projects for long term procurement of electricity by the procurers, having size of 5 MW and above. Therefore, the grid connected sugar industry can avail the benefits by installing PV power plants having size 5 MW and above [3]. However, this is subjected to the availability of large barren/useless land area of about 30 acres (for 5MW) while using thin film technologies (12.5% efficiency) [4]. This much large barren/useless land may not be available in most of the sugar factories.

Rooftop solar technology has experienced a huge drop in price over the recent years and advanced development in the technology with increased system efficiency has made an extremely lucrative investment option for industries. For roof top PV installations government offers different schemes and fixed subsidized rates of installation. For 100-500kWp slab as Rs36/- per watt for other than special category states and an additional of Rs.4/- for special category states/UTs [9]. The sugar mills, as per locations, by and large fall in the former category.

Considering available rooftops of office building, sugar and other go-downs, general stores, etc., suitable for installing the PV panels a 1000kWp roof top installation is considered

in table-2 for a 5000TCD plant assuming area availability of rooftop as 10000m^2 using thin film technology.

Table-2

Particulars	**Unit**	**Value**
Area used for Solar PV system	m^2	10000
Solar PV System rating	kWp	1000
Power generated per day	kWH	2880
Power generated per annumn	kWH	1080000
Unit rate of Power	Rs/kWH	5
Total Cost of Power Generated	Rs (Lakh)	54
Cost of installation	Rs (Lakh)	360
Pay back period (approx.)	Years	6-7

The above is subjected to the assumption that regular cleaning of the panels is ensured as the dust/ air borne bagasse particle may settle over the panels and affect its efficiency upto 10% [10]. Further, MNRE scheme supports Biomass based Cogeneration Projects in Sugar mills and other Industries for power generation in the country and Central Financial Assistance (CFA) provides financial assistance for bagasse cogeneration projects. The schemes were valid till 31.03.2021 [11]. The proposal for continuation of the above-mentioned schemes is under review and may be continued. This may discourage the millers to opt for solar PV as government is still promoting the bagasse based co-generation for the power generation.

3. Conclusion:

The potential of use of solar energy in the sugar industry is studied both for thermal and PV application. The solar thermal (concentrated solar thermal) may be implemented for heating purpose but it is highly capital intensive option with a payback period of around 10years. Its expertise and operating manpower is also limited being emerging technology. Grid connected solar PV system is feasible (utilizing govt. assurance for long term procurers) if installation is for more than 5MW which shall require a large area barren (useless) land of atleast 30acres. This much of barren/useless land may not be available with most of the sugar mills. Off-grid (roof top) solar PV is implementable and pay back period is around 6-7 years for a 1000kWp roof top plant. However, extra manpower to keep the panels clean shall have to be kept for consistently better efficiency of the system. Therefore, in comparison to two technologies, solar thermal and solar PV, the solar PV proves better option in terms of RoI besides the constrains mentioned in the paper.

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ABSTRACTS:

Changes in colour during dropping-pan crystallisation by David Moller published in International Sugar Journal in April, 2021.

Sampling was undertaken during the 2017 crushing season at three factories during A and B dropping-pan operation to monitor changes in different sugar-quality parameters due to changes in pan-boiling procedures. The sampling program included batch and continuous pan operations. The parameters measured in the sugar and affined sugar during the period from the initial charging to the final dropping conditions were colour, pol, moisture, ash, glucose, and fructose. Analyses were also performed on the massecuite samples collected during the pan run-up and dropping. The full set of results can be obtained through Sugar Research Australia Limited.

Comparative performance of factory clarifiers with automatic or pump mud extraction systems by Maria del Carmen Perez, Stephania Imbachi-Ordonez, Jose Diaz, Gillian Eggleston & Peter Gaston published in International Sugar Journal in April, 2021.

A comparative investigation between two high retention time (HRT) clarifiers operating in parallel with different mud extraction systems was undertaken to evaluate their performance across the 2019 processing season at one Louisiana sugarcane factory. The factory operated a hot lime clarification process. One clarifier had an automatic (gravity) mud extraction (AMEC) system and the other a pump mud extraction (PMEC) system. Sample collection included five samples of Heated Limed Flash Juice (HLFJ), Clear Juice (CJ), and Mud, taking into account retention times, with a 30 min interval between sampling. Sampling periods were repeated six times during the processing season.

Labile C as an indicator of the impact of trash removal on soil health in the sugarcane production system by F Muñoz published in International Sugar Journal in April, 2021.

