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VSI BULLETIN

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Foreword

Foreword ...

Dear Members,
Greetings!
As this final issue of 2022 comes to the readers the New Year 2023 has already begun. The sugarcane growers and is in industry is in upbeat mood to achieve the targets of sugar production and Central Government announces new revised ethanol policy.

The current sugar season 2022-23 has started from October 2022 and 509 sugar mills were started their crushing operation in the country. The country's sugar production stood at 120.7 lakh tonnes from October to December 2022 with rise of 3.69% from previous sugar season. In Maharashtra state 197 operating sugar mills produced up to 46.8 lakh tonnes of sugar.

The Cabinet committee on Economic affairs (CCEA) Govt. of India approves mechanism for procurement of ethanol by Public Sector Oil Marketing Companies (OMCs) under Ethanol Blended Petrol (EBP) Programme - Revision of ethanol price for supply to Public Sector QMCs for Ethanol Supply Year (ESY) 2022-23 as; (i) The price of ethanol from C heavy molasses route be increased from Rs.46.66 per litre to Rs.49.41 per litre, (ii) The price of ethanol from B heavy molasses route be increased from Rs.59.08 per litre to Rs.60.73 per litre, (iii) The price of ethanol from sugarcane juice/sugar/sugar syrup route be increased from Rs.63.45 per litre to Rs.65.61 per litre, (iv) Additionally, GST and transportation charges will also be payable.

Government has advanced the target of 20% ethanol blending in petrol and a "Roadmap for ethanol blending in India 2020-25" has been put in public domain. Other recent enablers include: enhancement of ethanol distillation capacity to 923 crore litre per annum; Long Term Off-take Agreements (LTOAs) to encourage setting up of 431 crore litre per annum capacity of Dedicated Ethanol Plants (DEPs) in ethanol deficit States by private players which is expected to bring in investments of Rs.25,000-Rs.30,000 crores in coming years; multimodal transportation of ethanol and ethanol blended petrol by railways and pipelines. All these steps add in facilitating ease of doing business and achieving the objectives of Atmanirbhar Bharat.

Government has taken many decisions for reduction of cane farmer's dues including diversion of sugar and sugar-based feedstock for production of ethanol. Now, as, large quantity of ethanol is available right from the beginning of sugar season due to conversion of sugarcane juice and B heavy molasses to ethanol, it has been decided to redefine Ethanol Supply Year as a period of ethanol supply from 1st November of a year to 31st October of the following year from 1st November, 2023 onwards. Moreover, as the Fair and Remunerative Price (FRP) of sugarcane & ex-mill price of sugar have undergone changes, there is a need to revise the ex-mill price of ethanol derived from different sugarcane based feed stocks.

During the quarter, the Institute has organized the various training/workshop for the sugarcane growers and sugar mills and it is reflected in this issue of VSI Bulletin.

Here's wishing that '2023' opportunity & Challenges to be very exciting and prosperous for the sugarcane growers & Sugar mills and all those concerned with it.

RM Devarumath

(RM Devarumath)
Editor

WELCOME

WELCOME

Mr. Shivajirao Deshmukh

Mr. Shivajirao Deshmukh, IAS (Redt.) joined VSI as Advisor on October 1, 2022. He worked in the VSI as Director General from October 1, 2006 to September 30, 2022 and Officer on Special Duty from January 1, 2005 to September 30, 2006.

Mr. Sambhaji Kadupatil

Mr. Sambhaji Kadupatil, IAS (Redt.) joined VSI as Director General from October 1, 2022. Earlier he worked as Officer on Special Duty from June 1, 2021 to September 30, 2022

EVENTS

National Seed Day

VSI organized a training program on 'Sugarcane seed multiplication and production technology' for Cane Development Officer & Agriculture Assistant of sugar mills on the occasion of National Seed Day on October 1, 2022 which was sponsored by ICAR-AICRP on seed (Crops) project.

Mr. SS Katake, Scientist & Farm Manager, welcomed to the participants and taken opportunity to felicitate to the newly joined Mr. Sambhaji Kadupatil, Director General, VSI offered bouquet on behalf of VSI staff by Mr. PP Shinde, Scientist & Head, Agriculture Engineering Section.

Mr. Sambhaji Kadupatil inaugurated the training program along with representatives of sugar mills and sectional Heads of AST & D. In his inaugural speech he emphasized the role of quality seed material to enhance the sugarcane production. He also told that follow the three tier (Breeder, Foundation, Certified) seed production program at sugar mill area.

Dr. RS Hapase, Principal Scientist & Head Plant Breeding Section had given lecture on 'Varietal scenario in the State, its planning and Identification'. He highlighted different sugarcane varieties released for high yielding & sugar from VSI and CSRS, Padegaon. He gave the information about upcoming promising variety CoVSI18121, PDN15012 which are performed well in multi location trials.

Mr. SS Katake talked on 'Sugarcane seed multiplication and production technology. He highlighted the different technology for seed multiplication and suggested change the sugarcane seed every three to four years to maintain the genetic purity of seed and to avoid the pest & disease spread through seed. This will help in increase the productivity of crop.

Dr. RA Sawant, Scientist & Head Tissue Culture section had talked on 'Sugarcane seed production though tissue culture'. She gave the information about the process of tissue culture and important application to produce disease free seed multiplication.

Dr. GS Kotgire, Scientist, Plant Pathology Section, highlighted importance of seed certification and integrated management of disease & pest.

Mr. RG Yadav, Scientist, Entomology section, highlighted integrated management of pest in sugarcane seed nursery at sugar mills.

In the concluding session participants discussed their doubts with the experts of the respective subject and the program was concluded with vote of thanks

47th Foundation Day of VSI

VSI celebrated 47th Foundation Day on November 19, 2022 under Chairmanship of Mr. Dilip Walse-Patil, Hon. Vice President of VSI. Prof. Narendra G. Shah, Member Secretary, Rajiv Gandhi Science and technology Commission (RGSTC), Mumbai was the Chief Guest of function. Mr. Shriram Shete, GC Member of VSI & Chairman, Kadwa SSK Ltd., Nashik Mr. Sambhaji Kadupatil, DG and VSI staff members were present.

All the dignitaries were welcomed by Mr. Sambhaji Kadupatil and felicitated by Mr. Dilip Walse-Patil. The event was formally inaugurated by Chief Guest Prof. Narendra G. Shah by lighting the traditional lamp along with other dignitaries. Chief Guest introduced by Dr. KS Konde, Technical Advisor & Head, Department of Alcohol Tech. & Biofuels, VSI.

Prof. Narendra G. Shah in his speech briefed about sugarcane scenario about sugarcane growers and industry. He highlighted on various factors of sugarcane and their byproducts. He also emphasized on socio-economic issues related sugar industry. He appreciated the R & D work and other activities being carried out in the VSI in his speech.

The function concluded with vote of thanks by Mr. RS Gangele, Personnel Manager, VSI.

TRAINING

Oos Sheti Dnyanyag & Dnyanlaxmi

In memory of founder President of VSI late Padmabhushan Dr. Vasantdada Patil, a four days residential training programme was organized for women sugarcane farmers as ***Oos Sheti Dnyanlaxmi*** **and** for Men sugarcane farmers **as *Oos Sheti Dnyanyag.*** At present two batches training program were conducted and the details given in following Table.

Batch No	Date	Area from which the farmers participated	No. of sugar mills, individuals & total Participants
***Oos Sheti Dnyanlaxmi* (Women farmers)**			
I	20th to 23th December 2022	Kolhapur, Satara, Sangli and Solapur Districts	Sugar mills : 09 Individual : 02 Total = 167
***Oos Sheti Dnyanyag* (Men farmers)**			
II	27th to 30th December 2022	Kolhapur Dist. and Vidarbha region	Sugar mills : 07 Individual : 02 **Total : 102**
Grand Total (I to V Batches)			**269**

A training programme was conducted under the guidance of Mr. Sambhaji Kadupatil, DG, VSI. Mr. BH Pawar, Senior Scientist & Head, Plant Pathology Section has coordinated this activity with the help of HODs & HOSs and staff of AS & T Division.

The training programme conducted in the form of theory lectures and practical field demonstrations on various topics like sugarcane varieties & varietal planning, three-tier seed nursery programme & its implementation, tissue culture, modern planting

***Oos Sheti Dnyanlaxmi* programme (Women farmers)**

Batch No. : I

techniques, weed management, soil fertility & fertilizer management, irrigation water management, use of bio-fertilizers &bio-control agents, farm mechanization, economics of sugarcane cultivation ratoon management, integrated disease & pest management etc.

In the plenary session the participants discussed their doubts with the subject experts. In the concluding remarks, trainees expressed their views about training. Later certificates along with group photos were distributed to the trainees and function concluded with vote of thanks.

***Oos Sheti Dnyanyag* programme (Men farmers)**

Batch No. : II

WORKSHOP

WORKSHOP

Sugarcane Trash and Ratoon Management

A one-day workshop on 'sugarcane trash and ratoon management' jointly organized by the Government of Maharashtra, Department of Agriculture, Pune and Vasantdada Sugar Institute, Pune was held on December 8, 2022 at Vasantdada Sugar Institute, Pune for the Agriculture officers from Maharashtra State.

