

# SHARKARA

July – September, 2019

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## NATIONAL SUGAR INSTITUTE

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# SHARKARA

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*Stability in the sugar prices and revision of ethanol rates has brought some relief to the Indian Sugar Industry. The news coming from Maharashtra and Eastern Uttar Pradesh indicates possible sugar production of the extent of 28 million tonnes during sugar season 2019-20. The crushing operation in West Maharashtra, Eastern Uttar Pradesh & Bihar may commence after 15<sup>th</sup> November 2019 as a result of heavy & late rains. The only word of caution will be the availability of molasses as it would be comparatively lesser than last year and because of the growing demand with more ethanol units coming up as a result of financial assistance being extended by the Government of India. Although many sugar factories have intended for diversion of B-Heavy molasses for ethanol production but it will be interesting to see its magnitude with changes in the sale price of sugar.*

*Alternate feed stocks for ethanol, production of sugar to meet domestic and global requirements and utilization of by products in innovative manner has to be explored for economic and environmental sustainability of the sugar industry. Alternate usage of bagasse, in particular, for production of niche products viz. dietary fibre, nano materials and surfactants to products like particle board facilitating bulk consumption are also required to be made after careful market studies.*

***Wishing a very smooth & successful crushing season 2019-20.***

**(Narendra Mohan)  
Director**

## OUR PROVISIONS:

### SEMINAR ORGANIZED/PARTICIPATED:

1. National Seminar on "**Indian Sugars- Standardization & Quality Considerations**" was jointly organized by NSI-BIS-Maarc Labs at the institute on 26th September, 2019 at NSI, Kanpur. Delegates from BIS, New Delhi, Maarc Labs., Pune & sugar industry as well as students of the institute participated in the seminar.



Presentations were made on sugar standards prevalent in other countries & as accepted for global trade. Standard methods and protocols for analyzing various quality parameters were presented and deliberated. Importance of food safety management was also emphasized during the seminar.

2. Director, NSI participated in National Seminar on "**Food Chemistry, Processed Food and Toxicology**" and delivered Presidential Address on "Quality aspects of Indian Sugars for global competitiveness" on 25th September, 2019 at Department of Chemistry, D.A.V., PG College Kanpur. He called upon for implementation of quality management system and product quality as per international standards for global competitiveness.



3. Director, National Sugar Institute delivered Mangal Singh Memorial Lecture on the topic "**Sugar Industry- As I look at it**" during the 77th Annual convention of STAI held on 17-19th July, 2019 at Biswa Bangla Convention Centre, New Town, Kolkata, W.B. In his lecture, he stressed upon need for diversification and integration of the sugar industry with other food processing industries. He emphasized upon increasing revenue generation from other sources rather than depending heavily on revenues from the sugar.

## WORKSHOP ORGANIZED/ATTENDED:

1. A workshop on 5th September, 2019 on the topic “**Production of Particle Board from Bagasse**” was organized at National Sugar Institute, Kanpur. The workshop was aimed to discuss possible use of bagasse for production of particle board for manufacture of furnitures. An elaborate study was presented by M/s Protos Engineering Pvt. Ltd., Mumbai on relative cost-economics & quality.



2. Shri D. Swain, Prof. Sugar Engineering & Shri Anoop Kumar Kanaujia, Asstt. Prof. Sugar Engineering attended the National Conference on “**Sugar Tech – 2019**” organized by Confederation of Industry (CII) at Lucknow on 19th September, 2019. The institute participated as “**Knowledge Partner**” in the conference.

3. Director, National Sugar Institute attended “**Bharatiya Sugar Symposium**” on 20-21st September, 2019 at Kolhapur on the topic of “Sustainability of Sugar Industry”. He also addressed the delegates on “**Economics & Environmental Sustainability of the Sugar Industry**”.



## EXPERT LECTURES:

Under the aegis of Scientific Society of Council of Students Activities, Expert Lectures were organized at the institute for the benefit of staff and students:

1. Shri Manoj Kumar Goel, General Manager (Production), Simbhaoli Sugars Ltd., delivered a lecture on “**Specialty Sugar in India, Production Process and Market Demand**” on 21st August, 2019.



2. Shri D.K. Goel, Consultant delivered a lecture on **“Mill Efficiency Improvement and New Technology”** on 29th August, 2019 emphasizing on reducing power requirement at mills. He presented details of various configurations of milling tandems with respect to extraction efficiency and power consumption.



3. Dr. S.K. Nayak, Assistant Director, Shriram Institute, New Delhi delivered a lecture on the topic **“Transition on to ISO/IEC 17025-2017 and Related Requirements for our Analytical Lab”** for the benefit of staff and students on 09th August, 2019.

4. Dr. Droupti Yadav, Asstt. Professor, CSJM University delivered an expert lecture on 02nd September, 2019 on the topic **“Pollution Control in Sugar & Alcohol Industry”**.



5. Shri H.S. Shukla, Alcohol Technologists from Indore distillery delivered an Expert Lecture on 30th September 2019 on **“Grain Based Distillery- Different Raw Material Options, Economy & Process”**.

## TRAINING PROGRAMME ORGANIZED:

Three days training programme on **"Validation & Efficient Operation of Effluent Treatment Plants (Sugar)"** conducted at the institute from 11-13th September, 2019. Training on theoretical & practical aspects of effluent management was imparted to the participants. Dr. Sushil Solomon, Vice Chancellor, CSA University of Agriculture & Technology graced the occasion and distributed the certificates to the participants.



## VISITORS FROM ABROAD:

1. Mrs. Emilia Cartier, Attaché for university, scientific and technological cooperation visited the institute. She gathered information on various courses being conducted by the institute.



2. A 15 -member delegation from Cane & Sugar Board, Thailand and Thailand Society of Sugarcane Technologists visited the institute for looking at academic and research activities on 16th August, 2019. The delegation discussed possibilities of undertaking collaborative research on the areas of development of value added products.



## OUR RESEARCH AREAS:

The Institute is actively involved in the collaborative endeavors with the sugar and allied industries for developing innovative techniques and technologies for improving the overall profitability of the sugar industry.

The Institute during the period took up R&D work on the following:

### RESEARCH:

**1. Utilization of potash rich ash for production of valuable bio fertilizer-** Studies on viability of prepared bio fertilizers (Rhizobium; PSB & Azatobacter) were carried out during the period. Isolation and purification of new bio-fertilizer is in progress e.g. Tricoderma. These prepared bio-fertilizers (Rhizobium; PSB, Azatobacter & Tricoderma) will be used for field trials. Cost economics of bio-fertilizers was also worked out.



**2. Ethanol production from sugar** - Experiments for ethanol production using sugar as raw material, both on lab scale and pilot plant scale are in progress to assess the fermentation & distillation efficiencies and thus the possible yield of ethanol. The experiment is also being carried out to standardize the process parameters.

**3. Studies on the feasibility of utilization of sugarcane bagasse as a potential feedstock to access cosmetic ingredients** - In order to validate the developed method, reactions were performed on 20 g scale starting from bagasse (first replicate). Out of involved steps, two steps have been completed (Synthesis, isolation and identification by TLC).

**4. Studies on Production/Isolation of C5-Sugar Alcohol/Sugar using by-product resources of sugar industry** - The experiments related to implement the Ru - C/ iPrOH based catalytic system to access a sugar alcohol (xylitol) from bagasse derived xylose syrup have been completed. Results are not encouraging and optimization reactions are under progress. Furthermore the Organic Chemistry division is also aiming to implement fermentative conditions to access the target compound and will compare the results obtained under above catalytic system.



**5. Studies on pot-efficient synthesis of alkyl levulinates (Als) using sugarcane bagasse derived cellulose** – The Organic Chemistry division carried out several experiments towards establishing the optimum conditions to obtain methyl levulinate directly from bagasse or pretreated bagasse implementing various metal catalysts under Parr auto-clave reactor. Out of these a copper salt is found to be efficient to facilitate such reactions. Under the optimized reaction conditions methyl levulinate was synthesized from bagasse (@ 5gm scale dry bagasse). The purification & characterization of the compound are under progress.



**6. Mechanical Clarification of Juice** – Initial experiments on mechanical clarification of cane juice showed positive results. Further studies on adoption of mechanical clarification technique to reduce the basic chemicals like lime & sulphur in the sugar manufacturing process were carried out during the period. For further analysis work, procurement action for suitable centrifuge machine was initiated and modified work plan has been prepared and will be taken up during season 2019-20.

**7. Use of Brine reject in Final Molasses** – Analysis of various molasses & brine reject samples collected from Khatauli, Simbhaoli & Naglamal sugar units, was carried out during the period. More samples of molasses & brine reject are to be collected & analyzed during forthcoming crushing season 2019-20 so as to assess effect of brine reject on molasses quality upon storage.

