

# VSI BULLETIN



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## Foreword Foreword...

I am happy to share with you the contents of VSI Bulletin. This has been a outstanding year for the Indian sugar industry that it has achieved a record of sugar production of 36 million tonnes after diversion of 3.4 million tonnes of sugar to ethanol. India has now become the largest producer of sugar in the world and also the 2<sup>nd</sup> largest exporter of sugar. As this year continues, India is going to make the largest exports of 11 million tonnes of sugar. The country has now entered into the league of 3 nations who have achieved the 10% blending of ethanol after Brazil and USA.

In the forthcoming sugar season 2022-23, the anticipated production of sugar is about 35.5 million tonnes after the diversion of about 4.5 million tonnes to ethanol. We have also achieved 10% blending of ethanol under the EBP (Ethanol Blending Programme) before the given timeline of November 2022.

The Government of Maharashtra has announced that the forthcoming crushing season 2022-23 will be started from October 15, 2023. Around 203 sugar mills will likely to be start their crushing operations and will produce 13.8 million tonnes of sugar with

diversion of around 1.2 million tonnes for production of ethanol.

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

  
(RM Devarumath)  
Editor



## EVENTS

### 76<sup>th</sup> Independence Day

VSI celebrated 76<sup>th</sup> Independence Day of India on August 15, 2022. National flag was hoisted by Mr. Shivajirao Deshmukh, DG at VSI campus.

Mr. Sambhaji Kadupatil, OSD, Mr. DB Ghule, Registrar/Principal, staff members and students were present. On this occasion Mr. Sambhaji Kadupatil gave awards to meritorious children of VSI employees for their excellent performance in education.







## MoU between Centre for Materials for Electronics Technology (C-MET), Pune and Vasantdada Sugar Institute, Pune

Centre for Materials for Electronics Technology (C-MET), Pune and Vasantdada Sugar Institute, Manjari (Bk), Pune signed a MoU in presence of Mr. Prataprao Pawar, Chairman, College of Engineering, Pune on July 11, 2022 for collaborative research work.

Dr Bharat Kale, Director General, Dr Umesh Zope & Dr. Milind Kulkarni from C-MET and Mr. Shivajirao Deshmukh, Director General, Mr. Sambhaji Kadupatil, Officer on Special Duty, Dr KS Konde (Alcohol Technology), Dr Deepali Nimbalkar (Environmental Sciences), Dr Preeti Deshmukh (Soil Science), Mr. RA Chandgude (Sugar Engineering) & Dr. SG Dalvi

(Tissue Culture) from VSI were present. The collaborative research program will be conducted for development of soil nutrient sensor, nanomaterial characterization & catalytic waste degradation, hydrogen production for commercial and strategic sector. There shall be an academic and research interactions among duly authorized officials of both the parties and associates for collaborative research. To increase the relevance of the academic research and consultancy in the research and product development initiative at C-MAT and VSI, There shall be promote to share and exchange information between both the parties for mutual benefit and knowledge enhancement.



## MoU between Indian Institute of Sugarcane Research (IISR), Lucknow and VSI, Pune

ICAR's Indian Institute of Sugarcane Research (IISR), Lucknow and Vasantdada Sugar Institute, Pune signed a MoU on September 5, 2022 for collaborative research work with special emphasis on sugarbeet. Dr. AD Pathak, Director, Dr. DC Rajak, Chief Technical Officer from IISR and Mr. Shivajirao Deshmukh, Director General, Mr. Sambhaji Kadupatil, Officer on Special Duty, Dr. PS Deshmukh (Soil Science) & Dr. AS Patil (Agronomy) from VSI were present. In a collaborative work, IISR and VSI will undertake joint efforts for production of sugarbeet seeds in Indian conditions. There will be sharing of scientific expertise and exchange of research ideas in the form

of long term collaborative research, extension and training for improvement in sugarcane and sugarbeet.





## Cheetah is Back

Ministry of Environment, Forest and Climate Change's regional office, Nagpur coordinated with Department of Environmental Sciences to organize an awareness lecture on the theme '**Cheetah is back**'. This lecture was organized on September 14, 2022 at seminar hall of the Institute. In this awareness presentation, shrinking number as well as depleting habitat of Cheetah was presented to audience. In addition, morphologically distinguishing characteristics of Cheetah, leopard and jaguar were explained with

photographs. Efforts of Government of India to restore the Cheetah were highlighted in few slides of the presentation. Students of environmental sciences and few faculty members attended the programme. Dr. Amol Deshmane (Scientist, Dept of Environmental Sciences) delivered the presentation. Dr. Deepali Nimbalkar (Sr. Scientist and Head, Dept. of Environmental Sciences) and Mr. DB Ghule (Registrar) actively supported for organizing the programme.







## TRAINING

### *Oos Sheti Dnyanyag & Dnyanlaxmi*

In the remembrance of founder President of VSI late Padmabhushan Dr. Vasantdada Patil, **Oos Sheti Dnyanlaxmi and Oos Sheti Dnyanyag** a four days residential training programmes were organized for

women & men sugarcane growers of Maharashtra State at VSI during July to August 2022 in five batches as per the following details given in table.

Batch No	Date	Area from which the farmers participated	No. of sugar mills, individuals & total Participants
<b>Oos Sheti Dnyanlaxmi (Women farmers)</b>			
I	5 <sup>th</sup> to 8 <sup>th</sup> July 2022	Kolhapur, Satara, Sangli and Solapur Districts	Sugar mills : 05 Individual : 04 Total = 173
<b>Oos Sheti Dnyanyag (Men farmers)</b>			
II	12 <sup>th</sup> to 15 <sup>th</sup> July 2022	Kolhapur Dist. and Vidarbha region	Sugar mills : 07 Individual : 01 <b>Total : 216</b>
III	19 <sup>th</sup> to 22 <sup>nd</sup> July 2022	Sangli and Satara Dist.	Sugar mills : 07 Individual : 04 <b>Total : 183</b>
IV	26 <sup>th</sup> to 29 <sup>th</sup> July 2022	Pune, Ahmednagar and Nashik Dist.	Sugar mills : 08 Individual : 06 <b>Total : 164</b>
V	3 <sup>rd</sup> to 6 <sup>th</sup> August 2022	Solapur, Pune Dist. and Marathwada region	Sugar mills : 10 Individual : 03 <b>Total : 232</b>
<b>Grand Total (I to V Batches)</b>			<b>968</b>

A training programme was conducted under the guidance of Mr. Shivajirao Deshmukh, DG and Mr. Sambhaji Kadupatil, OSD, AS&T. 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 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 of every batch, the participants raised their queries and answered from 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 Dnyanlaxmi programme (Women farmers)



## Oos Sheti Dnyanyag programme (Men farmers)

Batch No. : II



Batch No. : III







## Batch No. : IV



## Batch No. : V



## Short term training programme for State Excise Officers of Maharashtra State

Commissioner of State Excise, Government of Maharashtra State requested VSI to arrange a short term training programme for their newly appointed officers. In this regard Department of Alcohol Technology & Biofuels (AT & B), VSI conducted tailor made short term training programme from July 11 to 15, 2022 (I Batch) for the Deputy Superintendent (2 Officers) and from September 5 to 8, 2022 (II Batch) for the Assistant Commissioner (1 Officer) and Deputy Superintendent (6 Officers), State Excise Officers, Government of Maharashtra.

The courses were inaugurated by Dr. KS Konde, Head, Professor & Technical Adviser, Department of AT & B. He introduced the staff to the trainee participants. He briefed the importance of the course to the

participants. He also thanked the Commissioner of State Excise, Government of Maharashtra for sending the officers for the training at VSI.