The workshop was inaugurated in presence of Mr. Sambhaji Kadupatil, Hon. Director General, VSI, Pune, Mr. RS Naikwadi, Divisional Joint Director of Agriculture, Pune, Mr. Vikas Patil, Director Agriculture Extension and Training, Pune and Dr. Preeti Deshmukh, Sr. Scientist & Head of Soil Science Section.

Mrs. Jyoti Kharade welcomed the guest, sectional Heads and all the participants. Mr. Sambhaji Kadupatil briefed about sugarcane scenario in Maharashtra state. He also told the importance of trash management in sugarcane and its benefit to sugarcane and soil Mr. RS Naikwadi briefed about the present status of sugarcane trash management at the state level.

In this one day workshop various topics were presented by VSI Scientist as Mr. PP Shinde explained 'Modern crop management practices in sugarcane', Dr. A Patil talked on the topic 'Agronomic management for higher ratoon productivity', Mrs. Sudha Ghodke made presentation on 'Use of decomposing culture/ biofertilizers for ratoon management in sugarcane'. Dr. Preeti Deshmukh briefed about the VSI's participation in Govt. scheme and Dr. SG Dalvi explained 'Use of Vasanturja in sugarcane crop'. Mr. NV Shipurkar showed demonstration on sugarcane trash management. On this occasion, total 76 Agriculture officers from the Department of Agriculture of Ahmednagar, Pune and Solapur Dist. were present. Mr. SA Surwase expressed his gratitude and concluded event with vote of thanks.

Green Hydrogen : Opportunities in Sugar & Distillery Industry

One-day workshop entitled 'Green hydrogen: opportunities in sugar & distillery industry' was organized by the Department of Alcohol Technology and Biofuels, at Vasantdada Sugar Institute Pune, on December 18, 2022 with the active participation of sugar mills and distilleries from different States across the Country.

In this workshop Eminent Delegates & Speakers comprising as Mr. Sharad Pawar, Hon. President, VSI, Pune, Member of Parliament (Rajya Sabha); Dr. Chinnakonda S. Gopinath, Scientist-H, CSIR-NCL, Pune; Dr. Bharat Kale, Director General, CMET, Pune; Prof. Rajnish Kumar, IIT, Madras; Prof. VV Mahajani, Adviser to RGSTC, Prof. (Retd.) ICT, Mumbai; Mr. Siddharth R. Mayur, MD, h2e, Pune; Mr. Sambhaji Kadupatil, Director General, VSI; Mr. Shivajirao Deshmukh, Advisor, VSI; Prof. SV Patil, Professor Emeritus, Alcohol Tech & Biofuels, VSI; Dr. KS Konde, Head, Professor & Technical Adviser, Alcohol Tech & Biofuels, VSI were present. Approximately 182 participants from sugar mills and distilleries attended the workshop.

The workshop began with registration of representatives participating from different followed by inauguration. During the inauguration function, welcome address was given by Mr. Sambhaji Kadupatil. He welcomed all the guests, sugar mill representatives and VSI staff. He thanked the president for gracing the event with his presence. He said that the sources of fossil fuels are becoming appallingly scarce day by day and on the other hand, the greenhouse gases which are emitted by combustion of these fossil fuels are causing significant negative effects on our environment such as global warming. He stated that to mitigate these problems, green hydrogen can prove to be a good alternative as it is a clean fuel and has high energy density. He also elaborated about 'National Green Hydrogen Mission' and 'National Green Hydrogen Policy' launched by the Government of India. Lastly, he expressed his expectations from the workshop to find sustainable solutions towards the vistas of hydrogen technology.

Hon. President of VSI, Mr. Sharad Pawar delivered the key note address. He briefed us about the existing and projected demand of hydrogen in India and globally. He further said that green hydrogen can be considered as the potential catalyst of the world's shift to sustainable energy and net zero emissions to tackle global warming and climate change. He advised sugar industry to explore the option of producing hydrogen in order to diversify their product portfolio. He said production of hydrogen in sugar complex will provide a win-win opportunity to industry & society. Hon. President informed the participants that this workshop organized by VSI is intended to facilitate deliberations on various challenges and exchange of knowledge to pave our path to future. Various issues related to storage, transportation, long term govt. policies, etc. should be addressed in this workshop. Hon. President said, he is sure that the discussions in this workshop will be very fruitful and will definitely lay-down path for sugar industry to venture in this emerging field of green hydrogen.

During the technical session-I, Dr. CS Gopinath gave a presentation on 'Green Hydrogen Economy - India's Ambitions'. He briefly discussed the India's ambitious climate action plan and their set targets. He said that the opportunities lie across hydrogen value chain. His talk was mainly focused on basic concepts of green hydrogen and current technology and R & D development.

Dr. Bharat Kale delivered presentation on the topic entitled 'Hydrogen: Overview of Photocatalytic Process'. Dr. Kale briefed overview of available facilities & ongoing projects at CMET, Pune. In his talk, he emphasized mainly on nanocatalysts and their application for hydrogen production. He also explained about nanocomposites and their applications.

Prof. Rajnish Kumar gave presentation on the topic entitled 'Challenges & Opportunities in CCUS'. He explained different techniques for CO_2 capture, and its sequestration. He mentioned regarding the techno-economic assessment of CO_2 capture, and its sequestration (30 -50 USD/tonne). He also explained method for CO_2 capture where hydrogen is converted to hydrates. He emphasized that the CO_2 capture methods are sustainable, however, industries have to invest huge amount for the same.

In the technical session-II, Dr. KS Konde, gave lecture on 'Hydrogen production opportunities in sugar & allied industry'. He discussed various possible routes of green hydrogen production in sugar complex i.e. electrolysis using cogen electricity, biogas to hydrogen via steam methane reforming and via biogas gasification. He also explained the economics and production cost of all three routes.

Dr. VV Mahajani delivered talk on 'Hydrogen Production from Methane and Bagasse'. He elaborated on the process used for Hydrogen and explained in detail about the process of Steam Methane Reforming (SMR), Partial oxidation technique and Biomass gasification.

Mr. Siddharth Mayur talked on 'Future of energy- Green Hydrogen'. He explained different techniques for electrolysis, and different types of electrolyzers used for it. He elaborated on the new approach for sugar complex where, green hydrogen, ammonia and sustainable aviation fuel (SAF) can be produced in sugar factory. He also explained about his company h2e power and about India's first ever green hydrogen pilot plant commissioned at Jorhat.

The programme was concluded with discussion and vote of thanks which was given by Prof. SV Patil.

VSI COMMITTEE MEETINGS

VSI COMMITTEE MEETINGS

VSI Committee Meetings namely, Investment Committee Meeting was held on November 27, 2022 and Building & Purchase Committee Meeting was held on December 11, 2022

Hon. President Visit to VSI

Mr. Sharad Pawar, Hon. President of VSI visited to VSI on November 12, 2022 and December 29, 2022 to review the various farms developmental work, project work and 3rd International conference work.

During these meetings Mr. Shivajirao Deshmukh, Advisor, Mr. Sambhaji Kadupatil, DG and All the HODs were present. In the meeting concerned authorities briefed the developmental progress work.

Review Meeting : I

Review Meeting : II

VSI PARTICIPATION

VSI PARTICIPATION

Public Private Partnership in Sugar Sector : Inside, Outside or Beyond at Bengaluru

One day multi stakeholder workshop on 'Public Private Partnership In Sugar Sector: Inside, Outside or Beyond' was organized by Solidaridad' New Delhi at Hotel Gold Finch Retreat, Bengaluru, Karnataka on October 11, 2022. The workshop was inagurated at the hands of Concellor General of Netherland Mr. Evout De Wit and Mr. Sambhaji Kadupatil, Director General of Vasantdda Sugar Institute, Pune. Ms. Monica Khanna, Country Manager of Solidaridad welcomed the guests and participants. Ms. Ella Lammers from Nedarlands Enterprise Agency participated in the workshop through online mode. Mr. Alok Pandey from Solidaridad presented the importance of PPP mode program for sustainability. During Panel discussion on "Engagement of partners for sustainable sugarcane program: Lessons and way forward" Mr. Selvaraj from NSL, Sugar, Mr. Raja Srivastava from DCM Shriram Sugar, Mr. Vijendra Singh from Renuka Sugar, Mr. Bharat Kundal from Olam Sugar and Dr. M. Mohan Raj from SBI made the presentations in the session and the different issues on related topics were discussed. In the Panel discusion on 'Water use efficiency in sugarcane farming : Opportunities and Challendges before institutions' Mr. Smambhaji Kadupatil from VSI, Dr. M. Muralidhara from Osmania University and Mr. Ashray Tyagi and Shailesh Acharya from Solidaridad made presentations. Mr. PP Shinde, Scientst and Head, Agril. Engg. VSI presented the results of trials conducted at VSI, Pune on Increasing water use efficiency in sugarcane farming. Mr. Prashant Pastore from Solidarid took part in the discussion and emphasized the importance of topic. The program ended with vote of thanks by Ms. Manisha Shaha from Solidaridad.