**8. Settling test at inclined surface** - Experiments with newly designed SSRT were carried out at ESF during season 2018-19. Results were found encouraging. Some modification in the design based on the results are being carried out for further experiments during season 2019-20.

**9. Boiler RO/DM water heating by Concentrated Solar Thermal (CST) system** - The literature survey has been completed and corresponding formulation of technical specifications/ material indenting is in progress. Efforts shall be made to work out the cost economics of the CST system and its comparison with the conventional system.

**10. 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 literature survey is under progress. Data for various combinations used in sugar factories is also being collected. Simulation work is under progress. Further work is to be carried out during the forthcoming crushing season.

## RESEARCH PAPERS/ POSTER / PRESENTED / PUBLISHED/ SENT FOR PUBLICATION:

1. **“Bio-Energy from Filter Cake”** by Sanjay Awasthi, SeemaParoha& Narendra Mohan published in the proceedings of 77<sup>th</sup> Annual Convention and International Sugar Expo of Sugar Technologists’ Association of India held on 17-19<sup>th</sup> July 2019 at Kolkata.
2. **“Effect of Potassium Application on Nutrient Uptake, Yield and Quality of Sugarcane & Sustainable Soil Health”** by Ashok Kumar, Lokesh Babar, Narendra Mohan & Surinder Kumar Bansal published in Indian Journal of Fertilizers in July, 2019.
3. **“Utilization of Sugarcane Bagasse as Dietary Fibre”** by Neelam Chaturvedi, V. P. Srivastava, Seema Paroha & Narendra Mohan published in the proceedings of 77<sup>th</sup> Annual Convention & International Sugar Expo of Sugar Technologists’ Association of India held, 17-19<sup>th</sup> July 2019 at Kolkata.
4. **“Moisture Reduction in Bagasse with Minimum Investment”** by Sanjay Chauhan & Narendra Mohan published in the proceedings of 7<sup>th</sup> **Bharatiya Sugar Symposium 2019**”, organized in July 2019 at Kolhapur, Maharashtra.
5. **“Valorization of Sugarcane Bagasse as a Potential Feedstock to Access Cosmetic Ingredients”** by Narendra Mohan, V.P. Srivastava &Tushar Mishra published in the proceedings of **“77<sup>th</sup> Annual Convention and International Sugar Expo of Sugar Technologists’ Association of India”** held on 17-19<sup>th</sup> July 2019 at Kolkata.
6. **“A 3 – Level Invertor based Induction Motor Drive for Cane Preparation in Sugar Industry”** by Vinay Kumar & Sanjiv Kumar sent for publication in the proceedings of IEEE sponsored 2nd International and Intelligent Control seminar to be held on 18-19<sup>th</sup> October, 2019 at Greater Noida.
7. **“Measures for Indian Sugar Quality Improvement”** by Narendra Mohan, A.K. Garg & Mohit Kumar, was presented in the National Seminar on "Indian Sugars- Standardization & Quality Considerations" jointly organized by NSI-BIS-Maarc Labs. on 26<sup>th</sup> September, 2019 at NSI, Kanpur.
8. **“Sugar Quality: Requirements of Institutional and Retail Customers”** by V.P. Singh, was presented in the National Seminar on "Indian Sugars- Standardization & Quality Considerations" jointly organized by NSI-BIS-Maarc Labs. on 26<sup>th</sup> September, 2019 at NSI, Kanpur.
9. **“Quality Management – Important aspect for Indian Sugar Industry”** by Narendra Mohan, M.K. Yadav & Km. Anushka Agrawal, was presented in the National Seminar on "Indian Sugars- Standardization & Quality Considerations" jointly organized by NSI-BIS- Maarc Labs. on 26<sup>th</sup> September, 2019 at NSI, Kanpur.
10. **“Review of Milling Efficiency”** by D. Swain was published in the proceedings of **“77<sup>th</sup> Annual Convention and International Sugar Expo of Sugar Technologists’ Association of India”** held on 17-19<sup>th</sup> July 2019 at Kolkata.

## ➤ 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 Expert Committee on sugar standards was held at NSI, Kanpur on 25<sup>th</sup> September 2019, wherein seven grades and their sale price were approved for the sugar season 2019-20.

On the basis of the approved Standards, Bureau of Sugar Standards Grades distribution commenced from 1<sup>st</sup> October, 2019.

### Price schedule for the sugar season 2019-20:

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 + 3 Velvet Cork in packing case	Rs.19000/= each set
3	Single Sugar Standard Grade	Rs.2500/= each
4	Empty Sugar Standard Glass Bottle	Rs.400/= 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 2019-20, payment shall be acceptable only through <b>BHARAT KOSH</b> . In any circumstances, <b>no Demand Draft/ Cheque/ Cash amount shall be accepted.</b>
9	Delivery of Sugar Standard Grades	Monday to Friday (10.00 AM to 5.00 PM)
10	Taxes	GST extra as applicable @18%. See SSOP

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 function of the institute is:

1. To function as a “Think-tank” to sugar and allied industry for proposing modernization and trouble free functioning of the process on advisory basis / through Extension Services.
2. To formulate strategies and promotes measures for expansion of capacities, energy conservation, co-product utilization etc. for sugar and allied industries.
3. To assist Govt. of India through technical contribution in policy formulation and control of Sugar Industry.

## CONSULTANCY SERVICES:

During July-September, 2019 consultancy services were provided to the following:

1.	M/s K.M. Sugar Mills Ltd., Moti Nagar, Distt – Faizabad, U.P.
2.	M/s Kesar Enterprises Limited, Baheri, Distt – Bareilly, U.P.
3.	M/s RadicoKhaitan Limited, Distt – Bareilly, U.P.
4.	M/s Uttarakhand JalVidyut Nigam Ltd. – Uttarakhand.
5.	M/s Harinagar Sugar Mills Ltd., Distt – West Champaran, Bihar.
6.	M/s Jind Co-operative Sugar Mills Ltd., Jind, Haryana.
7.	M/s The Kisan Sahkari Chini Mills Ltd., Tilhar, Distt – Shahjahanpur, U.P.
8.	M/s Central Pollution Control Board , New Delhi.
9.	M/s Shamanur Sugars Limited, Davangera, Karnataka.
10.	M/s Global Cane Sugar Services Pvt. Ltd., New Delhi.
11.	M/s U.P. State Sugar Co-operation Ltd., Unit – Mohiddinpur, Distt – Meerut, U.P.
12.	M/s Reliable Cashew Company Pvt. Ltd., New Mangalore, Karnataka.
13.	M/s U.P State Sugar Co-operation Ltd., Lucknow, U.P.

## ANALYTICAL SERVICES:

The institute now has a Centralized NABL Accredited Analytical Laboratory to carryout analysis of sugar, molasses, alcohol and other related products as ICUMSA and other standard protocols.

During the period July-September 2019, analytical services were rendered to following units for analysis of samples of sugar, molasses, alcohol and waste waters for various parameters:

1.	M/s Maa Mahamaya Sahakari Shakkar Karkhana Maryadit, Ambikapur, Distt - Surajpur, Chhattisgarh.
2.	M/s The Kallakurichi Co-op. Sugar Mills Ltd., Distt - Villupuram, Tamil Nadu.
3.	M/s Perambalur Sugar Mills Ltd., Eraiyur, Distt - Perambalur, Tamil Nadu.
4.	M/s District Food & Sales Officer, Kanpur Nagar, U.P.
5.	M/s The Salem Co-operative Sugar Mills Ltd., Mohanpur, Namakkal, Tamil Nadu.
6.	M/s The Sonipat Co-operative Sugar Mills Ltd., Sonipat, Haryana.
7.	M/s National Co-operative Sugar Mills Ltd., Distt - Madurai, Tamil Nadu.
8	M/s Arignar Anna Sugar Mills Ltd., Distt - Thanjavur, Tamil Nadu.
9	M/s M.R. Krishnamurthy Co-operative Sugar Mills Ltd.,Distt - Cuddalore, Tamil Nadu.
10	M/s The Kisan Sahkari Chini Mills Ltd., Unit - Satha, Distt - Aligarh, U.P.

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

## OUR OTHER ACTIVITIES:

1. Orientation Programme for the freshers was organized at the institute on 30<sup>th</sup> July, 2019. On this occasion Director, National Sugar Institute addressed the students and stressed upon for upgrading professional skills and to have a successful balanced life in order to keep away frustration, unfairness and isolation.



Education in charge and hostel warden's also addressed the students and briefed them about the various rules & regulations.