Both the short term courses covered topics such as composition of molasses & its storage, preservation and maintenance of yeast cultures, propagation of yeast culture on industrial scale, global and national scenario of distillery industry and potential of the country to meet the demand and supply of alcohol, latest technologies of alcohol production from various feedstock, various types of fermentation & distillation processes, operating parameters and operational efficiencies, alcoholometry, microbial analysis of molasses, estimation of viable yeast count, fuel ethanol production by molecular sieve dehydration



technology, production process of country liquor and Indian made foreign liquor (Whisky, Brandy, Rum, Gin & Vodka), malt alcohol production, Indian standards (BIS) for alcohol, liquors, beer and wines, concept of microbrewery, denaturant, denatured spirit & denaturation of spirit, records and registers to be maintained in CL & IMFL, maturation & aging, taxes and duties on molasses and alcohol etc. The course also included important demonstrations/practical in the training programme, which will be helpful for the State Excise Officers while working at distilleries and

liquor manufacturing units. The demonstration of alcohol estimation and sugar estimation of molasses were shown to the participants. The analytical facilities of the department were introduced to the participants. The officers were quite impressed after seeing the facilities such as GC, GC-MS, HPLC, Densitometer, FTNIR, pilot winery, nano brewery etc.

On the occasion of the concluding session the training, certificates distributed to the officers by Mr. Shivajirao Deshmukh, DG, VSI. The participated officers appreciated the overall training programme organized by VSI.



## Advanced Technologies in Sugarcane Agriculture

The residential training programme was organized under National Food Security Mission (NFSM) including Agriculture Officers, Agriculture supervisors and Agril. Assistants officers and staff members from Divisional Joint Director of Agriculture from Aurangabad (Nos. 16) and Latur (Nos.14) on September 6 & 7, 2022. Total thirty participants were participated in this training program. The objective of the training was to train the participant, about advanced technologies in sugarcane agriculture.

The training program was inaugurated by Mr. Sambhaji Kadupatil, Officer on Special Duty, in presence of Heads of Sections and staff members from AS&T Division. Dr. GS Kotgire, Scientist, Plant Pathology section welcomed the participants and others.

Mr. Sambhaji Kadupatil in the inaugural talk highlighted the importance of the training and appealed to participants to adopt advanced technologies in sugarcane cultivation, selection of

sugarcane cultivars, integrated cropping system, focus on integrated nutrient management and disease & pest management for increasing the productivity of crop.

In this training modern and scientific sugarcane cultivation technology was taught which covered the lectures on various topics like sugarcane varieties and varietal planning, seed nursery management, tissue culture, modern planting techniques, weed management, soil fertility and fertilizer management, irrigation water management, use of bio-fertilizers, farm mechanization, ratoon management and integrated disease & pest management. All the agriculture subject experts conducted theory lectures and more emphasis was given on practical and field demonstrations during the program.

In the plenary session, Mr. BH Pawar, Senior Scientist & Head, Plant Pathology welcomed all the participants and took the review of training. During discussion





participants resolved their doubts from the subject experts. In the concluding function, the representative trainees expressed their views about the training. Mr. Shivajirao Deshmukh, DG, discussed with participants about the difficulties faced by them in sugarcane

agriculture and appealed them to guide farmers for adopting modern technologies in sugarcane cultivation. Later, the certificates were distributed to the trainees and program concluded with vote of thanks.



VSI conducted three days residential training program on September 13 to 15, 2022 for farmers from Nashik and Beed (MS) sponsored by Agricultural Technology Management Agency (ATMA). The objective of the training was to train the farmers, about modern technologies in sugarcane agriculture. Total fifty seven farmers were participated for this training program from Nashik (Nos. 26) and Beed (Nos.31).

The training was inaugurated by Mr. Sambhaji Kadupatil, OSD in presence of Heads of Sections and staff members from AS & T Division. Mr. GE Atre, Scientific Officer, Plant Pathology section welcomed all the participants and others. In the inaugural speech, Mr. Sambhaji Kadupatil briefed about

sugarcane agriculture and highlighted the importance of the training.

In this program lectures were arranged on various topics like sugarcane varieties and varietal planning, seed nursery management, tissue culture, modern planting techniques, weed management, soil fertility and fertilizer management, irrigation water management, use of bio-fertilizers, farm mechanization, ratoon management and integrated disease & pest management. More emphasis was given on practical and field demonstrations.

In the plenary session, Mr. BH Pawar, welcomed all the participants and took the review of training. The certificates were distributed to the trainees and program concluded with Vote of thanks.





The three days residential training program for men and women farmers was organized by VSI in two batches on August 23 to 25 and September 20 to 22, 2022. This program was sponsored by Solidaridad Network Asia Limited, New Delhi and supported by Dalmia Bharat Sugar & Industries Ltd. and Dalmia Bharat Foundation Bayer (Food chain partnership). Total 104 men & women farmers participants from Dalmia Bharat Sugar & Industries Ltd, Sugar unit- Ninaidevi Dist. Sangli (men 29 & women 24) and Sugar unit- Datta, Asurle Porle Dist. Kolhapur (men 28 & women 23).

The training programs were inaugurated by Mr. Sambhaji Kadupatil, OSD, in presence of Heads of Sections and staff members from AS & T Division. During the inaugural speech, he briefed about the training program.

In the training various lectures and practical were conducted as mentioned in above. In the plenary session of both batches review was taken and discussions were take place on issues of the participants in sugarcane cultivation. Later, the certificates were distributed to the trainees and program was concluded with Vote of thanks.

## Batch No. : I



## Batch No. : II







## WORKSHOP WORKSHOP

### Management of Soil Health in Changing Climate

Soil Science section, AS & T Division, VSI organized as a part of the extension activity the monthly workshop was held on August 27, 2022 on Management of soil health in changing climate.

Total 97 participants from 44 sugar mills were present during workshop. The workshop was chaired by Mr. Sambhaji Kadupatil, OSD. He explained briefly about the natural resources like soil, water and air etc, their importance and how we can maintain these resources for clean and clear environment for our surrounding. He also highlighted the importance of soil health for the increasing the sugarcane production.

Dr. Pramod Jagtap, Soil Scientist NARP, in his presentation pointed out the important physical, chemical and biological parameter of soil, how the climatic factors like temperature, rainfall affect on soil parameter. He also explained the conservation farming and residue management is essential for each agro ecological region for managing soil health in changing climate. The site specific management practices for soil and water conservation, crop improvement and integrated nutrient management needs to be identified to overcome impact of climate change on physical, chemical and biological properties of soil.

Use of drone in Agriculture is a new advance technology adopted for increasing the efficiency of liquid fertilizers. Dr. SA Survase, in his presentation explained briefly importance of drones for increasing efficiency of

application of crop protection chemicals by reducing manpower requirement, reducing time of application, reducing volume of water, quantity of chemicals and saving drift to environment along with reducing exposure to human being to hazardous chemicals.

Mrs. JP Kharade explained briefly about the integrated nutrient management for adsali sugarcane. Integrated nutrient management i.e. combined application of chemical fertilizers along with organic resource materials like, organic manures, green manures, bi-fertilizers and other organic decomposable materials needs to improve soil physical, chemical and biological properties of soil and increase yield and quality of adsali sugarcane.

Mr. DB Jadhav, Cane Development officer from Shri Datta Shetakari SSK., Shirol Dist. Kolhapur explained various programme conducted in sugar mill for increasing the organic carbon of soil like trash mulching, green manuring, crop residue and organic manure and biofertilizer. Mr. SS Walte, CDO, K.A. Tope Samarth SSK, unit-1 Dist. Jalna explained different activities carried out in sugar mill for increasing the sugarcane productivity. Mr. DA Adak, Asst. CDO, Bhimashankar SSK, Dist. Pune briefly shared their experiences of using humic acid in sugarcane for increasing the fertility of soil in operational area of sugar mill. Mr. GS Yadav, General Cane manager explain the response of foliar application of multi micro and multimacro nutrient fertilizer and humic acid in Madhya Pradesh. Later event was concluded with discussion and Vote of thanks.