All India Coordinated Research Programme on Sugarcane AICRP(S)

The 34th Biennial workshop of All India Coordinated Research Project on Sugarcane was held during October 14-15, 2022 at ICAR-Indian Institute of Sugarcane Research (IISR), Lucknow. The workshop was inaugurated by Hon'ble Dr. Tilak Raj Sharma, DDG (Crop Sciences) ICAR New Delhi, Govt, of India. Dr. AD Pathak, Director and Project Co-ordinator, Indian Institute of Sugarcane Research, Lucknow and other three Ex-Directors of IISR, Lucknow were present during the inaugural session.

A team of VSI Scientists, Dr. RS Hapase, Head and Principal Scientist, Plant Breeding; Dr. JM Repale, Senior Scientist (Pl. Br.); Mr. PR Hapase, Scientist (Botany); Mr. US Manjul, Scientist; Mr. PP Shinde, Scientist and Head, Ag. Engg.; Dr. Preeti Deshmukh, Senior Scientist and Head, Soil Science; Mrs. Sudha Ghodke, Scientist and Head, Agril. Microbiology; Mr. BH Pawar, Senior Scientist and Head, Pl. Pathology and Mr. RG Yadav, Scientist; Head, Entomology and Dr. AS Patil, Scientific Officer, Agronomy Section participated and attended the discipline wise sessions.

The Crop Improvement session was chaired by Dr. RK Singh, ADG (CC), ICAR, New Delhi and Co-chaired by Dr. Hemaprabha, Director, Sugarcane Breeding Institute, Coimbatore and Principal Investigator (PI), AICRP(S) and Dr. AD Pathak, Director, IISR, Lucknow. The Principal Investigator (PI) presented report on zonal varietal trials conducted during 2021-22, fluff supply programme, evaluation of climate resilient Inter Species Hybrids (ISH) and Inter Generic Hybrids (IGH) genetic stocks and Salient characteristics of sugarcane varieties identified/ released during 2021-22 for five agro-climatic zones of India. The four varieties were notified which were developed through AICRP(S) are Co 14012 for Peninsular zone, two varieties viz., CoLk 15201 and CoLk 15207 for North West Zone and CoLk 15466 for North Central and North-East Zone. The total of 17 new entries were finalized for testing in IVT under AICRP(S) and VSI's proposal of midlate maturing clone VSI 22121 (VSI 56-2) developed from the biparental cross of Co 98006 x Co 775 was accepted for its testing in Peninsular zone.

The crop Production session was chaired by Dr. RL Yadav, Ex-Director, IISR, Lucknow and Co-chaired by Dr. SK Shukla, Principal Scientist and Head, Crop Production Division, IISR, Lucknow. Dr. TK Srivastava, Principal Scientist, IISR, Lucknow and Principal Investigator (PI), Crop Production, AICRP(S) presented report and highlighted that during 2021-22 report year, the elite sugarcane genotype belonging to early and mid-late maturity groups were found to perform well at wider spacing of 150 cms in peninsular zone, water efficient varieties belonging to early and mid-late maturity group were identified for different zones and band placement of fertilizers proved significantly superior over broadcasting method. Effect of PSAP (Potassium salt of active phosphorous) on improving germination, growth and cane yield was more noticeable in peninsular, east-coast and north central zones.

Under Crop Protection session Dr. AN Mukhopadhyay, Ex-Vice Chancellor, AAU, Assam chaired the plant pathology session and Co-chaired by Dr. OK Sinha, Ex-Project Co-ordinator (S), IISR, Lucknow. The entomology session was chaired by Dr. SN Sushil, Director, ICAR-NBAIR, Bengaluru by online mode and Co-chaired by Dr. SK Pandey, Principal Scientist and Head, ICAR-SBIRC, Karnal. The reports were presented by concern Principal Investigators of Plant pathology and entomology.

Dr. R. Viswanathan, Head, Crop Protection Division, ICAR-SBI, Coimbatore and Principal Investigator (PI), Plant pathology presented the report for the year 2021-22 on evaluation of zonal varieties for red rot, smut, wilt, yellow leaf disease (YLD) and pokkah boeng disease (PBD); Survey of naturally occurring diseases, studies on epidemiology of PBD incidence and observed that it is highly correlated with rainfall, temperature and relative humidity (RH). He told that sett treatment and sprays with carbendazim (0.1%) were found most effective in checking the PBD and management of yellow leaf through meristem culture

showed no yellow leaf incidence on planted canes. Two new projects as regards to 'Confirmation of methodology for pokkah boeng disease' and 'use of drones for the management of foliar diseases of sugarcane' were finalized for the year 2023-24.

Dr. Sharmila Roy, Head, Division of plant protection and Principal Investigator, AICRP(S), Entomology presented the report for the year 2021-22. Discussion was held regarding change in title and treatments of project number E40-Management of white grubs in sugarcane with new molecules and new bio-control agents) and E41-Development of management practices of pests of regional importance i.e. Internode borer (INB) for the year 2023-24. The session wise conclusions were discussed and finalized in the plenary session.

7th International Association of Professionals in Sugar and Integrated Technologies (IAPSIT) (SUGARCON 2022) Conference

The 7th IAPSIT (SUGARCON 2022) International Conference on 'Sustainability of Sugar and Integrated Industries: Issues and Initiatives' jointly organized by ICAR-Indian Institute of Sugarcane Research, Lucknow; Society for Sugar Research and Promotion (SSRP) and Association of Professionals in Sugar and Integrated Industries (ISPSIT) was held during October 16 -19, 2022 at Indian Institute of Sugarcane Research, Lucknow. Dr. TR Sharma, DDG (CS), ICAR New Delhi, inaugurated the conference function on October 16, 2022.

On this occasion, Scientists, officials associated with the sugar industry and sugarcane farmers were also awarded for their remarkable contributions.

Mr. Shivajirao Deshmukh, Advisor, VSI awarded for the 'Life Time Achievement Award' for his remarkable work in Sugarcane Research Management and Dr. RS Hapase, Head and Principal Scientist, Plant Breeding received 'Life Time Achievement Award' for his best work of development of new sugarcane varieties by the hands of Hon'ble Chief guest Dr. Tilak Raj Sharma, DDG, IARI (Crop Science), ICAR, New Delhi.

The team of scientists from the institute Dr. RS Hapase, Head and Principal Scientist, Plant Breeding; Dr. JM Repale, Senior Scientist (Pl. Br.); Mr. PR Hapase, Scientist (Botany); Mr. US Manjul, Scientist; Mr. PP Shinde, Scientist and Head, Ag. Engg.; Dr. Preeti Deshmukh, Senior Scientist and Head, Soil Science; Mrs. Sudha Ghodke, Scientist and Head, Agri. Microbiology; Mr. BH Pawar, Senior Scientist and Head, Pl. Pathology and Mr. RG Yadav, Scientist; Head, Entomology and Dr. AS Patil, Scientific Officer, Agronomy were attended the different Technical sessions and poster sessions. The details of research papers presented in the conference under oral and poster session as given in Table.

Dr. RV Dani, Head, Sugar Technology Department, VSI, Pune chaired the Technical Session -III on the theme 'Sugar crops Processing, Value Chain Management, Product Diversification and New norms in Sugar Agri-Business'. Total of 19 technical papers presented during this session mainly on the aspects of value addition through different by-products from bagasse, value addition through different types of Jaggery and assessing advanced sugar cane clones for special type of jaggery and Agro based opportunities in Indian Sugar Sector.

A Sugar Expo was organized in which more than 40 manufacturers, suppliers, service providers displayed sugarcane harvesters, neem coated urea, liquid phosphorus, organic fertilizers, organic jaggery, vinegar and various other products.

The valedictory session was organized on October 19, 2022 and was chaired by Shri SC Deshmukh, Advisor, Vasantdada Sugar Institute, Pune. The recommendations emerged through the conference were finalized.

Technical Session (TS)No.	Title of the paper / poster and proceeding details	Author/s	Oral / Poster
TS-I-7	Effect of Zeolite on sugarcane growth, yield and juice quality of sugarcane in water stress condition, 7th IAPSIT, IISR, Lucknow PP-9	Preeti Deshmukh, Samadhan Surwase and Amruta Raut	Oral
TS-I-30	Effect of graded levels of potassic source and consortium of potash mobilizing bacterial liquid bioinoculat on yield and quality of sugarcane 7th IAPSIT, IISR, Lucknow PP-30-31	KG Nigade, SD Ghodke and DS Jadhav	Oral
TS-I-P-34	Role of sett treatment techniques in sugarcane productivity, 7th IAPSIT, IISR, Lucknow PP-91-92	AS Patil and PV Ghodke	Poster
TS-I-P-46	Effect of application of microbial slurry containing natural agricultural beneficial microorganisms on yield and quality of sugarcane, 7th IAPSIT, IISR, Lucknow PP-101-102	BG Mali, SD. Ghodke and DS Jadhav	Poster
TS-II-3	Evaluation of sugarcane genotypes for their yield and quality characters in multilocation trial, 7th IAPSIT, IISR, Lucknow PP-113	PR Hapase and RS Hapase	Oral
TS-II-5	Evaluation of promising sugarcane genotypes for cane and sugar yield in northeast region of Maharashtra, 7th IAPSIT, IISR, Lucknow PP-115	RS Hapase	Oral
TS-II-P-15	Performance of newly developed sugarcane genotypes in multilocation trial at VSI, Pune center, 7th IAPSIT, IISR, Lucknow PP-180	JM Repale	Poster
TS-II-P-39	Screening of sugarcane genotypes for their reaction against major insect pests, 7th IAPSIT, IISR, Lucknow PP-202	RG Yadav and TD Shitole	Oral
TS-II-P-48	Occurrences of three entomopathogenic fungi on sugarcane white fly, Aleurolobus barodensis, 7th IAPSIT, IISR, Lucknow PP-210	Uday Manjul, Sonali Gaikwad, Sudha Ghodke and RS Hapase	Poster
TS-II-P-50	In vitro efficacy of fungisides, bioagents and chitosan against Fusarium moniliformae, a causal organism of pokkah boeng disease of sugarcane, 7th IAPSIT, IISR, Lucknow PP-213	GS Kotgire, BH Pawar and GE Atre	Poster
TS-III-P-24	Importance of mechanization in sugarcane cultivation, 7th IAPSIT, IISR, Lucknow PP-261-262	PP Shinde	Poster