2. Prof. Narendra Mohan, Director, Dr. A. Bajpai, Prof. Sugar Technology & Shri Subhash Chandra, Junior Technical Officer were conferred with Noel Deerr Gold Medal for the best research paper during the 77<sup>th</sup> Annual convention of STAI held on 17-19<sup>th</sup> July, 2019 at Biswa Bangla Convention Centre, New Town, Kolkata, W.B.



3. Mr. Rajneesh Tyagi, an alumni (pass out of Alcohol Technology Course), at present working with North West Bio-Energy Ltd., Canada, & also as Visiting Professor, Department of Chemical and Biological Engineering at University of Saskatchewan, Canada visited the institute for recruitment of Alcohol Technologists on 05<sup>th</sup> August, 2019. He also interacted with the students of various courses and discussed areas of bio-products development in sugar factories with the staff of the institute.

4. Institute continued it's efforts for creating awareness about environment protection and in this series a programme on **"Tree Plantation"** was organized on 06<sup>th</sup> August, 2019.

5. On the 73<sup>rd</sup> **Independence Day**, Director, hoisted the National Flag at the Institute and addressed the staff, students and faculty members. The prizes were distributed to Staff and Students who emerged as winners during various competitions organized during the Swachhta Pakhwada.



6. Director, NSI addressed **Technical Conclave** organized by M/s DCM SHRIRAM LTD. (DSCL) at Lucknow on the topic “**Control of Process Parameters for Higher Technical Efficiency**” 7<sup>th</sup> August, 2019. He gave an overview of the standard operating procedures in the processing house for attaining optimum technical efficiency.



7. Campus interviews were conducted by M/s Dalmia Bharat Sugar Mills Ltd., M/s Saraswati Sugar Mills Ltd., M/s DCM Shriram Ltd., M/s ISGEC, M/s Balrampur Chini Mills Ltd., & M/s Uttam Sugar Mills Ltd. for placements from various courses during the period.



8. 15 nos. B.Sc. (Ag.) students of Pacific University, Udaipur for “RAWE” programme under ICAR-IISR, Lucknow visited the institute on 29<sup>th</sup> August, 2019 to seek information on sugarcane cultivation & processing.



9. The Annual Function of the “**Scientific Society**” under the Council of Student’s Activities was organized on 18<sup>th</sup> September, 2018. Quiz, presentation & other related competitions were organized on this occasion. Dr. Rajpal Singh, Advisor, International Finance Corporation (World Bank Group) and an eminent Sugarcane Technologist graced the occasion as Chief Guest. “**SUGRATHON**” was also organized on the topic “**Water Conservation in Sugar & Ethanol Processing**” in which students participated enthusiastically.



10. “**VishwakarmaPooja**” was organized in the Experimental Sugar Factory & Instrumentation Division on 17<sup>th</sup> September, 2019.





11. Meeting of the Committee of Experts constituted by the Govt. of India under the Chairmanship of Director, National Sugar Institute for approval of Sugar Standards Grades for the season 2019-20 was held on 25<sup>th</sup> September, 2019. The distribution of Standards shall commence from 1<sup>st</sup> October, 2019. The details with respect to grades, prices and their procurement procedure are available on the institute website [http://: nsi.gov.in](http://nsi.gov.in).



12. The students of various courses organized a function to celebrate the **Fresher's Party** on 06<sup>th</sup> September, 2019. Many activities viz. singing, dance and mono-acting etc. were performed by the students. Mr. & Ms. Fresher were also selected during the event. The staff and the senior students of the institute welcomed the fresher's and wished them a successful career ahead in sugar and allied industries.



13. संस्थान में दिनांक 1से 14 सितंबर, 2019 के दौरान हिंदी पखवाड़ा मनाया गया तथा हिंदी दिवस पर पुरस्कार वितरण समारोह संपन्न हुआ। हिंदी पखवाड़ा के दौरान आयोजित विविध प्रतियोगिताओं में विजेता कर्मचारियों एवं छात्रों को पुरस्कृत किया गया।



14. Under the Swachhata activities, **“Swachhata Hi Seva”** & **“Plastic Waste Management”** were also organized at the Institute from 11<sup>th</sup> September, 2019.



Various activities like tree plantation, cleaning activities in & around surroundings, awareness on reducing single use plastic wastes, inspiring the primary school students about the importance of cleaning, conducting drawing competition on **“Swachhata Hi Seva”** & **“Plastic Waste Management”** in a nearby primary school were conducted.

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## **HAPPENING IN THE SUGAR INDUSTRY:**

### **Cane growers in western Kenya switch to growing pawpaws.**

Farmers in parts of western Kenya have abandoned sugar cane for the more lucrative pawpaw farming, according to local press reports.

### **Tanzania – 2018/19 sugar output increased by over 16%.**

Sugar production increased by 16.8% to 359,219.25 tonnes in 2018/19 from 307,431.26 tonnes in 2017/18, Deputy Minister for Agriculture, Omary Mgumba, told Parliament.

### **Russia – 2019/20 beet sugar output to peak at over 6.4 million tonnes.**

Russia is expected to produce a record 6.4-6.7 million tonnes of beet white sugar in 2019/20 compared with 5.9 million tons in 2018/19, said the **Institute for Agricultural Market Studies (IKAR)**.

### **China – Sugar industry calls on government to maintain tariffs on sugar imports.**

Chinese sugar mills plan to ask the nation's Ministry of Commerce to extend hefty tariffs on sugar imports that Beijing imposed in 2017 to protect China's struggling domestic sector, according to two sources and a draft document viewed by Reuters.

### **Mexico – Sáenz Group puts on sale its three mills for US\$360 million.**

The family-owned Sáenz Group has put up its three mills for sale for MXN7 billion (US\$360 million), according to local press reports.

### **Brazil – Sugar-ethanol producer Grupo Moreno files for bankruptcy protection.**

Grupo Moreno, which operates three plants in the heart of Brazil's sugarcane belt in Sao Paulo state, filed for bankruptcy protection on 18th September, reported Reuters. This was triggered by negotiations with creditor banks failing – the company's debt is estimated by the source at around BRL2 billion (US\$483.44 million).

### **South Africa – Government considering phasing out sugar import tariffs.**

Signs that import protection tariffs for the sugar industry might be phased out indicated a turnaround in government thinking on this issue, SA Sugar Importers Association chief executive Chris Engelbrecht said on 5th September, according to local press reports.

### **Brazil – Tariff-free ethanol imports quota increased to 750 million litres.**

The Brazilian government has renewed and increased the size of its tariff-free quota for ethanol imports from 600 million litres to 750 million litres, but the new allotment will last only one year instead of the two years allocated to the former quota that expired on 31st August, according to the country's official gazette, reported Reuters.

### **Cashew nut shells source of environment-friendly sunscreens.**

A team of international scientists led by the University of the Witwatersrand have developed the production of biobased sunscreen using the shells of cashew nuts that is environmentally-friendly compared with the ones currently produced from petrochemicals.

### **Indian government approves subsidy to export 6 million tonnes sugar.**

India's cabinet has approved a mega assistance package for sugar mills to export up to 6 million tonnes sugar during in the 2019-20 marketing starting October to aid the cash-strapped millers, reported Reuters.

### **Uganda – Madhvani making more money from selling surplus power to grid than sugar.**

The Madhvani Group of Companies has said that its sugar business is not competitive in the current market – selling surplus cogenerated power and ethanol are significantly more profitable.

### **Fiji – Input subsidies for cane growers from the government.**

Sugarcane growers in Fiji will continue to benefit from the government's grant towards the cost of fertilizers and herbicides, according to local press reports.

### **Philippines – Roxas sells its sugar mill to Tanduay.**

Sugar and ethanol producer Roxas Holdings Inc.(RHI) agreed to accept the improved offer of Tanduay Distillers Inc. to purchase the former's PHP6.5 billion (US\$123.9 million) sugar mill and refining facilities in Nasugbu, Batangas.

### **India – Ethanol blending rate expected to rise to 5.8% as output increases.**

India's average blending rate for ethanol in gasoline is expected to reach a record 5.8%, up from a previous record 4.1% last year and considerably higher than historical levels according to the United States Department of Agriculture's Foreign Agriculture Service recent report.

### **Philippines – Top senator chides SRA for not fully spending allocated budget to drive improvements in the sugar sector.**

The Senate Committee on Agriculture and Food will be conducting a hearing on 15th August to look into the alleged failure of the Sugar Regulatory Administration (SRA) to implement the Sugar Industry Development Act (SIDA) for underspending the allocated budget.

### **El Salvador – Millers invite the government to incentivise ethanol production.**

As a structural sugar exporter, El Salvadoran sugar millers have been hit low sugar prices and are now planning to diversify by expanding into cane-based biofuels production, said yesterday the president of the Sugar Association of El Salvador (AAES), Mario Salaverría, according to local press reports.