## VSI COMMITTEE MEETINGS

VSI Committee Meetings namely, Building & Purchase Committee meeting was held on August 6, 2022, Selection Committee meeting was held on September 1, 2022 and Investment Committee Meeting was held

on September 18, 2022 followed by Governing Council Meeting under the chairmanship of Hon. President, Mr. Shard Pawar in presence of Governing Council members.







## VSI PARTICIPATION

### Sugar Technologists' Association of India (STAI)

The 80<sup>th</sup> Annual Convention of the (STAI) & International Sugar Expo 2022 was held during July 28-29, 2022 at Dr. Shyama Prasad Mukherjee Indoor Stadium, Goa.

The convention was inaugurated by Sadhvi Niranjana Jyoti, Hon'ble Minister of Consumer Affairs, Food & Public Distribution & Rural Development, Govt. of India, in the presence of Dr. Pramod Sawant, Hon'ble Chief Minister, Goa, Mr. Sudhanshu Pandey, IAS, Secretary, Dept. of Food & Public Distribution, Mr. Ishwarsinh T. Patel, Chairman, Gujarat State Federation of Coop. Sugar Factories, Mr. Shivajirao Deshmukh, Director General, VSI, Pune, Mr. RL Tamak, Executive Director & CEO- Sugar Business, DCM Shriram Ltd., Mr. Ranjit Puri, Chairman, ISGEC Heavy Engineering. Dr. Narendra Mohan, Director, NSI, Kanpur, Mr. Sanjay Awasthi, President STAI. Life time Achievement, Industry Excellence & Efficiency awards were distributed by hands of Chief Guest & Guest of Honor

Mr. Shivajirao Deshmukh, Director General, VSI, Pune delivered SN Gundurao Memorial lecture on 'Sustainability of Sugar Industry: Beyond Sugar'. He emphasized the need for making the sugar industry globally competitive and for that, the industry need to focus on production of value added products, namely bio-fuels and biochemical's. The investment in the research and development must be a continuous process and sugar mills must ensure constant interaction and coordination with the research organizations.



#### Agriculture Session:

Total 19 papers were in sugarcane Agril session. In first part, out of 10 papers, 7 papers were presented. The Sugarcane Agriculture session was chaired by Dr. Kuldeep Kumar, Deputy Executive Director, Dalmia Sugars & Co-chaired by Mrs. Sudha D. Ghodke, Scientist & Head, Agril Microbiology section, VSI. Mrs. Sudha Ghodke also presented two papers entitled 'Effect of Graded Levels of Iron and Zinc Source and Consortium of Iron and Zinc Solubilizing Microbial Liquid Bioinoculant on Yield and Quality of Sugarcane under Iron & Zinc Deficient Soil' and 'Evaluation of Exopolysaccharide Producing Bacteria for Sustainable Cane and Sugar Yield of Sugarcane under Water Stress Condition'.

#### Co-products session:

The Co-products session was chaired by Mr. Pradeep Tyagi, Council Member, STAI and Dr. Deepali Nimbalkar, Senior Scientist and Head, Department of Environmental Sciences, VSI. A total of 13 papers were presented on subjects like zero liquid discharge, water conservation and environmental regulations. Dr. Nimbalkar also presented a paper on 'Impact of Changing Environmental Regulations on the Sugar and Allied Distillery Industry'.

#### Factory Engineering & Processing:

This session was chaired by Dr. RV Dani, Head & Technical Adviser, VSI, as a Chairman along with Mr. Anup Keswarwani as a Co-chairman. Fourteen papers were submitted during the session. Three papers were sub-



mitted by team from Sugar Technology Department, VSI. Dr. RV Dani, Mr. S. Panda and Mr. K Gangadharam were attended this session and presented their papers in Factory Processing session as given below ;

- **Enhancement of Ethanol Yield by using Defecated Syrup in Place Of Single Sulphited Syrup** by S Panda, N Mahana, YS Kadam & RV Dani
- **Raw Sugar Production for Export and Potentiality for Sale in Domestic Market** by RV Dani & S Panda
- **Additional Monetary Gain with increase in Mixed Juice% Cane by Sustaining the Steam Consumption** by K Gangadharam, S Panda & RV Dani



## Factory Engineering Section:

Mr. RA Chandgude, Technical Adviser & Head, Sugar Engineering Department, VSI presented a paper '**Photovoltaic Solar Power Generation in the Sugar Mills**' has been awarded Silver medal during Annual Convention & International sugar Expo.

The technical paper presented by Mr. RA Chandgude, Technical Adviser & Head, Sugar Engineering Department during STAI Annual Convention 2021 entitled '**Sustainability of sugar mills through innovative technologies**' has been awarded a Silver medal.



## South Indian Sugarcane and Sugar Technologists Association (SISSTA)

The 51<sup>st</sup> Annual Convention of the South Indian Sugarcane and Sugar Technologists Association (SISSTA) was held on August 26 -27, 2022 at Rahul convention Center, Tirupati. The Chief Guests of the inaugural session was chaired by Mr. Shivajirao Deshmukh, Director General, VSI, Pune; Shri Narendra Mohan, Director, National Sugar Institute, Kanpur and other dignitaries were present.

Mr. Shivajirao Deshmukh, Director General, VSI, Pune has delivered SV Parthasarathy Memorial Lecture on the topic '**Indian Sugar Industry-Futuristic Strategy for R & D Priorities**'. He briefed about Research and Development (R&D) is an essential tool for the survival and growth of any business or organization. The method and the kind of R & D development may

be different for different organizations but the objective is similar like use of available data, reviewing information, hypothesis & collection of new







data analysis and conclusions. There should be greater coordination between academic research and industrial research for better outputs. The research results are transferred to stakeholders through modern educational programs and dissemination tools. Its research activity strengthens rural development and contributes to the adoption of a sustainable rural policy and innovation offer.

## Factory Engineering Session:

In this session, Mr. SS Sastry, Sugar Engineering Department, VSI was presented paper on **'Ameliorating Juice Extraction through Material Balance'** by SS Sastry, RA Chandgude and SP Nalawade.

## Factory Processing Session:

A session was chaired by Mr. RV Dani, Technical Advisor (Sugar Technology), VSI, Pune & N Gopalakrishnan, Sugar technologist, Chennai. In this session total eight papers were presented out of which two papers were from VSI team viz. **'Advanced Raw Sugar Process to Sustain Shelf Life & Suitable to Domestic Consumption'** by Mr. S Panda and RV Dani and **'Generating Revenue by Understanding Sugar losses'** by SS Sastry, S Panda, RA Chandgude and RV Dani

## Co-products Session:

In this session two papers were from VSI team viz. **'Restart the Non-operational Sugar Industries as Standalone Distillery - for Financial Sustain'** by S Panda, YS Kadam, & RV Dani and **'Spontaneous Combustion of molasses – Problems & Remedies'** by N Mahana, S Panda, & RV Dani.

## Agriculture session:

Following papers were presented in this session by VSI;

- **'Performance of promising sugarcane genotypes in South zone of Maharashtra state'** by Dr. RS Hapase, Principal Scientist & Head Plant Breeding Section
- **'Selection of sugarcane clones for yield and quality traits'** by Dr. JM Repale, Senior Scientist Plant Breeding Section.
- **'Plant Growth Promoting Rhizobacteria: The Novel Isolates for Biosynthesis of Phytohormones and Its Impact on Sugarcane Growth'** by Mrs. Sudha Ghodke, Scientist, Head Agriculture Microbiology Section

During the 51<sup>st</sup> Annual Convention 2022, VSI achieved three awards for the technical papers presented in 50<sup>th</sup> Annual Convention 2021. A paper on **'Disposal of distillery spent wash through incineration Technology'** by Mr. RA Chandgude, Technical Adviser & Head, Sugar Engineering Department was awarded Silver medal, **'An Option of Conventional Refined Sugar Production during Diversion of Cane Sugar mill Feed Stocks for Bio-fuel Production'** by S Panda, RR Patil, RN Ghorpade & RV Dani, Sugar Technology Department was awarded with the Gold Medal and **'Biological Reclamation of Saline Sodic Soil Using Halophilic / Halotolerant Microorganism to Increase Crop Yield'** by Mrs. Sudha Ghodke, Scientist & Head Agriculture Microbiology section was awarded with Silver Medal.