Life time Achievement Award received by Mr. Shivajirao Deshmukh, Advisor, VSI

Life tine Achievement Award received by Dr. RS Hapase, Head & Principal Scientist, Plant Breeding, VSI

Dr. RV Dani, Head, Sugar Technology during the conduct of technical session

Winter School : ICAR-Indian Institute of Sugarcane Research, Lucknow

Dr. GS Kotgire, Scientist, Plant Pathology section attended twenty one days winter school on 'Recent approaches for doubling farmers income in sugarcane based cropping system. at ICAR-Indian Institute of Sugarcane Research, Lucknow (U.P.) during December 8-28, 2022. Total 25 participants from different States were participated and in this training total 64 lectures and 8 practices were conducted.

VISITORS TO VSI

VISITORS TO VSI

Mr. Subhod Kumar Singh, Joint Secretary (Policy & FCI & S.A.), IAS, Government of India and Mr. Shekhar Gaikwad IAS Commissioner of Sugar Maharashtra State visited to Institute on October 4, 2022. Mr. Sambhaji Kadupatil, Director General, VSI welcomed team and briefed about Institute activities. In presence of visitors and Head of Departments/ Sections VSI film was shown to team. In the introductory speech Dr. R Dani, HOD & Technical Adviser, Sugar Technology (ST) Department briefed about the need of the process validation during diversion of various feed stocks for ethanol production.

Mr. Kakarala Gangadharam, Technical Adviser, ST Department made presentation and explained about the Department Of Food and Public Distribution (DFPD) guide lines for feed stocks diversion and various amendments taken place till date. Further he emphasized about the New Sugar Customer Relationship Management (CRM) software which was jointly developed by VSI, Sugar technology department and Sugar commissionerate, Maharashtra and It was successfully implemented during the crushing season 2021-22 for Fair and Reasonable Price (FRP) recovery calculation during the diversion of various feed stocks for ethanol production in Maharashtra. Team also visited departments like Tissue Culture section, Alcohol Technology & Biofules they also visited to Pilot Winery and Nano Brewery etc.

Visit of ICAR- Directorate of Floricultural Research, Pune

Dr. KV Prasad, Director, ICAR- Directorate of Floricultural Research, Pune and his team of Scientist visited VSI on October 10, 2022.

Mr. Sambhaji Kadupatil, Director General, VSI, along with all the Head of the Departments of VSI, welcomed the delegates. Mr. Sambhaji Kadupatil briefed about activities of VSI. The team visited various departments, concerned scientists briefed about R & D activities etc.

Visit of Kenyan Guest

A delegation comprising Ms. Sabina Mutua and Mr.KumarAnkur Singh of Kwale International Sugar Company Limited from Nairobi, Kenya, East Africa visited VSI on October 12, 2022.

Mr. Sambhaj Kadupatil, Director General, VSI, along with all the Head of the Departments of VSI, welcomed the delegates. Mr. Sambhaji Kadupatil explained regarding various R & D activities, Academic activities like graduate and post graduate courses, tailor made courses & training activities for foreign countries and extension & advisory services of VSI towards overall progress of the sugar industry and sugar business worldwide.

The team also visited various departments, Laboratories and Library. They discussed with concerned department experts & scientists and got information about various research & development activities, extension services and achievements of the departments and academic activities regarding various courses and trainings conducted by VSI.

Visit of NABL Assessment Team to Vasantdada Sugar Institute Testing Laboratories for Continuation of Accreditation

NABL team consisting of Ms. S Shashirekha, Analytical Consultants & Experts(ACE), Bengaluru, Karnataka as a Lead and Technical assessor, Ms. Sheena Jacob, Hindustan Lifecare Ltd., Kozhikode, Kerala, Mr. Niteesh K Shukla - Indian Tyre Technical Advisory Committee, Noida, Uttar Pradesh, Mr. Sanjeev Kumar Singh, National Environmental Engineering Research Institute (NEERI), Nagpur as Technical assessors from NABL visited Vasantdada Sugar Institute, Pune on October 29-30, 2022 for onsite assessment of the laboratories for continuation of accreditation of the VSI labs.

Mr. PP Shinde, Quality Manager of the laboratory welcomes the team for the surveillance assessment. The visiting team was introduced to Director General. The Director General, Head of the departments of Sugar Tech, Alcohol Tech& Biofuel, Environmental Sciences and Technical Managers of all labs were introduced to the team. Mr. Sambhaji Kadupatil felicitated the team and expressed his views and co-operation for surveillance audit. The team carried out surveillance assessment of the laboratory as per IS 17025: 2017. In the concluding meeting the team recommended the continuation of NABL accreditation of the laboratory till September 2023.

Visit of Brazil Guest

Mr Patrick Haim, Chief Agronomist, Isryal chemical Limited (ICL), Brazil and Mr. Sanjay Biradar, Chief Agronomist, ICL, India visited Vasantdada Sugar Institute, on November 2, 2022 for discussion on research project of 'Effect of Polyhalite on sugarcane' sponsored by ICL. Dr Preeti Deshmukh welcomed the delegates and explained the R & D activities, Extension and academic services of VSI towards the progress of sugar Industry for State and Nation level. They also visited various departments.

VISIT OF AICRP(S) MONITORING TEAM

The AICRP(S) monitoring team comprising of four scientists comprising of Dr. SB Patil, Principal Scientist (GPB) & Head, Agriculture Research Station, Sankeshwar (Karnataka); Dr. Arun Baitha, Entomologist, ICAR-IISR, Lucknow; Dr. Sanjay Kumar Yadav, Agronomist, ICAR-IISR, Lucknow and Mr. BH Pawar, Head & Senior Scientist, Pathologist, VSI, Pune had visited the institute on November 15-17, 2022 to monitor the AICRP(S) research program at VSI location. The team visited the experiments conducted at research farm as per the technical programme 2022-23 of AICRP(S) by the Plant Breeding, Agronomy, Soil Science, Entomology and Plant Pathology. The team members visited four Zonal Varietal Trials conducted by Plant Breeding and the seedlings (total 3756) raised from fluff under fluff supply program of AICRP(S). The promising genotypes from zonal varietal trials are as under-

1. Initial Varietal Trial-Early: CoN 19071, Co 19008, CoVSI 19121, Co 19003, Co 19009.
2. Advanced Varietal Trial-I Plant: Co 17002, Co 17001, MS 17082, Co 17004, CoVc 17061.
3. Advanced Varietal Trial-II Plant: Co 16006, Co 16018, Co 16010.
4. Advanced Varietal Trial-I Plant-Ratoon: Co 16018, Co 16006, Co 16010.

Dr. SB Patil visited the four zonal varietal trails and two trials on evaluation and identification of climate resilient ISH and IGH stocks and appreciated the crop growth in the breeding experiments conducted at Vasantdada R & D farm and Manjari farm. He also visited the seedlings developed from fluff received from SBI, Coimbatore under fluff supply programme.

Dr. Sanjay Kumar Yadav visited the Agronomy experiments AS 72: Agronomic performance of elite sugarcane genotypes in these genotypes Co 16006, Co 16010 & Co 16018 performed better than the standard Co 86032. In visit to AS 74: Evaluation of sugarcane varieties for drought tolerance it was observed that the genotypes CoM 09057, Co 12009 & MS 10001 performed better than the standard Co 86032.

The experiments conducted by soil science section were also visited by Dr. Sanjay Kumar Yadav. The experiment AS75: Precision nutrient management through rescheduling time of application for widely spaced sugarcane plant - ratoon system. (Ratoon Crop) it is observed that the M2S3 treatment showing best performance on variety Co 86032 where application of RDN & RDK in seven split with band placement fertilizer application method. In experiment AS76: Evaluation of PSAP on AICRP in sugarcane at given varieties in different agro climatic zone. (Plantcane II and Ratoon crop), where T5 treatment showing best performance on variety Co 86032 where application of RDF plus set soaking 0.8 % PSAP and 4 foliar spray of PSAP at 45,60,90 and 120 DAP. The experiment AS77: Evaluation of liquid nano urea for its efficacy in

enhancing N use efficiency and sugarcane growth and yield (Plantcane) showed that treatment T9 showing best performance on variety Co 86032 where application of 50 % N at basal and rest in three equal split spray of liquid nanourea at 45,90 and 135 DAP.