**Tanzania – Local billionaire to invest US\$148 million in the cane sugar sector.**

The Tanzanian businessman Mohammed Dewji is to invest US\$ 148 million in the sugarcane industry, according to the Russian press wire Regnum. This is part of the US\$375 million his company is planning to invest in the over the next five years.

**Lanza Tech secures investment of US\$72 million from Novo Holdings to expand its carbon capture technology.**

The biotech start-up Lanza Tech has secured an investment of US\$72 million from Novo Holdings to scale-up its production of sustainable fuels and chemicals, according to the press release from the two firms.

**Mozambique – Government considers saving the closure of two TongaatHulett’s sugar mills.**

The Mozambican government’s Institute for the Management of State Holdings (IGEPE) is negotiating with various partners to obtain finance to prevent the paralysis of two of the country’s sugar mills, according to local press reports citing the Minister of Industry and Trade, Ragendra de Sousa.

**La Réunion and Guadeloupe cane sectors granted €38 million by France.**

The French government has renewed for one year the state aid to La Réunion and Guadeloupe’s sugarcane-sugar sector to the sum of €38 million to compensate for the end of sugar production quotas in Oct 2017, according to the announcement by the Ministries of Agriculture and Overseas.

**Philippines – Imports of 250,000 tonnes sugar approved.**

The Sugar Regulatory Administration (SRA) has allowed the private sector to import 250,000 tonnes to meet the projected increase in demand amid low domestic production, according to local press reports.

**Brazil – Amyris partners with Raízen for the production of zero-calorie sweeteners from cane sugar.**

The biotech start-up Amyris recently announced that it has reached an agreement with the sugar-ethanol giant Raízen for the supply of sugar, energy and other utilities to its new planned production plant co-located with Raízen’s Barra Mill at Barra Bonita, Brazil.

**Malawi – Illovo Sugar installs new vitamin A fortification unit.**

Illovo Sugar has installed a new vitamin A fortification unit at its Dwangwa factory in the central district of Nkhotakota, according to local press reports.

**Côte d’Ivoire – EU injects €29 million to develop the sugar sector.**

The European Union (EU) has funded around €29 million for the revival of the Ivorian sugar sector, according to the representative of the Minister of Agriculture and Rural Development, Bernard Kouassi.

### **Maharashtra: Floods, drought spoil plans for ethanol production.**

The recent floods and severe drought in some parts of Maharashtra seem to have played spoilsport with the plans of sugar millers in the state to convert sugar to ethanol. The Maharashtra State Cooperative Sugar Factories Federation had recently sought permission from the Centre to convert existing sugar stocks into ethanol.

### **14 out of 25 private sugar mills in Tamil Nadu not to start operations.**

At least 14 of the 25 private sugar mills in Tamil Nadu will not commence operations in the 2019-2020 sugarcane season due to a shortage of sugarcane and liquidity constraints.

### **Maharashtra revises estimates, will produce 58.28 lakh tonne of sugar this season.**

Ahead of the sugarcane crushing season, Maharashtra's Sugar Commissionerate has revised the state's sugar figures. As per the new figures, the state is expected to produce 58.28 lakh tonnes (lt) of sugar. This is an almost 50 per cent dip from the 107.2 lt of sugar that the state had produced during the 2018-19.

### **'No production at Sanjivani sugar factory this season'**

Months before the onset of the crushing season at the state's lone sugar factory, the Sanjivani Co-Operative Sugar Factory, the government has decided not to start production this year. "We are not going to run the factory this season.

### **Outdated laws hampering sugar sector.**

Outdated laws and rigid licensing norms are impacting the growth potential of three sectors — sugar, tourism and alcohol-beverage, which had provided eight crore jobs in India last year, said a study by Pahle India Foundation.

### **States must ease sugar sector norms for better Ease of Doing Biz rank: Kant.**

NITI Aayog CEO Amitabh Kant called upon states to ease regulations for sugar, alcohol beverages and tourism sectors to help improve the country's Doing Business ranking. Kant highlighted that tourism, alcohol-beverages and sugar industries have the potential to generate jobs and fuel India's growth story.

### **India exports 3.68 million tonnes of Sugar so far in 2018-19.**

India is estimated to have exported 3.68 million tonne of sugar in the ongoing 2018-19 marketing year so far, industry data showed. The government has allowed to export surplus five million tonne of sugar in the current 2018-19 marketing year (October-September) for which subsidy is also being provided.

### **A better farmer-miller relationship can fetch higher prices for sugarcane: Report.**

India's industrial output grew 4.3 percent month-on-month (MoM) in July, according to the Index of Industrial Production (IIP) data released by the government on September 12. Industrial output,

or factory output, is the closest approximation for measuring economic activity in the country's business landscape.

### **FM assures help to TN sugar industry.**

Union Finance Minister Ms. Nirmala Sitharaman, who was in Chennai to highlight 'Achievements in 100 days of Modi government', assured the representatives of sugar industry in Tamil Nadu of help from the Centre's help in overcoming their woes, which is peculiar to those in the rest of the country.

### **UP co-op banks to lend Rs 3,221 cr to sugar mills ahead of crushing season.**

With the 2019-20 crushing season in Uttar Pradesh less than two months away, cooperative banks are said to be extending working capital loans worth Rs 3,221 crore to mills in India's top sugar-producing state. Currently, there are 23 factories operated by the government-managed UP Cooperative Sugar Mills Federation Limited in the state.

### **Govt should allow more sugar diversion for ethanol making: NFCSF.**

With sugar supply expected to be at record level in the next year, industry body NFCSF on Wednesday urged the government to allow diversion of more sugar for ethanol making and at least 7 million tonnes of export.

### **Crushing blow: Maharashtra sugar millers still owe Rs 590 crore FRP dues to farmers.**

Sugar millers in Maharashtra still owe farmers around Rs 589.59 crore in fair and remunerative price (FRP) payments for the season of 2018-19 which translate to 2% of the total dues for the season. Farmers' body Swabhimani Shetkari Sanghatana, however, alleges that the FRP payment dues could be more than Rs 800 crore.

### **Sugar breaking out of bitter cycle! 6 stocks that could give 20-30% return in a year.**

The sugar sector is being overhauled, as the government and the industry push for more sustainable business models by raising the ethanol-blending target to 10 percent by 2022 and doubling it by 2030, ICICI Direct has said in a report.

### **Nearly 50 sugar mills in Maharashtra may not crush sugarcane this season**

With cane growing districts in Maharashtra reporting losses due to floods, as many as 50 sugar mills in the state are unlikely to crush cane for the 2019-20 season due to lack of cane availability.

### **Punjab: Cane farmers begin indefinite protest.**

Members of the Pagri Sambhal Jatta Lehar and Farmers Action Committee Mukerian-Gurdaspur, in protest against the non-payment of crores of rupees to the farmers by the Mukerian sugar mill till now, started an indefinite dharna today in front of the mill.

### **Japanese harvester to help solve Maharashtra's cane harvesting woes**

The government of Japan, through Japan International Cooperation Agency (JICA), will be taking trial of a special sugarcane harvester in Maharashtra which aims at solving problems faced by mechanised harvesters in the country.

### **Indias Ethanol Production To Reach 3 Billion Liters In 2019.**

As per the latest update from United States Department of Agriculture (USDA),Indias ethanol production is forecast at 3 billion liters in 2019, which is eleven percent above last year and a record volume.

### **Brazil Sugar-Ethanol Mill Maker Dedini Signs Cooperation Deal With India's Praj.**

Brazil sugar-ethanol mill maker DediniIndústrias de Base said on Monday it has signed a cooperation agreement with India's Praj Industries to sell equipment for ethanol production, including technologies for corn-based biofuels.

### **Sugar cane fields damaged, farmers face bitter harvest.**

The floods have washed away all hopes of sugar cane farmers from Kolhapur, who were preparing for a bumper harvest later this year. More than half the area under sugar cane cultivation in the district has been damaged.

### **Telangana mills owe Rs 120 crore to sugarcane farmers, CIFA blames Centre.**

The Telangana sugar mill owners owe Rs 120 crore in sugarcane arrears to farmers as of 2018-2019, informed the Central government.

### **Govt fixes export quota of 10,000 tonne of sugar to EU at concessional rate.**

The government has fixed an export quota of 10,000 tonne of white/raw sugar to the European Union (EU) under a provision for a 12-month period beginning October.