The use of sugarcane harvest residues (trash) for alternative uses such as energy cogeneration or second-generation ethanol production has generated uncertainty about the impact of the removal of waste on soil health. In order to study the impact of this practice in the long term, an experiment was established in 1999 at the CENICAÑA experimental station in Colombia. Ten years after the experiment was initiated, organic matter was assessed as a possible indicator of the impact of different trash management options. However, as it was difficult to detect significant changes in its concentration, it was decided to investigate labile.

Evaluation of sugarcane borer (Diatraea saccharalis) resistance among commercial and experimental cultivars in the Louisiana sugarcane cultivar development program by Blake E. Wilson, W.H. White, R.T. Richard & R.M. Johnson published in International Sugar Journal in April, 2021.

Stem boring Lepidoptera, including the sugarcane borer (Diatraea saccharalis), are the primary economic pests of sugarcane in Louisiana, USA. Borer-resistant cultivars are a key component of pest management programs. Continued assessment of borer resistance among new sugarcane cultivars is needed to optimize management programs and improve development of new

cultivars. Field studies were conducted from 2013 to 2016 to evaluate levels of resistance to D. saccharalis among commercial and experimental sugarcane cultivars. A range of resistance was observed among cultivars with 4- to 26-fold reductions in D. saccharalis injury by resistant relative to susceptible cultivars across trials.

Exploiting lignocellulosic feedstocks for lignin and chemicals by Arvind Chudasama published in International Sugar Journal in May, 2021.

Over the past decade, there has been considerable research on cellulosic biofuels. This involves breaking down biomass residues be it crop or wood waste into component parts cellulose, hemicellulose and lignin, and breaking down the former two further into C5 and C6 sugars to make them available for the production of fuel ethanol via the conventional fermentation routes. There has been considerable research, by both biotech start-ups and government research establishments, to develop process conversion technologies to produce purified lignin, a valuable commodity and platform chemical from which to produce a variety of other useful chemicals and final products.

Economic evaluation of post-harvest cane cleaning by SP Ginns, GA Kent, W Johnston, JH Panitz & BG Robotham published in International Sugar Journal in May, 2021.

This paper examines three cane supply treatments, Commercial Harvesting, Low-Loss Harvesting and Low-Loss Harvesting plus Cane Cleaning, to determine if post-harvest cane cleaning offers economic benefits over current harvesting strategies. The project involved field and factory measurements of different harvesting and cane-supply strategies in an effort to identify strategies that maximise the total industry benefit, considering, in particular, the cost of the harvesting and cane-supply strategy, the resulting cane loss and the impacts of the resulting extraneous matter in the cane supply. The economic analysis quantified harvesting costs and the resulting product income.

Energy traits in three sugarcane cultivars in Tucumán, Argentina by JV Díaz, S Ostengo, DD Costilla, MA Golato, M Aybar Guchea, S. Zossi, ER Chavanne, D Paz, M. Ruiz & MI Cuenya published in International Sugar Journal in May, 2021.

Bagasse (stalk fibre) and agricultural harvest residues (AHR) obtained from sugarcane are considered energy sources that can contribute to reducing the use of non-renewable fuels. The purpose of this work was to characterize the main sugarcane cultivars grown in Tucumán according to the yield of fibre and AHR and their energetic quality components for use as fuel in steam boilers. Three sugarcane cultivars (Tuc 95-10, TucCP 77-42 and LCP 85-384) were evaluated in four trials distributed throughout the sugarcane growing area of Tucumán. The trials were planted in a randomised complete-block design with three repetitions.

Experience gained from perforated mill rolls in Réunion by Camille Roussel, Olivier Macé, Patrick Ricquebourg, Bertrand Mazeau & Vianney Tailamee published in International Sugar Journal in June, 2021.

Perforated rolls (also known as Lotus rolls) have been in use for some time in sugar mill tandems. High drainage rates were expected when such designs were provided. However, blockages often occurred, and

this design of mill rolls did not spread worldwide. Nowadays, improved design of shell materials, of holes and juice drainage capacity reduces blockages. In Réunion, the two sugar mills implemented perforated rolls in their extraction processes in 2017. The main objectives were to improve juice drainage and reduce maintenance costs of the Messchaert grooves.

High-vibration incidents at the Proserpine, Victoria and Plane Creek shredders – actions and response planning by J Rozis published in International Sugar Journal in June, 2021.