Dr. Arun Baitha visited the pathology eight trials. The trial PP17 B: Evaluation of zonal varieties for resistance to smut disease under artificial disease condition at field level. In this trial out of total 23 IVT genotypes 09 genotypes and from 12 genotypes in AVT, 05 genotypes were found free from smut disease under artificial disease condition**.** In the trial PP17 D: Yellow leaf disease study (YLD), out of 12 genotypes, YLD noted only one genotype Co17003.In the trial PP 17E: Methodology for screening of varieties for brown rust it was observed that out of 12 genotypes, brown rust noted on six genotypes viz., Co 17003, Co 17004, Co 17005, CoVc 17061, CoN 17072 and MS 17082.In the trial PP 17F: Screening of entries under AVT for pokkahboeng disease, out of 12 genotypes, six genotypes viz., Co 17002, Co 17013, CoVc 17061 CoN 17072, MS 17082 and CoT 17366 were found free from pokkahboeng disease. In trial on PP 31: Screening and epidemiology of Pokkahboeng in sugarcane, it was discussed that due to erratic information available about the climate it was difficult to correlate the data for studying the epidemiology of the pokkahboeng disease. In trial PP 32: Management of brown spot disease of sugarcane, amongst all the fungicides tested, fungicides *viz.,*Tebuconazole and Propiconazole are found effective to control brown spot disease. The trial on PP 33: Management of yellow leaf disease through meristem culture, it was observed that TC plantlets of VSI 08005 and MHAT Co 86032 treatments were free from disease while rests of treatments were positive reaction to YLD disease. The trial on PP 34: Efficient delivery of fungicide and other Agro inputs to manage major fungal diseases in sugarcane showed that smut disease was noted in control plot where setts were not treated with Sett Treatment Device. Dr. Baitha expressed his satisfaction about the conduct of trials.

Dr. Arun Baitha visited the Entomology four trials. In trial E 4.1- Evaluation of zonal varieties / genotypes for their reaction against major insect pests and in this trial genotype CoVSI 16121was found less susceptible to early shoot borer. The trial E.30-Monitoring of insect pests and bio agents in sugarcane agro- ecosystem, in this trial the % incidence of early shoot borer was maximum. The % incidence, & infestation index of INB was maximum 21.0 & 0.31 respectively in the 39 SMW (28.09.2022). The trial E.34- Standardization of simple, cost effective techniques for mass multiplication of sugarcane Bioagents, under this experiment produced 1589.5 cc *Corcyra* eggs, 936*T. chilonis*and 386*T. priteosum*card up to October, 2022. In trial E.40- Integrated approach to manage white grubs in sugarcane, under his trial in July 2022, Aug.-2022, Sept.-2022 and Oct.-2022 T 1 (IPM module) & T2 (Organic module) were free from white grub infestation, while in T3 (Untreated control) no of grub per clump were 2.6,1.0,1.6 and 0.6 respectively. The trial E.41- Assessment of yield losses caused by borer pests of sugarcane under changing climate scenario showed that at 120 DAP cumulative per cent incidence of early shoot borer was 3.58 and 12.14 in treated block and untreated block respectively.

Compressed Bio Gas (CBG): Opportunities in Sugar & Allied Industry

Agricultural residue (sugarcane trash), cattle dung, sugarcane press mud cake (PMC), municipal solid waste, etc. are used for production of biogas. The biogas is purified to remove hydrogen sulfide, carbon dioxide, water vapor. The purified biogas is compressed as Compressed Biogas, which has methane (CH4) content of more than 90%. CBG has calorific value and other properties similar to compressed natural gas (CNG). It can be utilized as green renewable automotive fuel. Thus, it can replace CNG in automotive, industrial and commercial areas, given the abundance biomass availability within the country.

As per directive of Hon. President, VSI, a meeting & lecture was held with Mr. Sunil Handa and Ashwin Joshi of Remeth Renewables Pvt. Ltd. (RRPL) at VSI on November 25, 2022. The meeting was attended by Mr. Sambhaji Kadupatil, Director General, VSI, Mr. Shivajirao Deshmukh, Advisor, VSI and VSI Scientists were present.

Mr. Ashwin Joshi gave a presentation on 'Business & Technology Review of CBG'. He informed that RRPL has installed 3TPD CBG plant at Hyderabad with poultry waste as a feedstock. They have also used press mud cake as feedstock for this digester for 7-8 months. RRPL has patented this technology for biogas production from PMC and biogas up gradation to CBG. From Sugar Industry perspective, RRPL would like to install 10-15 CBG plants in sugar mills in Maharashtra. Their business model will be on build and operate basis.The plants will be installed and operated by RRPL with their capital investment. PMC will be purchased from sugar mills with long term agreement for 15-20 years. RRPL will share revenue with sugar mill which is three to four times more as compared to existing PMC price (Rs 500-600 per MT). In the meeting, RRPL also informed that they have received order for two biogas digesters (PMC or agro-waste as a feedstock) from Natural Sugars & Allied Industry Limited (NSAIL).

The following options can be considered in CBG production in sugar & allied industry.

- CBG plant can be installed using biogas in distillery.
- CBG plant can be installed with PMC as feedstock.
- CBG production potential in Maharashtra is 500 to 600 ton per day from 218 sugar mills
- CBG plant & machinery can be purchased from RRPL/ other supplier by sugar mill with good financial health and availability of sufficient funds as done by NSAIL.

  OR

  If sugar mill's financial position does not permit they can go ahead for BOOT project on terms & conditions mutually agreed by both the parties.
- There is need to formulate research/field trials on fermented organic manure for optimization of dose and its effect on sugarcane yield and soil fertility.

Following Visitors were visited VSI during last three months (JULY-AGUST-SEPTEMBER 2022)

Name of Institutions	Visitors	Total
July - 2022		
Shri. Dudhganga-Vedganga SSK Ltd., Mouninagar, Tal : Kagal, Dist : Kolhapur	Farmers	**10**
Deputy Regional Agriculture Office, ParturDist : Jalna	Officers and Farmers	**65**
Dist : Parbhani in Operational area of Twenty one Sugar factory	Farmers	**10**
Dr. D.Y. Patil Agriculture College,Talsande, Dist : Kolhapur	Lecturer and Students	**32**
Subdivisional Agriculture Office,Phaltan, Dist : Satara	Officers and Farmers	**96**
Vilasrao Deshmukh Agriculture College, Latur Dist : Latur	Lecturer and Students	**45**
NSL, Sugar Unit Head, Hyderabad, Dist : Andhra Pradesh	Unit Head	**2**
Floriculture Institute, Pune	Director and Scientists	**10**
Individual Farmers from Maharashtra State	Farmers	**189**
November - 2022		
St. Xavier College, Mapusa, Goa	Lecturers and Students	**43**
Sanjivani Rural Education Society's Sanjivani K.B. Polytechnic, Kopargaon, Dist : Ahmednagar	Principal and Faculty members	**8**
Gayatri Sugars Ltd., Kamareddy Unit, State : Telanganga	Officers and Farmers	**45**
Sub divisional Agriculture Office, Vaijapur Dist : Aurangabad	Officers and Farmers	**65**
Modern College of Arts, Science and Commerce, Ganeshkhind, Pune	Faculties and Students	**48**
Individual Farmers from Maharashtra State	Farmers	**173**
December - 2022		
Shri Shivaji College of Agril. Biotechnology, Amravati, Dist : Amravati	Faculties and Students	**68**
Changu Kana Thakur College, Navi Mumbai, Panvel	Lecturers and Students	**96**
Dr. D.Y.Patil College of Agriculture, Talasande, Dist Kolhapur	Lecturers and Students	**28**
Govindraoji Nikam College of Agriculture,Mandki-palvan, Tal: Chiplun, Dist: Ratnagiri	Lecturers and Students	**90**
Subdivisional Agriculture Office, Pachora Tal: Pachora Dist : Jalgaon,	Officers and Famers	**63**
Agriculture College of Biotechnology, Loni, Pravara, Dist : Ahmednagar.	Faculties and Students	**73**
Subdivisional Agriculture Office, Dapoli, Tal : Dapoli Dist : Ratnagiri	Officers and Framers	**53**
Individual Farmers from Maharashtra State	Farmers	**315**
Total :		**1357**

PUBLISHED ARTICLES
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पूर्व हंगामी ऊसपीक आधारीत आंतरपीक पध्दती

महाराष्ट्र राज्यामध्ये दरवर्षी ऊसाखालील क्षेत्रात वाढ होताना दिसत असली तरी दिवसेंदिवस वाढता उत्पादन खर्च व घटत चाललेली सरासरी उत्पादकता यामुळे शेतकऱ्यांना उत्पादन खर्च व मिळणारा नफा याचा ताळमेळ घालणे अवघड होत चालले आहे. यावर पर्याय म्हणून ऊस लागवडीमध्ये आंतरपिकांचा समावेश करणे गरजेचे आहे. ऊस लागवडीमध्ये आंतरपिक घेत असताना बाजारातील आवक, मागणी, मिळणारा भाव, घ्यावयाच्या आंतर पिकाचे गुणदोष आणि जमिनीच्या प्रकारानुसार उसात योग्य त्या आंतरपिकाची निवड करणे महत्वाचे असते. दोन्ही पिकांची (मुख्य+आंतरपीक) योग्य प्रकारे काळजी घेतली तर अशा पीक पध्दतीत चांगले उत्पादन मिळते व नैसर्गिक स्त्रोतांचा कार्यक्षमपणे वापर करणे शक्य होते.