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## ➤ RESEARCH ARTICLE:

# “EMERGING TRENDS FOR IMPROVING SUGARCANE PRODUCTIVITY AND SUGAR RECOVERY IN KARNATAKA”.

By

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## ABSTRACT

Karnataka state is the 3<sup>rd</sup> largest producer of sugarcane and sugar in India. For the past two years sugar production in the state decline drastically due to severe drought conditions coupled with reduced cane price. The factors responsible for decline in cane productivity *viz.*, biotic and abiotic stresses, imbalance and over/under use of chemical fertilizers, Un-controlled and faulty irrigation schedules and methods, deterioration of soil physical characters, lesser/no use of organic manures, less or no emphasis on use of bio-agents and bio-fertilizers, poor quality cane seeds, adoption of un-scientific agronomic practices and ignorance of inter-cropping. Of the several factors the water shortage is one of the major factors limiting the sugarcane production in the state. The sugar recovery is higher in north compare to southern part of the state because of climatic and varietal advantages. The emerging agro-technologies which are adopted in the farmers field *viz.*, sub-surface drip and fertigation, placement and methods of fertilizer application, seed nursery programme, sprouted single eye bud, method of planting, trash incorporation, adoption harvesters etc., are playing significant role in increasing the productivity of sugarcane despite sustainable production. Suggestive measures to increase the productivity of sugarcane and sugar recovery with special emphasis on adoptability of technologies are discussed.

**Key words:** Sugarcane, drip, organic, seed, fertilizer, harvesters, sugar recovery.

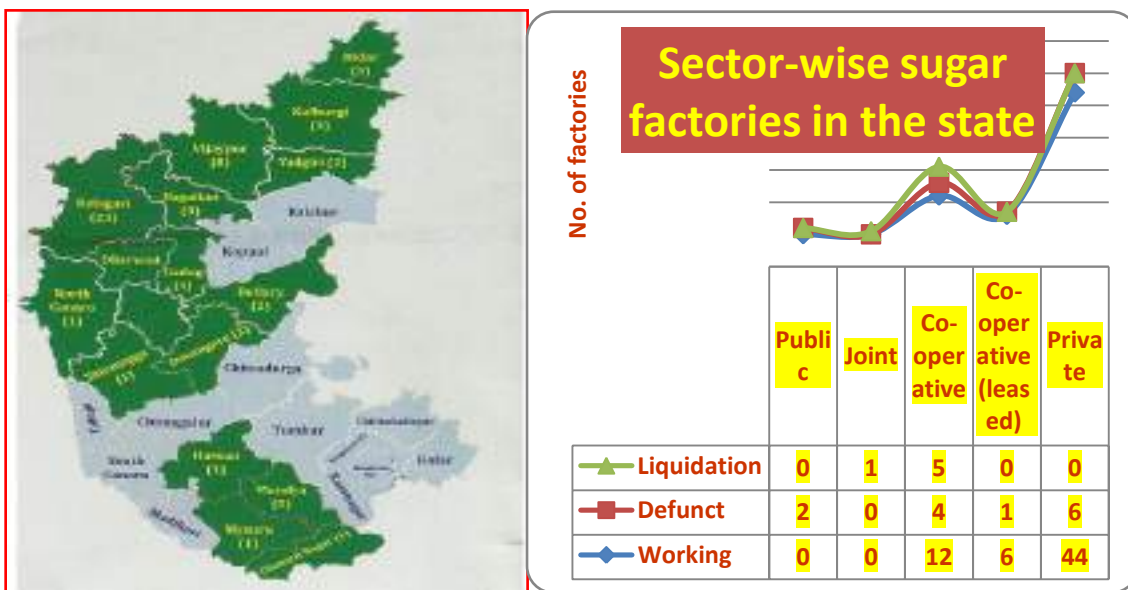
## I. Preamble:

Karnataka stands 3<sup>rd</sup> in cane production next only to Uttar Pradesh and Maharashtra States and it stands 2<sup>nd</sup> in sugar recovery after Maharashtra states in India. The area covered under sugarcane in the state is 4.0-4.3 lakh hectares and the average productivity of sugarcane is hovering @80-100 t/ha. It is observed that the average productivity of sugarcane is generally higher during excess sugarcane availability season. This is because of the higher harvesting age of sugarcane as during more cane availability seasons the cutting orders issued by the sugar mills are at higher age. On the other hand during shortage cane situation the sugar mills are compelled to

harvest immature cane which has lower crop age. These two factors play predominant role in influencing the average productivity of sugarcane.

Sugar Industry in Karnataka contributed for development of socio-economic aspects of rural area. The industry has provided technical know-how to sugarcane farmers and improved its operational issues by bringing in latest technologies to increase the different milling efficiencies.

Sugarcane is grown in 16 districts of the State. Belagavi, Bagalkot, Vijayapur, Mandya, Mysuru, Chamrajnagar and Bidar are the major sugarcane growing districts of the state. Map showing major sugarcane growing districts and sector-wise sugar factories in the state is given below:



Sugarcane area, cane crushed, sugar production, sugar recovery and cane productivity during for the past 5 years and sector-wise sugar factories in the state

Year	Area under sugarcane (lakh ha)	Productivity (t/ha)	Sugarcane production (lakh MT)	Sugarcane crushed (lakh MT)	Sugar production (lakh MT)	Sugar recovery (%)
2014-15	4.80	91.2	437.76	446.42	49.35	11.06
2015-16	4.50	84.1	378.34	377.14	40.49	10.74
2016-17	4.40	76.0	334.40	200.39	21.42	10.37
2017-18	4.50	95.0	380.00	347.55	36.87	10.61
2018-19	5.0	90.0	450.00	364.85	44.05	10.75

Karnataka has favourable agro-climatic conditions for sugarcane cultivation resulting in increased sugarcane production year after year, giving scope for establishment of more new sugar units in the state. At present the crushing capacity of 81 existing sugar mills in the state is 3.33 lakh TCD and they require 500.00lakh MT's sugarcane for operating 150 days. Additionally, 10 to 15% of the cane produced is utilized for preparation of gur(jaggary ) and seed which is to tune of 50 to 75 lakh MTs. Hence, the total cane required in the state is to the extent of 563 Lakh MTs. Further, there are 25 to 30 new sugar mills are likely to commence their operations within 2-3 years and some of the existing sugar factories are likely to expand their crushing capacities which would be an additional pressure. Conversely water and land are increasingly becoming scarce which will lead to less scope to bring more cane area under sugarcane. Therefore, the left over option of vertical enhancement with respect to cane productivity has to be explored. To achieve the potential cane yield or at least achievable productivity there has to be intensive adoption of improved technologies in sugarcane.

### **The factors responsible for lower cane productivity in the state**

1. Adverse effects of various biotic and abiotic stresses on sugarcane crop.
2. Use of imbalance and over/under use of chemical fertilizers. It is more relevant for the application of nitrogen to sugarcane.
3. Un-controlled and faulty irrigation schedules and methods for sugarcane.
4. Deterioration of soil physical characters due to poor drainage/no drainage systems for sugarcane fields.
5. Lesser/no use of organic manures in sugarcane cultivation including green manuring.
6. Less or no emphasis on use of bio-agents and bio-fertilizers in controlling sugarcane pest and diseases and also in cropping system of sugarcane.
7. Planting of poor quality cane seeds which are not from a definite source.
8. Adoption of un-scientific agronomic practices for sugarcane cultivation.
9. Ignorance of inter-cropping cultivation and measures to enhance soil productivity in sugarcane.

### **The main features of cane cultivation in Karnataka.**

- The sugarcane productivity is in the range of 70-75 tonnes/ha in northern part and in south the productivity is in the range of 80-100 t/ha.
- Sugarcane is grown mainly by utilizing the water from Canals, Bore-wells, and Open-wells, major and minor Lift irrigation schemes. The Canal irrigation is mainly provided during kharif and rabi seasons and thereafter water is supplemented to sugarcane by Bore-wells or Open-wells etc.,
- The major plantation of sugarcane takes place in the month of September to November. However, sugarcane is planted from June to February in the region.
- Sugar mills start their crushing operation in the month of October –November and depending upon the cane availability to crush the sugarcane till April-May. In southern part sugar mills

normally commence their crushing operation in July and continue upto April-May based on cane availability.

- Most of the sugarcane area is covered under Co86032 which is a high cane yield and high sugar recovery variety. Co86032 is amenable to plant in different seasons due to its sparse & delayed flowering or no flowering character. Co62175 is occupied a predominant position owing its high cane yield ability.
- Harvesting and transportation arrangement is done by the sugar mill and south many a times farmers themselves are arranging harvesting and transportation and sugarcane price on ex-gate basis
- By and large there is acute water shortage during summer season due to depleted water levels in the Open-wells and Bore-wells coupled with power shortage.
- Un-controlled and faulty irrigation schedules and methods for sugarcane especially during kharif season where there is abundant water availability during kharif season.