During the 2018 crushing season, Victoria Mill's B side Shredder developed reoccurring high levels of vibration with variability in the phase angle following the processing of low-quality cane. Over a course of weeks, the vibration levels trended upward until reaching unacceptable levels (>10 mm/s). Vibration analysis trends indicated an out-of-balance phase angle shift. This followed evidence of a phase-angle shift at the Proserpine Mill when the disc pack was found to be loose. With 10 weeks until the end of crush, attempts were made to reduce the vibrations at Victoria Mill to acceptable levels and manage the operational capacity.

Process control and sugar crystallization by Steven Murphy & Leonie Wong published in International Sugar Journal in June, 2021.

The process of always producing sugar crystals of a defined size in large volumes requires a robust process control strategy. With sustainability a key focus of most sugar producers, the challenges are to maintain consistency (reduce wastage, rework) and reduce dependence on human interaction as staffing levels in all operations are already stretched. Siemens is working with sugar manufacturers both in Australia and around the world to help with process control strategies whether in continuous vertical or horizontal pans, or in vacuum batch pans. This presentation aims to show through case studies and reference examples how Siemens has helped.

Effective quarantine: Interception of sugarcane diseases in the last 20 years has protected the industry from exotic threats by Nicole Thompson & Elizabeth Wilson published in International Sugar Journal in June, 2021.

Sugar Research Australia Indooroopilly has a post-entry quarantine facility that imports foreign clones per year. The imported clones are used for germplasm improvement in the SRA breeding program, with approximately 50% of the released cultivars having at least one foreign clone as a parent. Quarantine of clones prior to their entry into the Australian sugarcane industry is important to prevent exotic pests and diseases. There have been many changes to quarantine since the industry began over 100 years ago, from no precautions at all, to the comprehensive system that we have today.

Small-scale growers and contractors: Understanding the working relationship to improve the quality of sugarcane delivered by S Dube & RJ Nicholson published in International Sugar Journal in June, 2021.

Small-scale sugarcane growers (SSGs) have significant challenges affecting their production, such as low yields, rising costs, and poor quality sugarcane. In most cases, SSGs rely on contractors for planting, ratoon management, harvesting, and haulage of sugarcane. Therefore, the

relationship between the two parties is critical to ensure that quality sugarcane is delivered to the mill. The purpose of this research was to understand the dynamics of SSG contracting systems in certain mill areas, to highlight issues in contractor services, and to provide recommendations for solutions to challenges highlighted by growers and contractors.

Sugarcane leaf hopper Pyrilla perpusilla Wlk. (Homoptera: Lophopidae) and its management by P. Mahesh, and J. Srikanth published in Indian Sugar Journel in May, 2021.

Sugarcane, Saccharum officinarum L., a major commercial crop grown throughout the world in tropical and sub-tropical conditions, is cultivated in over 4.87 Mha in India with a production of 377.766 Mt and productivity of 77.61 t/ha, according to 2019-20 estimates. Sugarcane is attacked by a number of insect pests resulting in loss in yield, poor juice quality and low sugar recovery. In India, the leaf hopper Pyrilla perpusilla Wlk. (Homoptera: Lophopidae), commonly known as pyrilla, is an endemic pest of sugarcane in the subtropics where it often reaches epidemic levels; it exhibits occasional outbreaks in tropical India. Besides the primary host sugarcane, pyrilla has also been recorded on several other cultivated crops such as maize, sorghum, rice and wheat, and wild grasses including Saccharum spontaneum L., Erianthus munja Roxb. and Pennisetum purpureum Schum.

Sustainable Sugarcane Farming under Changing Scenario of Bihar by A.K. Singh , Navnit Kumar and Lalita Rana published in Indian Sugar Journel in June, 2021.

In present scenario the Bihar Agriculture as a whole is undergoing several transformative changes. Growing population, changing lifestyles, expanding urbanization and accelerating climate changes are creating new challenges for Bihar agricultural research and development. Bihar is an agriculture dominating state and its economy mainly depends on agriculture. About 77% of the population primarily engaged in agriculture which contributes about 35% to the state domestic product. Sugarcane occupies an important position in agrarian economy of Bihar. The area under sugarcane during 2019-20 is soared up to 3.15 lakh hectares and during 2018-19 state produced 182.85 lakh tonnes of cane with an average productivity of 60.15 tonnes /hectare (Deptt. of Cane Development, Govt. of Bihar). During current season more than 8.40 lakh tonnes of sugar was produced by sugar mills of the state.

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