

VSI BULLETIN



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Foreword Foreword ...

During the 2022-23 crushing season, 211 sugar mills in Maharashtra are in operation of which, 108 are in cooperative and 103 are in private sector. During current season, state produced 10.57 Mt (Million tonnes) of sugar by 105.66 Mt which was 22.96% less than previous season (13.72 Mt) with average bagging sugar recovery of 10.00%. Out of 211 sugar mills, 121 sugar mills are diverted BH molasses, sugarcane juice/sugar syrup as a feedstock for production of ethanol and 1.35 Mt of equivalent sugar is sacrificed in the process of diversion for ethanol production and State's FRP sugar recovery remained as 11.27%.

At National level, 534 operating sugar mills have produced 32.97 Mt of sugar by crushing of 302.90 Mt of sugarcane and around 4.00 Mt of equivalent sugar will be diverted for ethanol production.

The central cabinet has approved the highest ever Fair and Remunerative Price (FRP) of Rs. 315/qtl for Sugarcane Farmers for sugar season 2023-24.

Sugarcane growers are worried scanty rainfall during the crop's crucial growth period will affect the yield and reduce sugar output in the upcoming season due to El Nino climate pattern.

The Department of Agriculture & Farmers' Welfare has released progress of area coverage under kharif crops in that, sugarcane area shown as on 30th June 2023 is 54.40 lakh hectare.

A look at the news and events reported in this issue will once again showcase the prominent role of VSI in capacity building thorough training to the sugarcane growers, Government of Maharashtra officials and Industrial officials.

Visitors to VSI also do not fail to be impressed by its functions in research, extension and training as VSI's work has always related to the farmers and industry's needs by trying to reduce the gap between lab and the land.


(RM Devarumath)
Editor



EVENTS EVENTS

63rd Maharashtra Day

Vasantdada Sugar Institute celebrated 63rd Maharashtra Day popularly known as 'Maharashtra Din' as the formation of western Indian state on May 1, 1960. On this occasion National flag

was hoisted by Mr. Sambhaji Kadupatil, DG along with Mr. Shivajirao Deshmukh, Advisor, Mr. DB Ghule, Registrar/Principal. All the staff members and students were present.



National Technology Day

Technology thrives in every area right from agriculture and healthcare to application and food services. National Technology Day is celebrated on May 11 every year to commemorate the achievements of scientists, researchers, engineers and all others involved in the field of science and technology. At VSI, we have celebrated this special day by organizing a lecture of an eminent scientist or researcher on a subject of interest every year. The subjects have ranged from applications of biotechnology to nanotechnology, technology transfer, supercomputing, intellectual property rights etc. The Technology Development Board of the Ministry of Science & Technology declared this year's theme as "School to Startups-Igniting Young Minds to Innovate". In keeping with the theme, VSI invited Dr. Rajendra Shende, Founder Director, Green Terre Foundation and former Director, United Nations Environment Program, Paris who has worked on the global stage and is now working for inspiring the youth through the 'Smart Cloud Campus Network'. Mr. Sambhaji KaduPatil, Director General (DG), VSI, presided over the program.

The function began with the lighting of the lamp by Dr. Shende, the Director General and others. Dr. Deepali Nimbalkar introduced the speaker. She mentioned that he is an international expert on Sustainable Development, Green Economy, Climate Change, Energy, Ozone Layer Protection and Food

security. He was Coordinating Lead Author of Inter-governmental Panel on Climate Change (IPCC) that shared Nobel Peace Prize in 2007 with Al Gore. After the introduction, the Director General felicitated Dr. Shende and addressed the audience. He explained the background of the National Technology Day and the 3 events that happened on May 11, 1998 which laid the foundation for this day being declared as national celebration.

Dr. Shende delivered a talk on 'Technology 1.0 To 5.0: Did we forget Technology 0.0?' He initiated his talk by explaining about the development of technology from 1.0 to 5.0 and how the pace of technological development has grown exponentially. He cautioned about the dangers of artificial intelligence as a part of technology 5.0 and said that nature was much more advanced than most of the technological developments made by man. Infact, many technological developments have been inspired by nature. He gave examples of the dung beetles accurate movements and carrying load many times more than its body weight, perfect ventilation in huge termite nests/ant holes etc. which were inspiring development of today. He also explained part of his work on solar energy and development of solar vaccine cooler.