ऊस लागवडीनंतर सुरूवातीच्या तीन ते चार महिन्याच्या कालावधीमध्ये ऊसाची वाढ सावकाश होत असते. रूंद सरी लागण पध्दतीमध्ये तणांचा प्रादुर्भाव मोठ्या प्रमाणात होण्याची शक्यता असते म्हणून ऊस पीकामध्ये आंतरपीकाची लागण/ पेरणी करावी. आंतरपिक म्हणून द्विदलवर्गीय पिकांचा समावेश केल्यास नत्राचे स्थिरीकरण होण्यास मदत होते. हिरवळीच्या पिकांचा सुध्दा आंतरपीक म्हणून समावेश होऊ शकतो.

आंतरपिकांची निवड करताना असताना पुढील काळजी घ्यावी : १) आंतर पिकाचा कालावधी हा तीन ते चार महिन्यांचा (९० ते १२० दिवस) असावा. जेणेकरून उसाच्या मोठी बांधणीच्या वेळी आंतरपीक काढणीस तयार व्हावे. २) आंतरपिक हे तीन फुटापेक्षा जास्त वाढणारे नसावे. ३) आंतरपिक हे ऊस पिकाशी स्पर्धा करणारे नसावे. (उदा. ज्वारी, मका, सूर्यफूल इ.) ४) मुख्य पीक व आंतरपीक हे एकाच वर्गातील नसावे. जेणे करून मुख्य पिकास कीड व रोगाचा उपद्रव होणार नाही.

पुढील पध्दतीने उसामध्ये आंतर पिकाची लागण करता येते : १) रूंद सरी पध्दत : या पध्दतीमध्ये दोन सरीतील अंतर ४.५ ते ५.० फुटापर्यंत जमिनीच्या प्रकारनुसार ठेवून मधल्या पट्ट्यात दोन ते तीन ओळी पेरणी/टोकन पध्दतीने आंतरपिके घेता येतात. २) एक आड एक सरी किंवा सरी आड सरी पध्दत : या पध्दतीमध्ये सलग २.५ किंवा ३ फुटाच्या सऱ्या सोडून एका सरीमध्ये ऊस लागण व दुसऱ्या सरीतील वरंब्याच्या दोन्ही बाजूला टोकन करून आंतरपीके घेता येतात. ३) पट्टा पध्दत किंवा जोडओळ पध्दत: या पध्दतीमध्ये जोड ओळीतील अंतर २.५ ते ३ फूट व त्यानंतर ५ ते ६ फूट रिकामा पट्टा ठेवण्यात येतो. या रिकाम्या पट्ट्यात विविध आंतरपीके लावून चांगले उत्पादन घेता येते. परंतु आंतरपीक घेत असताना या पिकांचा उसाच्या उगवणीवर, फुटव्यांवर परिणाम होणार नाही याची काळजी घेतली पाहिजे. उदा. हरभरा या पिकास उसापेक्षा कमी पाणी लागते. त्यामुळे पाणी व्यवस्थापणाचा मेळ घालणे आवश्यक ठरते. यासाठी वरंब्यावर हरभऱ्याची एक ओळ (६ ते ९ इंच अंतरावर) टोकण करावी व हरभरा उगवणीच्या कालावधीत स्वतंत्र पाण्याचे नियोजन करावे. पाणी जास्त झाल्यास हरभरा जोमाने वाढतो. त्यामुळे घाटे कमी भरतात व त्याचा उसाच्या फुटव्यांवर परिणाम होतो.

पूर्व हंगामी ऊस लागवडीत खालील प्रमाणे आंतरपिके घेता येतात.

१) कडधान्य वर्गीय :- हरभरा, घेवडा, वाटाणा

२) पालेभाज्या :- पालक, मेथी, शेपू, कोथिंबीर, लालमाठ

३) भाजीपाला :- फ्रेंच बीन्स, फुलकोबी, पानकोबी, नवलकोल
४) कंदवर्गीय :- कांदा, लसूण, बीट, बटाटा, शुगरबीट, मुळा
५) हिरवळीची पिके :- ताग, धैंच्या व इतर

प्रयोगाअंती फायदेशीर ठरणाऱ्याकाही आंतरपिकांबाबत थोडक्यात माहिती : १) कांदा : उसामध्ये कांद्याच्या रोपांची लागण वरंबाच्या दोन्ही बाजूला १५ सेंटीमीटर अंतरावर करावी. या पिकास मुख्य पिकाच्या खतमात्रे व्यतिरीक्त हेक्टरी १०० किलो नत्र ५० किलो स्फुरद व ५० किलो पालाश द्यावे. कांदा लागवडीच्या वेळी अर्धे नत्र व संपूर्ण स्फुरद, पालाश खताची मात्रा द्यावी. उर्वरित नत्र खताची मात्रा २५ ते ३० दिवसांनी द्यावी. कांद्याचे पीक ३.५ ते ४ महिन्यात काढणीस तयार होते. कांदा या आंतरपिकापासून साधारणत: ८० ते ९० क्विंटल उत्पादन मिळते त्याचबरोबर जमिनीची सुपिकता टिकवण्यास मदत होते. २) कोबी : ऊस लागण झाल्यानंतर आंबवणीच्या पाण्यावेळी वरंब्याच्या दोन्ही बाजूस ३० सेंटीमीटर अंतरावर अंदाजे ३० ते ३५ दिवसांचे कोबीचे रोप लावावे. या पिकास हेक्टरी १६० किलो नत्र, ८० किलो स्फुरद, ८० किलो पालाश ऊस पिकाच्या खत मात्रे व्यतिरिक्त द्यावे. अर्धे नत्र, संपूर्ण स्फुरद व पालाश लागवडीच्या वेळेस द्यावे. कोबीचे पिकास उरलेले अर्धे नत्र लागवडीनंतर एक महिन्याने द्यावे. कोबीचे पीक साधारणत: जातीपरत्वे ६५ ते ८० दिवसात तयार होते. या आंतर पिकापासून साधारणता हेक्टरी ६० ते ७५ क्विंटल पर्यंत उत्पादन येवू शकते. ३) बटाटा : पूर्व हंगामी उसाच्या लागवडीवेळी बटाट्याची लागवड करणे हा उसाच्या उत्पादनाबरोबर बटाट्याचे उत्पादन वाढविण्याचा एक प्रभावी मार्ग दिसून आलेला आहे. साधरणत: बटाटा हे पीक तीन महिन्यात तयार होते. ऊस हा सरीमध्ये व बटाटा वरंब्यावर वाढत असल्याने दोन्ही पिकांच्या रोपांची मुळाची व पानांची वाढ ही अनुक्रमे सऱ्या व वरंब्यात होत राहते, त्यामुळे दोन्ही पिकात स्पर्धा न होता ही पिके एकमेकांना पूरक ठरतात.

बटाटा या पिकासाठी लागवडीच्या वेळी हेक्टरी १०० किलो ६० नत्र किलो स्फुरद १२० किलो पालाश द्यावे. लागवडीनंतर ३० दिवसांनी ५० किलो नत्राचा दुसरा हप्ता द्यावा. उसाची बाळबांधणी करत असताना वरंब्याची जास्त माती काढणे टाळावे कारण बटाटा पिकाची वाढ वरंब्यावर होत असते वरंब्याची जास्त माती काढली असता बटाटा सूर्यप्रकाशामुळे हिरवा पडतो व असा बटाटा खाण्यासाठी अयोग्य ठरतो या बटाट्यास बाजार भाव कमी मिळतो.

बटाटा हे पीक ९० ते १०० दिवसांमध्ये पक्व होते. काढणीसाठी रिजरच्या साहाय्याने वरंबा फोडून घ्यावा, त्यामुळे बटाटे मोकळे होतात. बटाटे गोळा करून त्याची प्रतवारी करावी. चांगल्या पध्दतीने बटाट्याची निगा घेतल्यास हेक्टरी १२० ते १३० क्विंटल पर्यंत उत्पादन मिळते व त्याच बरोबर ऊसाला बटाट्याच्या पाल्याची खते मिळवून जमिनीची सुपीकता वाढते.

हिरवळीची पीके : आंतरपीक म्हणून तागासारखी हिरवळीची पिकेसुध्दा घेतायेतात. पीक फुलोऱ्यावर आल्यानंतर (४० ते ४५ दिवसांनी) जमिनीत गाडल्यास चांगल्या प्रतीचे सेंद्रिय खत मिळून जमिनीचा पोत सुधारतो व जमिनीतील सेंद्रिय कर्बाचे प्रमाण वाढण्यास तसेच आवश्यक मूलद्रव्याचे प्रमाण वाढण्यास मदत होते. यासाठी लागणीनंतर ४५ ते ५० दिवसांनी वरंब्याच्या दोन्ही बाजूला कुदळीने चळी घेवून ताग किंवा धैंच्या पेरावा व मोठ्या बांधणीच्या वेळेस सरीमध्ये गाडावा. यापासून ५ ते ६.५ टन प्रति हेक्टरी ओल्या हिरवळीच्या पिकाचे उत्पादन मिळून, साधारणपणे १.५ ते २ टन चांगले कुजलेले खत ऊस पिकास मिळते.