## **EMERGING SCENARIO OF SUGARCANE**

### **I. Micro-propagated sugarcane plantlets (Tissue culture) as a source of breeder seed material:**

Sugarcane production is challenged by disease viz., yellow leaf disease, red rot, ratoon stunting, grassy shoot and mosaic (Wada, 1997). Tissue culture method is an alternative approach for fast multiplication of a variety in its original form and micro-propagation is very effective in rejuvenating /reviving the well adopted promising cultivars who are facing gradual decline or degenerating in yield and vigour by freeing from diseases causing pathogens.

Physiological and genetic purity, clean, healthy, disease free quality seed can determine the performance of the crop. Micro-propagation intervention helps for sugarcane growers by providing more productivity and sustainable healthy. This ensures to avoid sourcing of poor quality seed planting materials by the farmers there by increasing the use efficiencies various inputs used in cane production. The breeder seedlings can be utilized effectively for primary, secondary and commercial seed nurseries. This approach shall have more adoptability compare to conventional three tier seed nursery programme by using MHAT/AST units.

### **II. Single Bud seedling method of planting:**

Generally farmers views either three or more budded or two budded or single budded or sprouted single bud sets or seedlings for planting is type of planting costing them approximately Rs. 12000 to 37500 per ha, which is 15 to 20% of the total cultivation expenses. Therefore, sprouted single eye bud seedlings method has emerged as most successful and economical for planting sugarcane. This method despite consuming only 1250 kg/ha as seed material will also help in increasing the cane yield. This is possible by planting the sugarcane seedlings with wider

row spacing of 120x60 cm or 150x30 cm which requires about 12500 to 15000 buds against 120000 buds per ha. It is possible to achieve the seed multiplication ratio to the tune of 25-30 by adopting these techniques (Bharathiet *al.*, 2017). The adoption of the method is farmers friendly and saves more cane for sugar factories crushing operation.

### **III. Water and fertilizer use efficiencies:**

It is needless mentioned that water and fertilizers play important role in increasing the productivity of sugarcane. Adoption of sub-surface drip irrigation system with fertigation has established highest water and fertilizer use efficiency. This system doubled or tripled the cane productivity in the farmer's fields. In some of the cases it is observed that the system is interfaced with solar system and automatic system for releasing water and fertilizers to sugarcane. These technologies are to be tuned with more scientific information and adoptable practices for getting higher productivity on sustainable basis. The research findings reveal that the adoptability of method of fertilizers by farmers is hardly 20-25% owing to difficulties in practicing the technologies in the field. Therefore, the applications fertilizers by mixing with small quantity of organic manure helps in increasing the fertilizer use efficiency because of the colloid properties of organic manure. The placement of fertilizers by plough sole method with split application shall significantly increase the productivity of sugarcane and also bring down the cost of production of sugarcane by increasing the fertilizer use efficiency (Madhu G. *et al.*, 2017).

### **IV. Management of trash**

It is estimated that sugarcane provide about 7.5 to 10 tonnes of trash/ha. There are several recommendations to utilize the trash as much/compost however due to non-availability or less availability of labours it is practically difficult for the farmers to adopt these technologies. Oflate due to adoption of wider row spacing in sugarcane the farmers can in-corporate the dried leaves during different growth stages of sugarcane. Periodical de-trashing of dried leaves and placing them in inter row spacing commencing from 6 months to 10 months will substantially reduced the generation of trash at the time harvesting of sugarcane. The removal and placement of dried leaves in the row shall help in reducing the transpiration losses of water, alleviating weed infestation and increasing the organic matter of the soil. The minimum availability of trash after harvest of the sugarcane will not pose any hurdle in taking of ratoon management operations.

### **V. Drought/Water stress management:**

Apart from adoption of drip irrigation system there is need to adopt the integrated drought management techniques in sugarcane for getting sustained yield levels. The information indicates that there are cultivars which can help in mitigating the water stress conditions. The Sugarcane

Breeding Institute, Coimbatore has provided 35 genotypes viz., Co 85019, Co 9003, Co 92002, Co 92013, Co 92020, Co 93009, Co 94005, Co 95020, Co 98008, Co 98017, Co 2002-02, Co 2000-10, Co 0112, Co 0212, Co 0303, Co 05007, Co 05009, Co 05011, Co 06015, Co 06022, Co 07015, Co 08020, Co 09004, Co 10015, Co 10017, Co 10024, Co 10033, Co 12003, Co 12007, Co 12012, Co 13003, Co 13006, Co 14005 and Co 14011 to S. Nijalingappa Sugar Institute, Belagavi for further evaluation under drought situations. These efforts will have significant impact for production sugarcane under limited water availability. The varieties along with the agro techniques of trash mulching, use of organics, alternative furrow irrigation method and potash application required to be integrated in the production of sugarcane under water stress situations. Despite these techniques it is reported that the application of bio-silicate can help sugarcane in producing higher cane yields during water shortage situations. These techniques are to be popularized on commercial scale.

## **VI. Mechanized sugarcane harvesting**

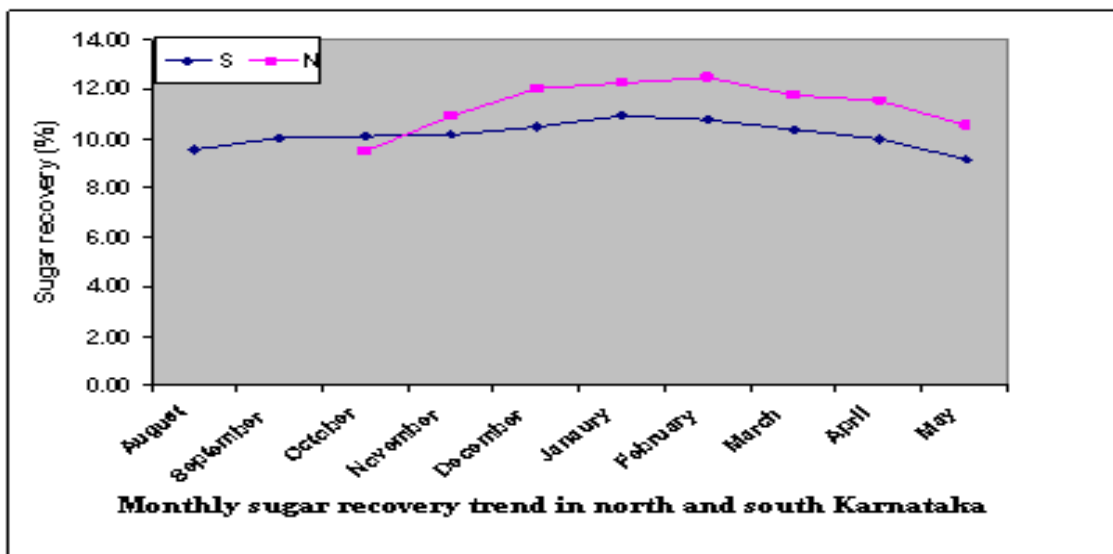
Though sugarcane harvesters are available in some regions of India, manual harvesting of sugarcane by using harvesting knives is most common and it is posing problems due to scarcity of labour and drudgery involved manual harvesting and loading of cane. Keeping all these in view, mechanization for harvesting should be adopted in sugarcane cultivation. The manual harvesting of sugarcane by using tools is highly labour intensive process and costly too. About 850-1000 man working hours per hectare is required for harvesting of sugarcane manually. The process involved in sugarcane harvesting is base cutting of sugarcane, de-topping, de-trashing, bundling and transporting the harvested cane to sugar mills. Delayed harvesting affects the quality of sugarcane, yield, and juice quality and sugar recovery. So keeping all these disadvantages of manual harvesting in view, sugar industries are looking for mechanical harvesting of sugarcane crop at a reasonable wage rate.

Many researchers and research stations like IISR, Lucknow have made efforts in developing the mechanical means for harvesting of sugarcane crop so as to improve the quality of cutting and reduced energy input. The present available mechanization in sugarcane harvesting is whole stalk linear windrowing, whole stalk traverse windrowing, whole stalk bundling machine, hand controlled self-propelled harvester and chopper type cane harvester but these have not yet commercialized due to some demerits and difficulty in adoptability.

The states like Tamil Nadu, Maharashtra and Karnataka have imported models of sugarcane chopper harvesters and tried in the fields. The output was found to be 25-30 tonnes/hour but the trash percentage in the billets was found to be 8-10%, high initial cost of the machine, maintenance and service to harvesters, availability of spare parts, wider row spacing (1.5 m) required (but Indian farmers maintain 80-90 cm row to row spacing) and advanced systems are some of the issues related to the successful adoption of these imported machine in Indian conditions.