## 2<sup>nd</sup> International Conference on Applications of Radiation Science & Technology

Dr. SG Dalvi, Scientist, Tissue Culture Section, participated in the 2<sup>nd</sup> International Conference on Applications of Radiation Science & Technology organized by International Atomic Energy Agency of United Nations. The conference was held during August 21-26, 2022 at head quarter of IAEA, Vienna, Austria. Dr. Dalvi was one of the 4 delegates deputed by Atomic energy, Govt. of India, He orally presented the paper entitled '**Electron Beam Irradiated Chitosan : An Overview of Its Applications for Sustainable Productivity in Different Crops**'. He also visited the Wein University, Vienna Austria for exploring the opportunities of scientific collaboration for characterization of gamma irradiated chitosan Nano fragments. There were dialogues with Dr. Palak Chaturvedi, Group leader, Crops in Climate Change, University of Vienna and Dr. Arvindam Ghatak, Dept. of Ecogenomics and Systems Biology, University of Vienna for sharing their advanced infrastructure facilities for Gamma irradiated chitosan fragment characterization and the induced abiotic, biotic stress tolerance mechanism by them. Both agreed for scientific collaboration for climate change and its mitigation by crop adaptations, providing advanced facilities for completing part research work of Ph. D students at VSI.

During the conference, Dr. Dalvi was also get invited for a Guest Lecture by Prof. Protochy Martin Head, Institute of Experimental Botany, Czech Academy of Sciences, Prague, Czeck Republic. He delivered a lecture on '**Use of Gamma Irradiated chitosan for Sustainable Crop productivity and mitigation of Climate Change**'. All the faculties of the academy were present for his lecture. There was discussion on research collaboration for exploring the chitosan induced metabolomics and proteomics in the plant cell.

Dr. Dalvi visited to Dept of Plant Sciences, Faculty of Agri& Food Sciences. Dr. Molnar Zoltan, Head of Department showed the impressive collection of algal genotypes fresh water and soil. The university has characterized and maintained more than 1000 genotypes of algae and characterized for the different bio-stimulant metabolites form them tested inplant tissue culture system for enhancing the growth of in-vitro plants and evaluated with wheat, maize etc. The low cost bioreactor systems with CO<sub>2</sub> generator are being utilized for mass multiplication of algae from which the plant growth promoting metabolites are extracted with freeze drying system.



Dr. SG Dalvi presentation at Czech Academy, Prague



Dr. SG Dalvi with Dr. Molnar Zoltan looking collection of algal genotypes





## Biopesticide and Bioregulators in Sustainable Agriculture

Dr. SG Dalvi, Scientist from Tissue Culture Section, VSi was invited as panel member for discussion on the biostimulators in one day workshop on **'Biopesticide and Bioregulators in Sustainable Agriculture'** was organized by Bhabha Atomic Research Center, Mumbai on September 11, 2022. He presented the BARC-VSi developed gamma irradiated chitosan development steps from the BRNS funded research project for sugarcane micropropagation to the commercial product development with multi-location trials on different crops and recommendation through JOINT AGRESCO.



## Excursion of M.Sc. Environmental Sciences

Department of Environmental Sciences organized two-day excursion (field visit) on September 24 & 25, 2022 for M.Sc. (Environmental Sciences – 1<sup>st</sup> & 2<sup>nd</sup> year) students for Ecology-Biodiversity studies. Alibaug in Raigad district and its nearby areas such as Kankeshwar sacred grove were identified for the said visit. On the way to Alibaug, while passing through western ghat near Lonavala students observed changes in habitat as well as land cover. Students raised several queries related to observations which were answered by Dr. Amol Deshmane. He also explained the bio-diversity aspects with reference to change in the vegetation. On the first day evening, students visited Alibaug fish market to observe marine faunal diversity. They observed several species of fishes, crabs, mollusks, prawns, ray, mudskippers, etc. Dr. Deshmane and Dr. Vivek Patil explained the marine pollution aspect to the students.

On September 25, 2022 a nature trail of approx. 10 km was organized. For the same, students were taken to Kankeshwar sacred grove. Students observed several plants, birds, butterflies and insects during the nature trail. Students were very curious about the habitat and biotic-abiotic interaction. Ecology-

biodiversity practical performed near Kankeshwar temple, where variety of plant species were observed and studied. The entire discussion session was useful to students as it offered a different perception, enhance their ability to think and visualize about importance of nature in daily life. After discussion, students visited the site and noted their observations. Followed by, students visited a Jetty situated at Mandva, to observe domestic transportation through sea route/way. During the visit all faculties namely, Mr. Vikram Deshmukh, Mr. Aftab Momin, Ms. Priyanka Kad, Dr. Vivek Patil and Dr. Deshmane answered the queries.



## VISITORS TO VSI

Mr. Rahul Karavandra from Tanzania and members from Industry Key Bouvet vis., Mrs. Aditi Chandra, Mr. Carlos Gomez Legapsi and Mr. YG Kunjir visited Vasantdada Sugar Institute on July 14, 2022. Dr. RS Hapase, Principal Scientist & Head plant Breeding Section welcomed the delegates and explained various R & D Activities, extension, and academic services of VSI towards the progress of the sugar industry for State and National level. They discussed with concerned department personnel and collected the information about the sugarcane cultivation, various research and cane development activities, extension services and achievements of the departments. They visited various agriculture sections like Soil Science, Plant Breeding, Tissue culture and Agriculture Microbiology.



The team comprising, Dr. Rajani Nadagauda (Auditor), Former Professor, Indian Institute of Advanced Research, Plant Cell and Molecular Biology, Pune, Dr. Vidya Gupta (Auditor), Former chief Scientist and Chair, National Chemical Laboratory (NCL), Pune and Dr. Niraj Singh, Project Officer, NCS-TCP Management Cell (NMC), National Institute of Plant Genome Research visited to examine the Accreditation Test Laboratory (ATL), at Molecular Biology & Genetic Engineering Laboratory at VSI on July 22, 2022. This accreditation is provided by the Department of Biotechnology (DBT) under the National Certification System for Tissue Culture raised plants (NCS-TCP) programme. During their visit, they examined the activities of ATL facility and records in the form of soft & hard copies of files. They interacted with project coordinator, principal investigator and staff members of the project.







Mr. Sharad Pawar, Hon. President of VSI visited VSI's Naigaoan Farm along with Mr. Shivajirao Deshmukh, Director General, VSI. During their visit, staff members of Farm Development & Management were present. Mr. SS Katke, Scientist, Farm Development & Management briefed the present scenario of farm about new developments and activities of farm and also discussed about issues of Naigaoan Farm.



Mr. Sudhansu Pandey IAS, Secretary, Department of Food & Public Distribution, Govt. of India accompanied with Mr. Vijay Waghmare IAS, Secretary Food, Government of Maharashtra and Mr. Shekhar Gaikwad, IAS, Commissioner of Sugar Maharashtra State visited to Institute on September 15, 2022. Mr. Shivajirao Deshmukh Director General, VSI welcomed team and briefed about Institute activities. Mr. Sambhaji Kadupatil, Officer on Special Duty and Head of Departments / Sections was also present in the meeting with Director General. VSI film was shown to team. Team visited Departments Sugar Technology, Alcohol Technology & Biofuels and Environmental Sciences and Agriculture Science & Technology Divisions viz., Tissue Culture, Molecular Biology and Genetic Engineering Lab., Soil Science, Plant Pathology and Microbiology.