प्रामुख्याने हिरवळीच्या पिकामध्ये

मुळावर गाठी असलेली आणि गाठी नसलेली पिके हिरवळीच्या खतासाठी वापरतात. मुळावर गाठी असलेल्या पिकांद्वारे नत्र व सेंद्रिय पदार्थ जमिनीत घातले जातात त्यामध्ये ताग, धैंच्या, मूग, उडीद, गवार, चवळी, इत्यादी पिके मोडतात की ज्याचापासून हेक्टरी ८ ते २१ टना पर्यंत हिरवळीच्या पिकाचे उत्पादन मिळते व ४५ ते ८० किलो हेक्टरी नत्राचा पुरवठा होतो. मुळावर गाठी नसलेल्या पिकांपासून फक्त सेंद्रय पदार्थाच जमिनीत गाडले जातात यामध्ये गिरीपूष्पाचा समावेश होतो.

आंतरपिके घेत असताना ऊस या मुख्य पिकाची जोपासना योग्य प्रकारे करावी. शिफारस केल्याप्रमाणे पूर्व हंगामी उसात हेक्टरी ३४० किलो नत्र, १७० किलो स्फुरद व १७० किलो पालाशची मात्रा लागवडीवेळी, फुटव्याच्या अवस्थेत, कांडी सुटण्याच्या अवस्थेत आणि जोमदार वाढीच्या अवस्थेत विभागून द्यावी.

आंतर पिकाचा विचार करून योग्य अशा शिफारशीत तणनाशकांचा वापर करावा अथवा आंतरमशागत करून पीक तण विरहित ठेवावे. लागवडीनंतर दीड ते दोन महिन्यांनी बाळबांधणी व साडेतीन ते चार महिन्यांनी मोठी बांधणी करून ऊसाला मातीची भर द्यावी.

अशाप्रकारे पूर्व हंगामी उसामध्ये आंतरपीक लागवडीसाठी स्थानिक बाजारपेठेचा विचार करून पिकाच्या योग्य वाणाचा व योग्य पध्दतीचा अवलंब करून नियोजन केल्यास, उत्पादकता वाढविता येते.

– डॉ. ए.एस.पाटील,
श्री. एस.एन. वाघमारे
श्री. एस.एस. कदम

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वसंतदादा शुगर इन्स्टिटयूट निर्मित डिकंपोझिंग कल्चरचा वापर करून खोडवा पिकामध्ये सेंद्रीय पदार्थाचे व्यवस्थापन

सुधा घोडके, दत्तात्रय जाधव, आकाश शिंदे
वसंतदादा शुगर इन्स्टिटयूट, पुणे

पिकांच्या जोमदार वाढीसाठी व भरघोस उत्पादनासाठी जमिनीतील पोषक अन्नद्रव्ये, पाणी व सूर्यप्रकाश यांची आवश्यकता असते. जमिनीतील सेंद्रीय पदार्थ(ह्युमस) प्रामुख्याने जमिनीत घातलेल्या वनस्पतीजन्य पदार्थापासून सूक्ष्म जीवाणुच्या साहाय्याने कुजविण्याच्या प्रक्रियेतुन निर्माण होतो. सूक्ष्म जीवाणुंनी विमोचन केलेल्या सेंद्रीय आम्लामुळे जमिनीच्या कणांतून पिकांच्या वाढीसाठी उपयुक्त घटक मिळतात. जमिनीतील सेंद्रीय पदार्थामुळे पिकांना अन्न पुरवठा होतो, जमिनीचा पोत सुधारतो, जलधारण शक्ती वाढते, हवा खेळती राहून मुळांची वाढ चांगली होतेव जमिनीची उत्पादन क्षमता वाढते. एक हेक्टर ऊस क्षेत्रापासुन ८ ते १० मे.टन पाचट मिळते. परंतू पाचट गोळा करण्याचा खर्च जास्त येत असल्याने शेतक-यांना पाचटजाळण्याशिवाय पर्याय नसतो. पाचट जाळल्याने पाचटातील संपूर्ण नत्र वाया जाते. अशा परिस्थितीत ऊसाच्या पाचटापासून कंपोस्ट खत तयार करणे उपयुक्त ठरते. ऊसाच्या पाचटामध्ये ३९ ते ४६ टक्के सेंद्रीय कर्ब, ०.३३ ते ०.४४ टक्के नत्र, ०.१ टक्के स्फुरद व ०.६ टक्के पालाश असते.

उसाच्या पाचटाप्रमाणे साखर कारखान्यातून प्रेसमडकेक मिळते. प्रेसमड केकमध्ये ३३ टक्के ते ३६ टक्के सेंद्रीय कर्ब, १ ते १.५ टक्के स्फुरद व ०.४ टक्के ते ०.५ टक्के पालाश असते. परंतू प्रेसमडकेक मध्ये जमिनीस हानिकारक ८ ते १५ टक्के मेणाचे प्रमाण असते. स्पेंटवॉश हा डिस्टीलरीमधून वाया जाणारा प्रदुषण युक्त घटक आहे. त्याचा बीओडी ४०,००० ते ५०,००० हजार पी.पी.एम., सामू ३.५ ते ४.० असतो. म्हणून असा पदार्थ शेतीसाठी अगर पाण्यामध्यून वापरणे हानिकारक आहे. परंतू यामध्ये २८ टक्के ते ३६ टक्के सेंद्रीय कर्ब, १.८९ टक्के नत्र, ०.२६ टक्के स्फुरद व ९.४५ टक्के पालाश असते. त्यामुळे स्पेंटवॉश हे प्रेसमडकेक बरोबर कंपोस्ट करून शेतीमध्ये वापरणे फायद्याचे ठरते.

कंपोस्ट खत तयार करताना लक्षात ठेवण्याच्या बाबी :

चांगल्या प्रतीचे कंपोस्ट तयार करण्यासाठी खालील बाबींकडे लक्ष देणे गरजेचे आहे.

१. कर्ब : नत्राचे प्रमाण : पाचटामध्ये कर्ब नत्राचे प्रमाण १२०:१ एवढे असते, त्यामुळे पाचट कुजविण्यास विलंब लागतो. हे प्रमाण ३५:१ इतके खाली असणे आवश्यक आहे. त्यासाठी युरियाचा वापर करून कर्ब नत्राचे प्रमाण योग्य ठेवता येते. तसेच जिवाणूंची वाढ जोरात होण्यासाठी त्याचे खाद्य म्हणून एक टन सेंद्रीय पदार्थासाठी १० किलो सुपर फॉस्फेट वापरावे.

२. तापमानः कंपोस्टींगसाठी ५ ते ६५ डिग्री से.ग्रे. तापमान लागते. ५ ते १५ डिग्री से.ग्रे. तापमानास मायक्रोफिलीक जिवाणू वाढतात. १५ ते ४५ डिग्री से.ग्रे. तापमानास मेसोफिलीक जिवाणू कार्यरत असतात. त्यावेळी हे जिवाणू आम्ले सोडून कंपोस्टचे तापमान ६५ ते ७० डिग्री पर्यंत वाढवतात. अशा तापमानास मेसोफिलीक जिवाणूंची क्रिया मंदावते व थर्मोफिलीक जिवाणूंची वाढ होते व कंपोस्ट क्रिया पूर्ण होवून तापमान पूर्ववत होते.

३. टर्निंग : हया कंपोस्टिंग क्रियेमध्ये टर्निंगमुळे(कंपोस्ट खत खालीवर करणे) ऑक्सिजनचा पुरवठा होतो व त्यामुळे कंपोस्टींगची क्रिया जलद होते. तसेच हवेचा(प्राणवायुचा) पूरवठा न झाल्यास कंपोस्टिंग क्रिया मंदावते.

४. पाणी : सेंद्रीय पदार्थांचे विघटन हे प्रामुख्याने सूक्ष्म जिवाणूंकडून होत असल्याने त्यांच्या वाढीसाठी योग्य प्रमाणात पाण्याची गरज असते. हे प्रमाण पाचटाच्या किंवा सेंद्रीय पदार्थाच्या ५० ते ६० टक्के ठेवावे. पाण्याचे प्रमाण कमी झाल्यास विघटन व्यवस्थीत होत नाही.

५. सेंद्रीय पदार्थ : हया पदार्थामध्ये सेल्यूलोजचे प्रमाण जास्त असेल तर कुजण्याची क्रिया उशिरा होते व तेच प्रमाण कमी असल्यास कंपोस्ट लवकर तयार होतो.

६. जिवाणूंचा वापर : कुजण्याची क्रिया लवकर होण्यासाठी कार्यक्षम सेंद्रीय पदार्थ कुजविणारे जिवाणू वापरावेत. त्याचे प्रमाण चार टनास एक लिटर वापरावे व सर्व थरावर सम प्रमाणात पाण्यात मिसळुन शिंपडावे, त्यामुळे विघटनाची क्रिया जलद होते.

७. पाचटाचा आकार : पाचट लांब व रूंद असेल तर विघटनाच्या क्रियेस जास्त वेळ लागतो व पाचटाचे लहान तुकडे केल्यास कुजण्याची क्रिया जलद होते.