## VII. Sugar recovery

Cooler temperatures & long nights in case of Northern region of Karnataka during December to March help to increase sugar recovery in sugarcane. These conditions are favourable for more sugar accumulation regardless of variety and age at harvest. Therefore, the trend of sugar recovery in northern region is higher (11.0 to 11.5%). The recovery during October-November is lower and it increases as the crushing season advances. The peak recovery is attained in the month of February-March and during fag-end of the crushing season i.e., in April-May there is sharp decline in sugar recovery.



In case of southern region the sugar recovery is lower (9.0 to 9.5%). The lower recovery in south Karnataka is mainly attributed to the following reasons.

- Sugarcane varieties: Predominant variety is Co62175
- Climate: Less cooler nights during harvesting period of sugarcane
- Harvesting period: June to May (June to October is not conducive)

Regardless of the variety and agro-techniques adopted there is further scope to enhance the sugar recovery of a sugar mill by adopting the following measures on a sustainable basis in south Karnataka.

- Introduction of sugar rich varieties of sugarcane and replacement of existing low sugar varieties viz., Co8011, Co91010, Co740 etc in north and rejuvenate the CoC671 in north and identify a suitable alternative variety which can replace Co62175 in south.
- Optimize the age at harvest for different varieties particularly during early crushing and fag end of the crushing season.
- Adopting staggered plantation duly backed up with the three tier cane seed nurseries.
- Minimizing cut to crush period by following suitable harvesting and transport schedules.

## **VIII. Conclusion:**

1. There is need to achieve the potential productivity of sugarcane for higher profits of sugarcane farmers and to get quality and sufficient cane for sugar factories.
2. Adoption of fertigation with sub-surface irrigation and also drip irrigation ensure higher cane productivity with better sugar recovery despite in saving water.
3. The practices adopted by the farmers in improving cane yield coupled with soil health are to be authenticated and popularized by the recognized institute/organizations and extension agencies.
4. Re-orientation of three tier seed nursery programme and faster multiplication improved varieties by inculcating the micro-propagation technique in sugarcane.
5. Popularizing and solving the problems related to sugarcane harvesters and encouraging the entrepreneurs model for harvesting machines by the sugar factories.
6. Establishment of R&D centres to conduct demonstrations on promising varieties and improved agro-techniques by individual sugar factories.
7. Effective participatory method in adoption of new technologies of sugarcane in the farmer fields.

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## ABSTRACTS

**Cost assessment of the adoption of harvesting best practice (HBP) by B. Nothard, M Thompson, P Patane, G Landers, CA Norris & M Poggio published in International Sugar Journal in July, 2019.**

Using ground speeds and extractor fan speeds recommended by Harvesting Best Practice (HBP) will minimise cane loss and stool damage. While these benefits provide an incentive for growers to request contractors use HBP settings, little research based on trial data has examined the full impact on harvesting costs. Given that reduced ground speeds increase harvesting time, it is expected harvesting contractors would incur higher labour, fuel and machinery costs per tonnes. To incentivize the move to HBP, additional compensation would need to be paid to harvesting contractors by growers.

**Assessing cane and sugar losses utilising world-class methods by Phil Patane, Garry Landers & Chris P Norris published in International Sugar Journal in July, 2019.**

Harvester operators have immediate feedback on parameters such as bin weight but no feedback on levels of cane loss being suffered – this is an ‘invisible’ loss. This leads to machines being operated at settings conducive to high cane loss, to the detriment of all sectors of the industry. To mitigate this, industry bodies have demonstrated the magnitude of cane loss by running cane-loss

trials with individual harvester operators. Several cane-loss measurement strategies have been used. ‘Mass Balance’ (MB) trials, where cane loss is inferred by the difference in clean cane yield from different treatments.

**Integrity management of steam piping systems by Damien Charman & Kate Suppel published in International Sugar Journal in July, 2019.**

Steam piping is a vital part of the sugar production process and therefore needs to be maintained and managed to ensure it is safe for operation. An effective piping management system should function to comply with legislative inspection requirements, determine the required inspection intervals and assist to identify where potential damage could be present in a particular part of a pipe system. In the context of this paper, the piping system will be considered for elevated temperatures and under fatigue loading. To complement the inspection process, non-destructive testing (NDT) should be used.

**The influence of gas velocity and fibre density on the drying kinetics of bagasse by G Bezzina, M. Sheehan & C Walker published in International Sugar Journal in July, 2019.**

The production efficiency of steam and electricity from cogeneration boilers can be optimised by employing waste heat (in the form of boiler flue gas) for pre-combustion drying of bagasse fibre. Safety and economic

concerns demand accurate drying kinetics to guide dryer design and mitigate risk. This research involved the commissioning of a convective drying apparatus to manipulate and control gas temperature, gas velocity and fibre density. Bagasse moisture content was monitored over time and moisture ratio data were fit to Fick's Second Law of Diffusion.

**Investment activity in the global sugar sector over the period July 2018 to June 2019 by Arvind Chudasama, published in International Sugar Journal in July, 2019.**

The paper provides a snapshot of investment activity over the past year. This is neither exhaustive nor complete as it is compiled from reported news in the global media and some clients do not want to make public their investments. Investment in the sugar industry basically fall into two broad categories – maintaining competitiveness (through keeping up with routine maintenance, capacity expansion, factory upgrade, e.g. automation, exploiting by-products and waste streams, and extending/introducing bio-refining capabilities) and building new factories/refineries to address local structural deficit.

**Tenure risk in the African sugar sector can cause companies to lose up to US\$100 million Benedick Bowie & Joseph Feyertag published in International Sugar Journal in July, 2019.**

Africa faces structural deficiencies in the sugar sector. There is a great deal of

investment interest in sugar across the continent. However, the issues of land tenure, relocation and compensation for farmers are of great concern, from both a financial and reputational perspective. Almost half of all land disputes (46%) between sugar companies and local communities across Africa last for more than ten years, new research from the Overseas Development Institute (ODI) and TMP Systems has found. The research finds that these land disputes in the African sugar sector often cause long and costly delays.

**Upgrading the utility plant module for the generic sugar mill model by KM Foxon & M Starzak published in International Sugar Journal in August, 2019.**

The Sugar Milling Research Institute NPC published a MATLAB® model of a generic sugar mill, consisting of mass and energy balances of the individual units of a diffuser factory with mud filtration, five-effect evaporation and a three-boiling partial remelt scheme. The original model did not provide a means for balancing electrical power and steam production and demand and therefore was not able to predict the impact of process changes on overall energy consumption. The objective of this study was to expand the original model by including a power house and considering steam and electrical power balances.

**Profitability of different cane varieties by GA Kent, AP Mann & RC Parfitt published**

**in International Sugar Journal in August, 2019.**

The main selection criterion in the Australian breeding program, Economic Genetic Value (rEGV), does not adequately account for cane fibre content and does not account for fibre quality. These fibre parameters can have a large impact on the processing cost for a variety, and, hence, affect its attractiveness from an overall industry perspective. This paper presents an economic model that does account for the processing cost of a variety and calculates a net economic value for a variety in dollars per hectare relative to the value calculated for Q208A, a widely-grown variety.

**Evaluation of the Neltec ColourQ 1700CC for measuring the purity of magma from C centrifugals by D Pike, S King, R Broadfoot & P Woods published in International Sugar Journal in August, 2019.**

In Australian sugar factories one operator typically manages the high-grade fugal, sugar-drying and low-grade (C) fugal stations. The C fugals are managed least effectively as there is no process instrumentation to monitor on-line C sugar purity or final molasses purity. Conditions can change rapidly in the C fugals without the operator being aware, and poor performance can persist for several hours. Tight control of the C sugar purity is important to avoid high sucrose losses to final molasses or an excessive recycle of impurities in the C sugar (magma or remelt) to the pan stage. For the 2017 season, Isis Mill purchased a Neltec

ColourQ 1700CC transducer that had been recently released on the market to measure the colour (inferred purity) of the total C sugar magma production of the station. The transducer proved effective for the operators to pragmatically achieve tighter control of the purity of the C sugar magma. For the 2018 season, Isis Mill purchased a second ColourQ 1700CC transducer to monitor the colour of the C sugar on the screen within their large capacity fugal. Described are the results of extensive testing of the transducer mounted on the fugal and the use of the transducer to assist operators achieve tighter control of the magma purity. The experiences with the use of the transducer on the magma screw for monitoring the purity of the total C magma production from the station are also described.