## Biopesticide and Bioregulators in Sustainable Agriculture

The monitoring team of central zone-I of National seed production, AICRP on seed (crops), TSP monitoring and comprising of Dr. R Umarani, Director seed and Convener of team, TNAU, Coimbatore, Dr. Arun Kumar Hosamani, Entomologist UAS, Raichur, Dr. VS Mor, Seed Technologist, CCSHAU, Hisar, Dr. Ashish Kumar, Plant Pathologist, JNKVV, Jabalpur and Dr. Simanta Mohanty, Seed Technologist OUAT, Bhubaneswar had visited to the institute on September 23, 2022 to monitor the ICAR-AICRP on Seed (Crops) Project at VSI center.

Mr. SS Katake, Nodal officer AICRP on seed (crops) project had delivered information of breeder's seed & single bud seedling production process and shown recently released sugarcane varieties breeder's seed plots at Naigaon farm. The team also visited to tissue culture laboratory, Microbiology laboratory, Alcohol technology & Biofuels laboratory in the Institute's campus.

Mr. Sambhaji Kadupatil, OSD, VSI had meeting & discussion with Dr. R Umarani along with team members about sugarcane quality disease free seed

production program of VSI under ICAR-AICRP Seed (Crops) Project. The center had distributed 60.80 lakh two eye budded setts of breeder's seed to 44 mills during the year 2021-22 against target 90.85 lakh setts and single eye bud seedling 14.70 lakh against target 15.00 lakh. Other than this conventional seed production, institute has supplied One-lakh tissue culture plantlets during the year 2021-22 under this project. Breeder's seed distribution programme of the year 2022-23 is going on, total 7.04 lakh two eye budded setts and single bud seedlings 2.39 lakh is distributed up to September to farmers and sugar mills in the state for further multiplication of foundation. Breeder's seed of different sugarcane varieties are available on 48 ha area at institute's farms Viz., Naigaon, Lonarwadi, Manjari and Patharwala. Successful implementation of sugarcane breeder seed production through single bud & tissue culture settling on large scale production was appreciated by the monitoring team. The team had expressed praiseful views regarding work on alcohol technology and various bio-fertilizers production.







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

Name of Institutions	Visitors	Total
<b>July-2022</b>		
Modern College of Agriculture Biotechnology Kule-Dakhnane, Paud Road, Pune	Students	5
Marathwada Mitra Mandal's Junior College of Commerce and Science, Deccan Gymkhana Pune	Lecturers and Students	30
Individual Farmers from Maharashtra State	Farmers	371
<b>August-2022</b>		
Modern College of Agriculture Biotechnology Kule-Dakhnane, Paud Road, Pune	Students	5
Vaikunth Mehta National Institute Of Co-operative Management, Pune	Lecturers and Students	50
Padmabhushan Vasant Dada Patil College of Agriculture, A/P : Ambi, Tal : Maval Dist : Pune	Lecturers and Students	52
Individual Farmers from Maharashtra State	Farmers	358
<b>September-2022</b>		
BAIF Institute For sustainable Livelihood & Development, Parner, Dist : Ahmednagar	Officers and Farmers	23
Gandevi Sugar, Gujarat	Chairman, Director and Managing Director	6
Individual Farmers from Maharashtra State	Farmers	353
<b>Total</b>		<b>1253</b>

Total :

## LIBRARY NEWS

July 2022 to September 2022

- Kumar Anil & Navnit Kumar** (2021) *Sugarcane pests and diseases management* (1<sup>st</sup> ed.) New Delhi: Brillion publishing. (p. 210)
- Desai, S. S.** (2019) *Business statistics (paper-I)*. (3<sup>rd</sup> ed.) Kolhapur: Sangeeta S. Desai Jay-Gouri Prakashan. (p. 196)
- Desai, S. S.** (2019) *Business statistics (paper-II)*. (3<sup>rd</sup> ed.) Kolhapur: Sangeeta S. Desai Jay-Gouri Prakashan. (p. 196)



## पावसाळा हंगामात ऊस पिकांवर आढळणारे रोग व त्यांचे निमंत्रण

जी.ई. आत्रे, जी.एस. कोटगिरे व बी.एच.पवार

ऊसरोग शास्त्र विभाग

वसंतदादा शुगर इन्स्टिट्यूट, पुणे

ऊस हे भारतातील महत्वाचे नगदी पीक असून हे पिक देशातील अनेक राज्यात लागवडीखाली आहे. परंतु देशात ऊस पिकाचे दरमहा दरहेक्टरी उत्पादन मात्र अपेक्षेपेक्षा खूपच कमी आहे. ऊसाचे व साखरेचे हेक्टरी उत्पादन कमी येण्याची अनेक कारणे आहेत. या कारणांपैकी ऊस पिकावर होणाऱ्या रोगांचा प्रादुर्भाव व त्यांचा वाढता प्रसार हे एक महत्वाचे कारण आहे. महाराष्ट्रात आजपर्यंत ३० रोगांची नोंद ऊस पिकावर झालेली आहे. पिक संरक्षणाबाबत शेतकऱ्यांना मिळणारी अपुरी माहिती, रोग नियंत्रणाबाबत शेतकऱ्यांची उदासिनता, ऊस बेण्याची कमतरता आणि निकृष्ट बेण्याचा वापर, शिफारशीत नसलेल्या ऊस जातींची निवड, अवेळी लागण, ऊस बेण्यांची अनिर्बंध ने-आण, हवामानातील बदल, समस्यायुक्त जमिनी, एक पिक पद्धती, पिक फेरपालटीचा अभाव, सेंद्रिय, रासायनिक आणि जैविक खतांचा असंतुलित व अवेळी वापर, अपुरी पूर्व व आंतरमशागत, किडींचा वाढता प्रसार व प्रादुर्भाव, अतिवृष्टी, पूर परिस्थिती अशा विविध कारणांमुळे रोगाच्या वाढीस व प्रसारास योग्य वातावरणनिर्मिती तयार होवून रोगांचा प्रसार आणि प्रादुर्भाव वाढत आहे. ऊस पिकास अनेक प्रकारच्या बुरशी, सूक्ष्मजंतू, विषाणू, फायटोप्लाझ्मा सूत्रकृमी, अन्नद्रव्यांची कमतरता, परोपजीवी वनस्पती आणि हवामानातील बदल यामुळे रोग आणि विकृती होतात. काही रोग पिक वाढीच्या सर्व अवस्थेत आणि सर्व हवामान हंगामात दिसून येतात; तर काही रोग विशिष्ट अशा पिक अवस्थेत आणि हवामान हंगामात पिकांवर आढळून येतात. रोगामुळे ऊसाच्या व साखरेच्या उत्पादनात घट येते व ती घट रोगाच्या प्रसार, प्रमाण आणि पिक अवस्था यानुसार कमी-अधिक असते.

पावसाळा हंगाम चालू असतांना हवेत सापेक्ष आर्द्रतेचे प्रमाण जास्त असते, शेतात पाणी साचून मुळांची कार्यक्षमता घटलेली असते तसेच हलक्या, वालुकायुक्त, मुरमाड जमिनीतून पिकास आवश्यक असणारी अन्नद्रव्ये निचरा होवून किंवा पाण्याद्वारे वाहून जातात. यामुळे पिकाचे पोषण व्यवस्थीत होत नाही. पिक अशक्त बनते. अशा परिस्थितीत ऊस या पिकामध्ये काही रोगांचा प्रादुर्भाव आणी प्रसार होत असतो. पावसाळ्यानंतर ऊस पिकाच्या पानांवर हवेद्वारे पसरणारे तांबेरा, पोक्का बोंग, तपकिरी ठिपके, डोळ्यासारखे दिसणारे ठिपके (आय स्पॉट) आणि झोनेट स्पॉट तसेच जमिनीतून पसरणारे मर, आणि मुळकुज हे रोग प्रामुख्याने आढळतात.