कंपोस्ट तयार करण्याच्या पध्दती :

१. पाचट शेतात गाडणे:

ऊसातील पाचट शेतात गाडून कंपोस्ट करता येते. यामध्ये ऊस लागवडीच्या अगोदर सरीमध्ये ८ ते १० टन हेक्टरी पाचट अंथरले जाते. त्यावर हेक्टरी १०० किलो युरिया, १०० किलो सिंगल सुपर फॉस्फेट व २.५ व ३ लीटर पाचट कुजविणारे जिवाणू टाकले जातात. त्यांनतर पुन्हा सरी काढून सरीचा वरंबा व वरंब्याची सरी केली जाते. त्यामध्ये पाचट वरंब्याच्या तळाशी गाडले जाते. त्यास एक ते दोन हलके पाणी देवुन ऊसाची लागवड केली जाते. या गाडलेल्या पाचटाचे मोठया बांधणी पर्यंत पूर्ण कंपोस्ट होते.

२. खोडव्यामध्ये पाचटाचे नियोजन :

ऊस तोडल्यानंतरराहणारे पाचट जाळून न टाकता त्याचे खोडव्यातच कंपोस्ट खत तयार करावे. ऊस तुटल्यानंतर राहणारे पाचट सरीआड सरी मध्ये ठेवून त्यावर एकरी एक लीटर कंपोस्ट जिवाणू, एक बैलगाडी शेणखत किंवा कंपोस्ट खतात मिसळून सम प्रमाणात टाकावेत. नंतर एकरी एक गोणी सुपर फॉस्फेट पाचटवर सम प्रमाणात टाकावे व लगेच पाणी द्यावे. पाणी देताना पाचट चांगले तुडवून घ्यावे. म्हणजे पाचटाचे आकारमान कमी होवून त्याचा मातीशी संबंध येतो व कुजण्याची क्रिया जलद होते. प्रत्येक पाण्याच्या वेळी पाचट तुडवून घ्यावे. अशा प्रकारे साधारणपणे ३.५ ते ४ महिन्यात शेतामध्येच पाचटापासुन कंपोस्ट खत तयार होते.

३. ढीग पध्दतीने कंपोस्ट तयार करणे :

ऊसाचे पाचट व प्रेसमडकेक पासून कंपोस्ट खत तयार करणे.

अ. ऊसाचे पाचट व प्रेसमडकेक यांचे प्रमाण १:३ या प्रमाणे असावे.

ब. ढिग पध्दतीने कंपोस्ट तयार करावे. ढिगाचा आकार २ मिटर रूंद, १ मिटर उंच व लांबी सोईनुसार ठेवावी.

क. ऊसाचे पाचट व प्रेसमडकेक (९ इंच व ३ इंच) यांचे थरावर थर द्यावेत. प्रत्येक थरावर एक टन सेंद्रीय पदार्थासाठी १० किलो सिंगल सुपर फॉस्फेट, ८ किला युरीया, ०.२५ लीटर कंपोस्टींग कल्चर व ५० टक्के ओलावा राहील या प्रमाणे पाणी शिंपडावे.

ड. दिड महिन्यानंतर कंपोस्ट ढीग खालीवर (टर्निंग) करावा. व त्यावेळी ५० टक्के ओलावा राहील एवढे पाणी शिंपडावे. कंपोस्ट खताची प्रत वाढविण्यासाठी प्रति टनासाठी १ लीटर ॲझोफॉस्फो व २ लीटर गंधक विघटन करणारे जीवाणू खत टाकावे व पुन्हा ढिग खालीवर करावेत. अशा पध्दतीने ३.५ ते ४ महिन्यात उत्तम प्रतिचे कंपोस्ट खत तयार होते.

४. प्रेसमडकेक व स्पेंटवॉश पासून कंपोस्ट तयार करणे :

१. प्रेसमड व स्पेंटवॉशचे प्रमाण(१:२ किंवा १:३)
२. ढिगाचा आकार १०० मिटर.
३. वरीलप्रमाणे प्रेसमडचा ढिग लावून त्यावर दर ३ ते ४ दिवसाने ६० टक्के ओलावा राहील एवढे स्पेंटवॉश शिंपडावे.
४. एक वेळा स्पेंटवॉश शिंपडल्यावर एक टन प्रेसमडसाठी २५० मि.मि. जीवाणू एकदाच टाकावेत.
५. प्रत्येक वेळी स्पेंटवॉश शिंपडत असताना टर्निंग द्यावे व खत मिसळावे.
६. ६० दिवसात उत्तम प्रतिचे कंपोस्ट तयार होते. खताची प्रत सुधारण्यासाठी कंपोस्टमध्ये १ लिटर ॲझोफॉस्फो द्रवरूप जीवाणू खत व २ लीटर गंधक विघटन करणारे जीवाणू मिसळावे.

५. खड्डा पध्दतीने कंपोस्ट खत तयार करणे:

या पध्दतीमध्ये ऊसाच्या पाचटाबरोबरच इतर सेंद्रिय पदार्थ व प्रेसमडकेक यांचा उपयोग करून कंपोस्ट खत तयार करता येते. खड्डयाचे आकारमान २ मिटर रूंद, १ मिटर खोल व लांबी सोईप्रमाणे असावी. खड्डा भरण्यास सुरू करण्यापूर्वी एक टन सेंद्रीय पदार्थासाठी ५० लिटर पाण्यात ०.२५ लिटर कंपोस्ट जीवाणूंचे द्रावण तयार करून घ्यावे. त्याचप्रमाणे पुन्हा ५० लिटर पाण्यात ८ किलो युरिया व १० किलो सुपर फॉस्फेट प्रति टनाप्रमाणे द्रावण तयार करून घ्यावे. खड्डा भरण्यास सुरू करताना तळाशी एक फूट उंचीचा पाचट किंवा इतर सेंद्रीय पदार्थाचा थर द्यावा. या थरावर प्रेसमड केकचा अंदाजे पाच इंचाचा थर द्यावा. अशाप्रकारे एका आड एक थर देवुन खड्डा पूर्ण भरून घ्यावा. या प्रत्येक थरावर वरील प्रमाणे तयार केलेली दोन्ही द्रावणे शिंपडावीत. खड्डयात ५० ते ६० टक्के ओलावा राहील इतके पाणी टाकावे. दिड महिन्यानंतर कंपोस्टला एकदा खालीवर (टर्निंग) करावे. त्यावेळेस ५० ते ६० टक्के ओलावा राहील इतके पाणी टाकावे. अशाप्रकारे ३.५ ते ४ महिन्यात उत्तम प्रतिचे कंपोस्ट खत तयार होईल. या खताची प्रत सुधारण्यासाठी १ टन कंपोस्ट खतासाठी १ लीटर ॲझोफॉस्फो द्रवरूप जीवाणू खत व २ लीटर गंधक विघटन करणारे जीवाणू मिसळावे.

६. प्रेसमडकेक कुजविण्यासाठी व्ही.एस.आय. निर्मित द्रवरूप डिकंपाझिंग कल्चर :

व्ही.एस.आय निर्मित १ लिटर द्रवरूप डिकंपोझिंग कल्चर चार टन प्रेसमडकेक कुजविण्यासाठी म्हणजेच २५० मि.ली. कल्चर १ टनासाठी लागते त्यासाठी रू. ६२.५/- येवढा खर्च येईल. परंतु, व्ही.एस.आय. च्या सवलत दराच्या योजनेनुसार ३००० लिटर किंवा त्यापेक्षा अधिक कल्चर खरेदी केल्यास २५% सवलत दिली जाते. सवलतीच्या दराने १ लिटर कल्चरची किंमत रू. १८७.५/- एवढी होईल. १ टन पी.एम.सी कुजाविण्यासाठी २५० मि.ली. कल्चर लागते त्यानुसार १ टनासाठी फक्त रू. ४६.८७/- इतका खर्च येईल. म्हणुनच ३००० लिटर किंवा त्यापेक्षा अधिकची ऑर्डर दिल्यास कारखान्यास फायदेशीर ठरेल.

७. कंपोस्ट खत तयार झाल्याचे कसे ओळखावे :

१. खतांचा रंग गर्द काळा होतो.
२. खताचा माती सारखा वास येतो.
३. खत हातात घेतल्यास पिसासारखामऊ स्पर्श होतो.
४. कंपोस्टचे कर्ब नत्राचे प्रमाण २०:१ इतके येते.
५. कंपोस्टचा सामू ७ येतो.

वसंतदादा शुगर इन्स्टिटयूट निर्मित द्रवरूप डिकंपोझिंग कल्चरमध्ये १२ प्रकारचे जीवाणू आहेत. (चारप्रकारच्या बुरशी, चार प्रकारचे बॅक्टेरीया/जीवाणू व २ प्रकारचे ॲक्टीनोमायसेटस) हे जीवाणू १५°-६५° से. तापमानात सुरक्षित राहून वाढतात व कुजविण्याची क्रिया जलद करतात. यामध्ये जीवाणूंची संख्या $१X१०^{१०}$ प्रति मि.ली. इतकी असते व थंड जागेत वर्षभर या जीवाणूंची संख्या तशीच राहते.

अधिक माहितीसाठी :
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