**WinRHIZO™ software for evaluating effects of farming systems on sugarcane root systems by L Di Maggio, D Olsen & R Verrall published in International Sugar Journal in September, 2019.**

Sugarcane roots are notoriously difficult to study. The opaque nature of the soil matrix, large biomass, and ratooning habit of the crop make studying roots challenging. WinRHIZO™ is a specialist root analysis software that provides rapid and accurate measurement of a host of root characteristics in a fraction of the time that it would take by traditional methods. This paper demonstrates the use of WinRHIZO™ to evaluate root systems under different farming systems management. A paired site was

identified in the Herbert district consisting of two commercial sugarcane blocks.

**A new process for dextran preparation by dextranase addition coupled with sucrose feeding from *Leuconostoc mesenteroides* 31208 by Jiu-Hua Zhang, Da-feng Liang, Zhi-Fe Li, Guo-Wei Chang, Zhao-Peng WuYu-hong Li, Zeng-Wei Huang, Lian-qiang Zeng published in International Sugar Journal in September, 2019.**

Dextran is a microbial polysaccharide with glucose moieties linked by an  $\alpha$ -1,6-glucosidic bond, and it is used widely in medicine, chemical industry and other fields. Dextran synthesis has been extensively examined, but there are few published studies regarding its fermentation process control. In this work, a new process for its preparation by fed-batch fermentation of sucrose and dextranase hydrolysis was investigated. Dextranase hydrolysis is a crucial step in sucrose fed-batch process, which not only decreased broth viscosity, thereby facilitating substrate (sucrose) feeding, but controlled the molecular weight of the product.

**First year operation of a mechanical detrasher system at a Louisiana sugarcane factory - impact on processing and value-added products by Isabel Lima, Charlie Schudmak, Roddy Hulett, Herman Waguespack, Jr. Harold Birkett, John Gay, Al Landry & Atticus Finger published in International Sugar Journal in September, 2019.**

A new mechanical detrasher (dry cleaning) system was established at a Louisiana sugarcane factory. Its first commissioning year was in 2016. Three separate factory trials were conducted from November 9 to December 13 during the 2016 processing season. It was unequivocally shown that the prototype detrasher was capable of not only removing

**Molasses de-sugarization in the U.S. beet sugar industry: recent update by Erin Johnsonn, Matthew Morrow, Steve Peacock & Vadim Kochergin published in International Sugar Journal in September, 2019.**

Molasses desugarization (MDS) is an example of a large-scale chromatographic separation that has been in use in the United States beet sugar industry for almost 40 years. The process has proven commercially viable under current market conditions, energy and environmental cost. As a result, most US sugar beet companies have been operating one or more MDS installations. Because of the variation in efficiencies and configuration of existing installations, it is sometimes difficult to evaluate the desired separation targets and identify the areas of operational improvement. Over the last few years, achievable separation targets have improved significantly.

**Filtration of stored thick juice for the syrup campaign by BM Muir, SD Schöpf & C Meade published in International Sugar Journal in September, 2019.**

Extraction of sucrose from sugarbeet for sugar production on an industrial scale can be divided into two distinct types of operations: beet processing (operation of the entire factory) and syrup processing (operation of the sugar refinery only). During the beet harvesting campaign evaporator syrup is stored in large tanks for subsequent processing in the syrup campaign. It is good practice to filter the evaporator syrup prior to storage for removal of microbes and insoluble. More importantly is filtration of the syrup during the syrup campaign for food safety and to remove any solids that have precipitated during storage for sugar quality. This is normally done using a filter-aid to ensure filtration to below 5 µm is achieved. The use of a filter-aid is not ideal due to health concerns and the risk of causing sugar quality issues if filter-aid is carried forward with the syrup. A filtration system designed to operate without the use of a filter-aid was therefore tried at one of the Tereos factories in France. Standard liquor from storage tanks was filtered through 14 – 25 µm filter material during the 2018 syrup campaign. Operational and sugar quality results are discussed.

**Utilization of bagasse ash in sugarcane agriculture by D.B. Phonde, R.R. More & K. Banerjee published in 77<sup>th</sup> Annual Convention in STAI in July, 2019.**

Bagasse ash is a waste obtained in sugar industries, poses an environmental problem and presently its use is not explored, in this context the studies revealed that bagasse ash

contains 25 to 27 percent silica content which is a good source of silicon, which is a functional element required more than 400 kg ha<sup>-1</sup> by sugarcane in its full crop period. Being sugarcane as Si accumulator crop, soil application of bagasse ash after treatment with silicate solubilizing bacterial culture (SSB) @ 2.5 L ha<sup>-1</sup> showed significant results in increasing cane and sugar yield.

**A review on cane preparation & milling efficiency by D. Swain published in 77<sup>th</sup> Annual Convention in STAI in July, 2019.**

Milling is the most important unit operation in sugar production from sugarcane almost two-third of the total energy for sugarcane processing is consumed in milling. Similarly, in case of installation of a new sugar plant, almost forty percent of the total cost of the project under plant and machinery head, is invested for this operation. The output and so the economy of a sugar unit entirely depends on the efficiency of the milling operation and hence attracts utmost attention of every stakeholder of the industry.

**Techniques to achieve lower moisture in Bagasse by K.B. Kale & M.B. Londhe published in 77<sup>th</sup> Annual Convention in STAI in July, 2019.**

Hereby presenting a technical ways to reduce the moisture in the bagasse by reducing the sugarcane juice reabsorption in the cane extraction process. Increasing sugar loss in bagasse and reducing moisture in bagasse goes hand in hand. here is adoption of well-

judged combination of different techniques and equipments in the processing of cane to reduce moisture; such as use of forced feeding devices, adopt mill roller differential angle grooving, lotus mill rolls, adopt increase trash plate heel clearance, effective imbibition system working at high temperature.

**Optimization of white sugar colour with online-colour monitoring system (colobserver) by Sanjay Awasthi, Rajesh Srivastava & Awanish Kumar, published in 77<sup>th</sup> Annual Convention in STAI in July, 2019.**

The priority of any sugar factory is to produce sugar quality that meets to customer's requirement through effective control on process parameters. Any form of automation adopted in the sugar / refinery plants has to stand to his litmus test. And since the sugar colour and its consistency throughout the season, is one the most vital parameters of the sugar quality, continuous monitoring of the sugar colour is a vital activity and calls for a system which is online and has no manual intervention.

**Maximising Exhaustion at pan station by adjusting process parameters with advancement of season by Ramesh Chand Agarwal published in 77<sup>th</sup> Annual Convention in STAI in July, 2019.**

The author has used contact heaters for heating AH, BH, CL & C-1H Molasses by second body vapors by increasing molasses temperature to 90°C instead of 70°C for

increasing circulation in pans due to generation of flash vapors on feeding of molasses. Secondly dry seed quantity have been increased with increase in sugar recovery to increase crystal surface area for increasing exhaustion in A- pans. we have observed encouraging results. the plant have achieved total losses 1.67% cane & loss in FM remained 1.07% cane during season 2018-19.

**New technologies for achieving lowest steam consumption and zero effluent discharge in molasses & grain distilleries by Sanjay Desai & Sandeep Chichbankar published in 77<sup>th</sup> Annual Convention in STAI in July, 2019.**

Ethanol industry has become the fastest growing industry in last few years. Lucrative price of ethanol from different feedstock and government subsidies have provided ethanol sector a much needed push. The concept of multi-feed distilleries have also emerged to counter the effect of raw material shortage. In this scenario, it is of prime importance that project proponents, technology providers and government must partner together to achieve sustainability for the project and success of ethanol blending program.

**Utilization of sugarcane bagasse as dietary fibre by Neelam Chaturvedi, V.P. Srivastava, Seema Paroha & Narendra Mohan published in 77<sup>th</sup> Annual Convention in STAI in July, 2019.**

Comparing past and present times the degenerative disorders are seen to be on an exponential increase rate and solution to this

problem is to increase fiber intake in our diets. Hence, alternative sources of fiber must be explored. Bagasse is a rich source of fiber which could be exploited for human consumption. Bagasse was subjected to different treatments namely: steam, acid, alkali at different concentrations (0.1N, 0.25N, 0.5N, 0.75N, 1N) for different time intervals (15min, 30min, 45min, 60min).

**Zero water consumption zero liquid discharge and production of potable water in the sugar industry by Gurunatha A., R. B. Khandgave, Pradeep Kumar H. S. & Abhishek A. Kulkarni published in 77<sup>th</sup> Annual Convention in STAI in July, 2019.**

Sugar industry is one of the large heavy process engineering industry. As per pollution control board, sugar industry classified under category RED. Water and air are natural resources, pollution of these two are closely monitored in the industry and treated suitably before letting in to the atmosphere. It is time to the industry to address the pollution in sugar sector. Authors tried to put up their views how it can be attended and recovery of water available in the cane juice while in process.

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