### १. तांबेरा

तांबेरा हा रोग पुकसिनीया मॅलॅनोसिफॅला या हवेद्वारे पसरणाऱ्या बुरशीमुळे होतो. मागील काही वर्षांपासून या रोगाचा प्रसार जादा साखर उतारा देणाऱ्या ऊस जातींवर वाढत असून ही चिंतेची बाब आहे. तांबेरा रोगामुळे ऊस पिकाचे ४० टक्केपर्यंत नुकसान होवू शकते. सततच्या पावसामुळे ऊस शेतात दलदल तयार झाल्याने आणि तापमान कमी झालेने रोगाची बुरशी मोठ्या प्रमाणावर वाढते. महाराष्ट्राच्या पश्चिम भागात हा रोग उसपिकावर मोठ्या प्रमाणावर वाढलेला दिसून येतो. कोसी ६७१, को ४१९, कोव्हीएसआय ९८०५, को ९२००५ आणि व्हीएसआय ४३४ या ऊस जाती रोगास जास्त बळी पडतात; तर अलिकडे को ८६०३२ आणि कोएम ०२६५ या ऊस जातींवरदेखील या रोगाचा प्रादुर्भाव दिसत आहे. स्फुरद व पालाश जास्त असणाऱ्या जमिनीत घेतलेल्या उसपिकात रोगाची तीव्रता जास्त आढळून येते.

### तांबेरा रोगाची लक्षणे :

रोगाचा प्रादुर्भाव पिकाच्या पानांवरच आढळतो. सुरुवातीस पानांवर लहान व लांबट पिवळे ठिपके पानाच्या खालच्या बाजूस दिसून येतात. कालांतराने ठिपक्यांची लांबी वाढते व त्यांचा रंग लालसर तपकिरी किंवा तपकिरी दिसून येतो. ठिपक्यांचा भाग बुरशीच्या आणि बिजाणूंच्या वाढीमुळे फुगीर होतो. त्यामुळे पानांचा ठिपक्यालगत भाग फुटून त्यातून नारिंगी किंवा तांबूस-तपकिरी रंगाचे बिजाणू बाहेर पडतात. रोगग्रस्त पानाच्या पाठीमागच्या पृष्ठभागावरून बोट फिरविले असता बिजाणूची पावडर सहजपणे बोटस चिकटते. रोगाची तीव्रता वाढून पाने करपून वाळतात. यामुळे ऊसाच्या उत्पन्नात व साखरेच्या उताऱ्यात लक्षणीय घट येते. तांबेरा रोगाचा प्रादुर्भाव व प्रसार पावसाळ्यानंतर ढगाळ वातावरण, जास्त आर्द्रता व थंड हवा असताना जास्त प्रमाणात दिसून येतो. कोरड्या व उष्ण हवामानात रोगाची तीव्रता कमी होत जाते. ऊस पक्कतेच्या काळात या रोगाचा प्रादुर्भाव वाढल्यास पानांमध्ये साखर तयार करण्याचे कार्य मंदावते व त्याचा विपरीत परिणाम साखर उताऱ्यावर होतो. रोगाचा प्राथमिक प्रसार हवा, पाणी, पाऊस व किटकांद्वारे होतो.





तांबेरा रोगाची लक्षणे

## तांबेरा रोग नियंत्रणाचे उपाय :

- रोगाचा प्रादुर्भाव जास्त येणाऱ्या भागात मध्यम रोगप्रतिकारक जातींची (कोव्हीएस आय ०३१०२) लागण करावी.
- पिकाचे वय लहान असताना पाण्याचा ताण पडू देऊ नये, तसेच शेतात पाण्यामुळे दलदल होऊ देऊ नये. रात्रीच्या वेळी तुषार सिंचन करू नये.
- पिकास खतांची मात्रा माती परिक्षणानुसार योग्य वेळी द्यावी. नत्रयुक्त खताचा तसेच इतर खताची मात्रा उशिरा देऊ नये.
- रोग दिसून आल्यावर रोगग्रस्त ऊसाची वाळलेली पाने शेताबाहेर काढून जाळून टाकावीत व नंतर ०.२५ टक्के प्रमाणात प्रोपिनेब (अँट्राकॉल, १ लिटर पाण्यात २.५ ग्रॅम बुरशीनाशक) किंवा ०.३ टक्के प्रमाणात मॅकोझेब (डायथेन एम ४५, १ लिटर पाण्यात ३ ग्रॅम बुरशीनाशक) फवारावे. बुरशीनाशकाच्या १० दिवसांच्या अंतराने स्टीकर वापरून २ ते ३ फवारण्या कराव्यात.

## २. पोक्का बोंग

पोक्का बोंग हा रोग फुर्जरियम मोनिलीफॉरमी या हवेद्वारे पसरणाऱ्या बुरशीमुळे होतो. कोसी ६७१, व्हीएस आय ४३४, को ४१९, को ८६०३२, एम.एस १०००१ आणि कोव्हीएसआय ९८०५ या ऊस जाती या रोगास जास्त बळी पडतात. महाराष्ट्राच्या सर्व हवामान विभागात या रोगाचा प्रादुर्भाव आढळतो. दक्षिण महाराष्ट्रात मात्र जास्त पाऊस पडणाऱ्या भागात आर्द्रतेचे प्रमाण हवेत जास्त काळ राहिल्याने या रोगाचे प्रमाण जास्त आहे.

## पोक्का बोंग रोगाची लक्षणे :

पावसाळा हंगाम सुरू झालेनंतर किंवा पावसाळा हंगामापूर्वी पडलेल्या वळीव पावसामुळे हवेत आर्द्रता वाढल्याने पोक्का बोंग या रोगास कारणीभूत असणाऱ्या फुर्जरियम मोनिलीफॉरमी या हवेद्वारे पसरणाऱ्या बुरशीची लागण उसाच्या शेंड्यातील कोवळ्या पानांवर दिसून येते. सुरुवातीस तिसऱ्या व चौथ्या पानांच्या बेचक्यात (पानाच्या व देठाच्या जोडाच्या ठिकाणी) पांढरट - पिवळसर पट्टे दिसून येतात. लागण झालेल्या पानांवर सुरकुत्या पडून पाने आकसतात तसेच त्यांची लांबी घटते. रोगाची तीव्रता वाढते त्यावेळी पाने सडतात/कुजतात व नंतर गळून पडतात किंवा एकमेकांत गुरफटतात. पाने कुजल्याने किंवा गुरफटल्याने ऊसाच्या कांड्यांचे पोषण होत नाही

त्यामुळे कांड्या आखुड व वेड्यावाकड्या होतात. कधी कधी रोगाची तीव्रता वाढल्यामुळे पोंगा मर किंवा शेंडा कुज दिसून येते. काही वेळेस रोगग्रस्त ऊसाच्या कांड्यांवर कांडी काप (नाइफ कट) सारखी लक्षणे दिसून येतात. शेंडा कुज व कांडी काप (नाइफ कट) झालेल्या ऊसाचा शेंडा जोम नष्ट झाल्याने ऊसावरील डोळ्यातून पांगशा फुटतात व कालांतराने असे ऊस वाळतात. रोगट ऊसाच्या कांड्या आखुड झाल्याने व पांगशा फुटल्याने उत्पन्नात घट येते. रोगाचा प्राथमिक प्रसार हवेमार्फत, तर दुय्यम प्रसार पाणी, पाऊस व किटकाद्वारे होतो.