His talk was very well received by the staff and students of VSI. The function ended with vote of thanks by Dr. Preeti Deshmukh.



TRAINING

Modern Technologies in Sugarcane Agriculture

The three days residential training program for men and women farmers were organized at VSI sponsored by Solidaridad Regional Expertise Center, New Delhi, Dalmia Bharat Sugar & Industries Ltd and Baramati Agro Pvt. Ltd. with support of Bayer (Food Chain partnership) and Coca Cola. The objective of the

training was to train the participant, about modern technologies in sugarcane agriculture. The three days training programs were conducted in five batches during May and June, 2023.

The details of the participants are given below.

Particulars	Period	No. of Participants
Dalmia Bharat Sugar & Industries Ltd, unit-Ninaidevi, Dist. Sangli	May 30 to June 1, 2023	50
Baramati Agro Pvt Ltd, Pune	June 6 - 7, 2023	54
Dalmia Bharat Sugar & Industries Ltd, Unit-Asurle Porle, Dist.Kolhapur	June 12 - 14, 2023	50
Dalmia Bharat Sugar & Industries Ltd, unit-Ninaidevi, Dist. Sangli	June 15 - 17, 2023	50
Dalmia Bharat Sugar & Industries Ltd, Unit-Asurle Porle, Dist.Kolhapur	June 15 - 17, 2023	50
	Total	254

Total two hundred and fifty four participants were attended the training programs from Pune, Sangli and Kolhapur districts including staffs of Baramati Agro Pvt. Ltd., Dalmia Bharat Sugar & Industries Ltd. and Solidaridad Regional Expertise Center.

The training programs were inaugurated by Mr. Sambhaji Kadupatil, the Director General (DG), VSI in presence of Heads of Sections and staff members from Agriculture Sciences and Technology Division.

Mr. BH Pawar, Sr. Scientist and Head, Plant Pathology section welcomed the participants and others. In inaugural speech, the DG, VSI highlighted the importance of the training mentioned importance of tissue culture plantlets for preparation of seed nursery. He appealed to farmers and staffs to adopt integrated cropping system and focus on integrated pest management for increasing the productivity of sugarcane yield.

Under this training program, 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 management, use of bio-fertilizers, farm mechanization, ratoon management and integrated disease & pest management. All the agriculture scientists conducted lectures of their topics with the help of power point presentation and they made more emphasis on practical's and field demonstrations.

In the plenary session of all the batches, Mr. BH Pawar, 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 and facilities provided to them. The certificates were distributed to the trainees. The program was concluded with Vote of thanks.

Batch No. : I



Mr. Shambhaji Kadupatil, DG, VSI releasing a book of **Small Farmer Atlas**, prepared by Solidaridad Regional Expertise Center, New Delhi

Batch No. : II



Batch No. : III



Batch No. : IV and V



Oos Sheti Dnyanyag and Oos Sheti Dnyanlaxmi

In memory of founder President of VSI late Padmabhushan Dr. Vasantdada Patil, a four days residential training programme was organized for sugarcane Men farmers as *Oos Sheti Dnyanyag*. A training program for batch-I was conducted and the details are given in table.

Batch No	Date	Area from which the farmers participated	No. of sugar mills, individuals & total Participants
Oos Sheti Dnyanyag (Men farmers)			
I	June 27 – 30, 2023	Kolhapur, Sangli and Satara Districts and Vidarbha region	Sugar mills : 08 Individual : 03
			Total : 230

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

Total 230 participants participated in the training programme. The training was inaugurated by Mr. Sambhaji Kadupatil, DG, Dr. AS Kadlag, Principal Scientist (Production and Protection), Head of section and representative from farmers.