पोक्का बोंग रोगाची लक्षणे ऊसाच्या कांड्यांवर कांडी काप (नाइफ कट)

## पोक्का बोंग रोग नियंत्रणाचे उपाय :

- ऊस पिकास खतांची मात्रा (जैविक, सेंद्रिय व रासायनिक) माती परिक्षणानुसार योग्य प्रमाणात व योग्य वेळी द्यावी.
- शेतात पाण्यामुळे दलदल होऊ देऊ नये. पावसाळ्यात शेतात साचलेल्या पाण्याचा निचरा करावा.
- रोग लागण झालेल्या शेतातील शेंडेकुज झालेले व पांगशा फुटलेले ऊस शेतातून वेगळे काढावेत व जाळून नष्ट करावेत व नंतर रोगाच्या नियंत्रणाकरिता ०.२ टक्के कॉपर ऑक्झिक्लोराईड (१ लिटर पाण्यात २ ग्रॅम बुरशीनाशक) किंवा ०.१ टक्के कार्बेन्डेझिम (१ लिटर पाण्यात १ ग्रॅम बावीस्टीन) किंवा ०.३ टक्के मॅकोझेब (१ लिटर पाण्यात ३ ग्रॅम डायथेन एम ४५) यापैकी एका बुरशीनाशकाच्या १० दिवसांच्या अंतराने स्टीकर वापरून २ ते ३ फवारण्या कराव्यात.

## ३. तपकिरी ठिपके

ऊस पिकावर आढळणाऱ्या तपकिरी ठिपके या रोगाची नोंद १९०६ साली इ.जे. बटलर या शास्त्रज्ञाने भारतात सर्वप्रथम महाराष्ट्रात ऊस पिकावर केली. हा रोग बुरशीजन्य असून तो सरकोस्पोरा लाँगिपस या बुरशीमुळे होतो. पूर्वी या रोगाची नोंद एक सामान्य रोग (आर्थिकदृष्ट्या नुकसान न करणारा रोग) म्हणून केलेली होती; कारण या रोगापासून ऊस पिकाचे नुकसान अत्यल्प होत असे. सुरुवातीस या रोगाचे नांव पानावरील ठिपके असे होते. तदनंतर पानांवर आढळणाऱ्या तांबूस-



तपकिरी रंगामुळे याचे नांव बदलण्यात आले. हा रोग ऑस्ट्रेलिया आणि तैवान या देशाव्यतिरिक्त ऊस पिकविणाऱ्या सर्वच देशात ऊस पिकांवर आढळलेला आहे. पुर्वीच्या संदर्भानुसार या रोगाचा प्रादुर्भाव उसपिकावर वर्षभर आढळत असला तरी पावसाळ्यात अतिवृष्टीनंतर या रोगाची तिब्रता वाढते. जादा आर्द्रता आणि २५ ते ३० सेंग्रे दरम्यानचे तापमान या रोगास प्रादुर्भावास आणि प्रसारास अनुकूल आहे. महाराष्ट्राशिवाय या रोगाची लागण ऊस पिकावर कर्नाटक, गुजरात आणि गोवा राज्यात आढळलेली आहे.

### रोगाची लक्षणे :

या रोगाची लागण महाराष्ट्रात पावसाळा हंगामात जुलै महिन्यापासून दिसून आलेली आहे. सध्यातरी या रोगाचा प्रादुर्भाव पावसाळा हंगामात दिसून येतोय. रोग करण्याच्या बुरशीची लागण सर्वप्रथम जुन्या पानांवर होते. रोगाची लागण पानावर झाल्याने लाल-तपकिरी रंगाचे ठिपके उसाच्या पानांवर दिसून येतात. ठिपक्यांचा आकार टाचणीच्या टोकापासून ते ३ ते १५ मिमि इतका आढळतो. पानावरील ठिपके अंडाकृती किंवा लंबगोलाकार असून त्यांच्या सभोवतालचा भाग पिवळा दिसतो. जुन्या ठिपक्यांचा मध्य भाग वाळलेल्या काडासारखा, त्याबाहेरील भाग लाल आणि शेवटचे आवरण पिवळे दिसते. सामान्यपणे पानाच्या दोन्ही बाजूस ठिपके सारखेच दिसतात. उसाच्या कोवळ्या पानांपेक्षा जुन्या पानांवर ठिपके जास्त प्रमाणात दिसतात; तसेच ठिपके पानांवर सर्वत्र सारख्या प्रमाणात विखुरलेले आढळतात. रोगाची तीब्रता वाढल्यावर ठिपके पानाचा पूर्ण भाग व्यापतात आणि ते एकमेकात मिसळतात. तदनंतर पाने पूर्णपणे करपतात आणि वाळतात. दूरवरून रोगग्रस्त पिक तांबेरा रोगाने ग्रासल्यासारखे दिसते. पाणांची पूर्ण वाढ होण्याआधीच पाने पिवळी पडतात आणि पानाकरवी होणारे प्रकाश संश्लेषणाचे आणि साखर तयार करण्याचे काम मंदावते किंवा थांबते. पर्यायाने पिकाचे उत्पन्न घटते. ऊस पक्कतेच्या काळात या रोगाची तिब्रता वाढते; ही खरी चिंतेची बाब आहे. ऊस जातनिहाय रोगाची तीब्रता कमीअधिक आढळते. हा रोग फक्त पानावरच मर्यादित आहे.



तपकिरी ठिपके रोगाची लक्षणे

### रोग नियंत्रणाचे उपाय :

- लागणीसाठी बेणेमळ्यातील बेणे वापरावे. रोगग्रस्त शेतातून तसेच खोडवा पिकातून बेणे घेऊ नये. लागणीपूर्वी ऊस बेण्यास कार्बेण्डेझीमयुक्त बुरशीनाशकाची (०.१ टक्के) प्रक्रिया करावी.
- रोगग्रस्त उसावरील वाळलेली पाने काढून जाळून नष्ट करावीत; जेणेकरून रोगाच्या प्रसारास आळा बसेल. तसेच रोगग्रस्त पिक कापणीनंतर उरलेले पाचट जाळून नष्ट करावे. पिक फेरपालट करावी.
- ऊस पिकाचे वय लहान असतांना पाण्याचा ताण पडू देवू नये, तसेच पिकास आवश्यकतेनुसार पाणी द्यावे. पावसाळा हंगामात शेतात पाणी साचणार नाही; अशा पद्धतीने निचरा व्यवस्था करावी.
- पिकास सेंद्रीय, रासायनिक आणि जैविक खताची मात्रा माती परिक्षणानुसार वेळेवर द्यावी.
- रोगाची लागण दिसून आल्यावर लगेचच ताम्रयुक्त बुरशी नाशकाच्या (उदा. कॉपर ऑक्झीक्लोराईड) ०.२ % या प्रमाणात २ ते ३ फवारण्या १५ दिवसांच्या अंतराने स्टिकरचा वापर करून कराव्यात. फवारणीपूर्वी उसावरील रोगग्रस्त वाळलेली पाने काढावीत. या बुरशीनाशकाशिवाय मॅकोझेबयुक्त बुरशीनाशकसुद्धा उदा. डायथेन एम ४५, ०.३ % या प्रमाणात रोगाच्या नियंत्रणासाठी परिणामकारक आहे.

### ४. मर:

मर हा रोग व फ्यूजॅरियम सॅकॅराय या जमिनीद्वारे पसरणाऱ्या बुरशीमुळे होतो. जमिनीतील कांड्या पोखरणाऱ्या अळीचा (रूट बोरर) प्रादुर्भाव झाल्यास किंवा अन्य काही कारणाने उसाच्या जमिनीतील कांड्यास इजा झाल्यास या रोगास कारणीभूत असणाऱ्या बुरशीचा शिरकाव होतो व रोगाची लागण होते. अनेक ऊस जाती या रोगास बळी पडतात. महाराष्ट्रात या रोगाचा प्रादुर्भाव ऊस पिकावर कमी प्रमाणात आहे.



मर रोगाची लक्षणे





## रोगाची लक्षणे :

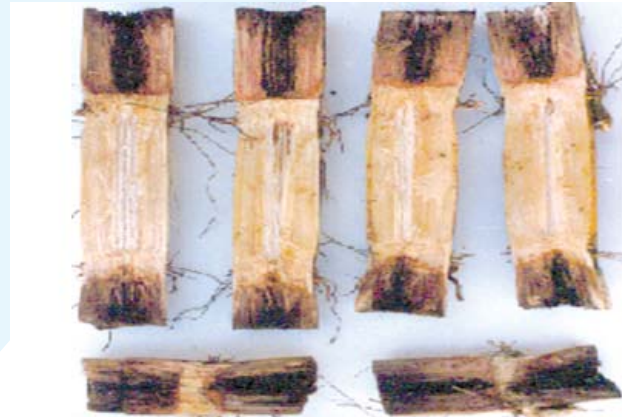
रोगाचा प्रादुर्भाव जमिनीतील कांड्यामध्ये प्रथमतः होतो. रोगग्रस्त उसाच्या बेटातील उसाची शेंड्याकडील पाने निस्तेज दिसतात व हळूहळू पिवळी पडण्यास सुरुवात होते. सुरुवातीला पानांच्या कडा करपतात व नंतर रोगाची तीव्रता वाढल्यानंतर रोगट बेटातील पाने व ऊस वाळतात. ऊस शेंड्याकडून खोडाकडे वाळत जातात. शेतात जागोजागी बेटे सुकलेली व वाळलेली दिसून येतात. वाळलेल्या उसाचा काप घेतल्यास पोकळ कांड्यात रोगाच्या बुरशीची पांढरी वाढ आढळते. रोगामुळे ऊस पोकळ होऊन रसहीन बनल्याने उसाच्या व साखरेच्या उत्पन्नात घट येते. या रोगाचा प्रसार प्रामुख्याने जमिनीद्वारे होतो तसेच रोगट बेणे, वारा व पाणी यामुळे प्रसार होतो.

## रोग नियंत्रणाचे उपाय :

- लागण केलेल्या जमिनीचा पाण्याचा निचरा होण्यासाठी व्यवस्था असावी.
- बेणेमळ्यातील बेणे लागणीकरिता वापरावे. नवीन लागण करतांना ऊस बेण्यास लागणीपूर्वी बुरशीनाशकाची (कार्बेन्डेझिम ०.१ टक्के) व मॅलाथियॉन ०.३ टक्के किटकनाशकाची १० ते १५ मिनीटे प्रक्रिया करावी.
- जमिनीतील कांड्या पोखरणान्या अळीच्या नियंत्रणासाठी क्लोरोपायरिफॉस (२० टक्के प्रवाही) प्रति एकरी २.० लिटर, ४०० लिटर पाण्यात मिसळून जमिनीत घालावे.
- रोगट बेटे खणून काढावीत व त्या ठिकाणी कार्बेन्डेझिम किंवा कॉपर ऑक्झिक्लोराईड यापैकी एका बुरशीनाशकाचे ०.१ टक्के द्रावण घालावे.
- ५. मर रोग झालेल्या उसाचा खोडवा न घेता त्या शेतात द्विदल धान्याचे पीक घेऊन फेरपालट करावी.

## ५. अननस :

उसाचा अननस हा रोग सेरॅटोसिस्टीस पॅराडोक्झा या जमिनीतून पसरणाऱ्या बुरशीमुळे होतो. रोगाची लागण झालेल्या उसाच्या कांड्या



रोगामुळे कांड्या तांबूस लालसर व नंतर काळ्या पडतात

आतून सुरुवातीस तांबूस लालसर पडतात व नंतर काळ्या पडतात. कुजलेल्या कांड्यांचा वास अननसासारखा येतो. भारी जमिनीत खोलवर लागण झाल्यास या रोगाची शक्यता अधिक असते. पूरग्रस्त भागात व दलदलीच्या ठिकाणी नवीन लागवडीत हा रोग वाढण्याची शक्यता असते. या रोगामुळे उसाच्या उगवणीवर प्रतिकूल परिणाम होवून शेतात तुटाळी तयार होते.



शेतात तुटाळी तयार होते.

## रोग नियंत्रणाचे उपाय

भारी जमिनीत उसाची कोरड्या पद्धतीने लागण करावी. लागण केलेल्या जमिनीचा पाण्याचा निचरा होण्यासाठी व्यवस्था असावी. लागणीकरिता रोपांचा वापर केल्यास या रोगाचा प्रादुर्भाव टाळता येईल.

## ऊस रोग प्रतिबंधात्मक उपाय:

पावसाळा हंगामात वरील रोगांव्यतिरिक्त इतरही काही रोग रेड रॉट, मुळकुज, कांडीकुज, रोपेमर असे रोग आढळलेले आहेत. पावसाळ्यात हंगामात रोगांचा प्रादुर्भाव आणि प्रसार कमी करण्यासाठी होवू नये याकरिता खालीलप्रमाणे प्रतिबंधात्मक उपाययोजना करणे आवश्यक आहे

- ऊस लागवडीकरिता निचरायुक्त जमिनी असाव्यात. ऊस पिकाचा कालावधी मोठा असल्याने जमिनीच्या समस्या टाळण्यासाठी जमिनीची पूर्व मशागत चांगली करावी. ऊस लागवडीकरिता रूंद सरी किंवा पट्टा पद्धतीची रानबांधणी करावी. हंगामनिहाय व जातनिहाय लागवडीचे नियोजन करावे. शिफारस केलेल्या ऊसजार्तीची लागण करावी.
- बेणेमळ्यातील बेण्याचा वापर करावा. मुलभूत बेणे किंवा उती संवर्धित रोपांचा वापर करून शेतकऱ्यांनी स्वतःचा बेणेमळा
- शास्त्रीय पद्धतीने तयार करावा. साखर कारखान्यांनी त्रिस्तरीय बेणेमळा योजना राबवावी.
- ऊस बेण्यास लागणीपूर्वी कार्बेन्डेझिम बुरशीनाशकाची (उदा.



बावीस्टीन १०० ग्रॅम) व कीटकनाशकाची (इमिडाक्लोप्रिड ७०%, ३६ ग्रॅम) १०० लिटर पाण्यात मिसळून १० ते १५ मिनिटे प्रक्रिया करावी.

- खोल काळ्या जमिनीत उसाची लागण कोरड्या पद्धतीने करावी, जेणेकरून लागण खोलवर होणार नाही.
- सेंद्रिय, रासायनिक व जैविक खतांचा वापर माती परिक्षण अहवालानुसार व वेळेवर करावा.
- पाणी व्यवस्थापन उत्तमरितीने करावे. पाणी शेतात जास्त काळ राहून दलदल होणार नाही याची काळजी घ्यावी. पावसाळ्यात अतिरिक्त पाण्याचा निचरा वेळीच करावा.
- आंतरमशागतीची कामे उदा. तणनिर्मुलन, उसाची बाळबांधणी व मोठी बांधणी वेळेवर करावी.
- खोडवा पिकाचे शास्त्रीय पद्धतीने पिक नियोजन करावे. खोडवा पिकात पाचट, पाचटाचे विघटन

- ऊस पिक घेतलेल्या जमिनीची फेरपालट द्विदल धान्याचे पिक किंवा हिरवळीचे खताकरिता ताग किंवा धेंचा पिक घेऊन करावी.
- ऊस पिकावरील किडींचे नियंत्रण वेळीच करावे; जेणेकरून रोगाच्या प्रसारास आळा बसेल.

## अधिक माहितीसाठी :

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### वसंतदादा शुगर इन्स्टिट्यूट, मांजरी (बु), पुणे

येथे संपर्क साधावा.

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