Mr. BH Pawar, welcome the participant and briefed about training information. Mr. Sambhaji Kadupatil in his inaugural speech highlighted the importance of the seed material, soil analysis and integrated approach to use the VSI's products etc.

The training programme was 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, the participants discussed their doubts with the subject experts. In the concluding remarks, trainees expressed their views about training. The function was concluded with distribution of certificates along with group photos to the participants and with vote of thanks.

Short Term Training Programme for Officers of Central Pollution Control Board

A short term training programme on 'Pollution control and waste management in distillery units' for officers from Central Pollution Control Board (CPCB), New Delhi was organized at VSI by Department of Alcohol Technology & Biofuels (AT& B), VSI in two batches. The 1st batch training session was conducted during April 19 - 21, 2023 (6 Officers) and 2nd batch during June 26 to 28, 2023 (9 Officers).

The training programmes were inaugurated by Mr. Sambhaji Kadupatil, DG, VSI. Dr. KS Konde, Head, Professor & Technical Adviser, Department of AT & B. Dr. KS Konde elaborated the activities of Department and thanked the CPCB for sending the officers for the training programme at VSI.

Both the short term courses covered topics such as Alcohol Production: World Scenario & Trends, Alcohol production from various feedstock, Distillery effluent treatment norms and present status, Trends, Technical challenges & solutions in distillery zero liquid discharge technologies (Biocomposting, incineration, dryer and CSIR-CSMCRI), Pollution profile and

by-product recovery (CO₂), Polishing treatment for process condensate and low strength effluent generated in distilleries, Best practices for reduction in fresh water consumption and spentwash generation, Concept of Captive Power Plant: Mode of turbine operation w. r. t. Power generation, water consumption and losses in cooling tower, Evaporation technologies for concentrating distillery spentwash, CIP of evaporator in distillery and fate of generated waste, Operation and maintenance of cooling towers, Water and mass balance in distillery unit (molasses and grain based), Advance technologies in distillery (Potash recovery and granulation technology from spentwash powder, Air cooled condenser & MVR) etc.

The visit to Shree Ambalika Sugar Pvt. Ltd of participants was arranged for understanding the effluent treatment system implemented in distillery industry. The officers were impressed by visiting the distillery and ETP.

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

Batch : I



Batch : II



Short Term Training Programme – June 2023

VSI has conducting various short term training programmes for the employees of the sugar mills working in different sections every year. These training programmes are related in the field of Sugar Engineering, Sugar Technology, Alcohol Technology & Biofuels, Environmental Sciences and Instrumentation. The main objective of these training programmes is to enhance working knowledge, vision to adopt new technology of the employees working in the Sugar mills. The participants of sugar mills are acquired knowledge of new developments that is useful for

improving technical efficiency of sugar mills and allied industries. The genuine effectiveness and practical utility of these courses have been widely accepted and adopted by the sugar industries. Many industries treat this training course as some essential criteria for granting promotion to higher grade for the employees. The short term courses were conducted during June 19- 30, 2023. The details of the training programme and number of participants are given below;

Programme	No. of Participants
Juice Clarification& Evaporation	59
Pan Boiling& Centrifugal	80
DFPD Guidelines for various feed stocks various feed stocks diversion for ethanol production & FRP Recovery Calculation	81
Boiler attendant	30
Mill foreman	38
Fermentation & Distillation techniques in distillery	50
Techniques in Analytical Instruments	06
Repairs and Maintenance of sugar factory instruments	30
pollution control& Environmental Management in Sugar Factories & distilleries	15
ETP Operation& maintenance	17
Special Analysisin Sugar Laboratory	8
Analysis of Water/Waste Water & Solid waste	04
Total	418

VSI COMMITTEE MEETINGS

Investment Committee, Purchase Committee and Governing Council Meeting

VSI Committee Meetings viz. Investment Committee Meeting and Purchase Committee Meeting was held on April 21, 2023. Governing Council Meeting and Investment Committee Meeting were held on June 19, 2023. In the Governing Council Meeting, review taken

of Developmental work and 3rd international Conference under the chairmanship of Mr. Sharad, Pawar, Hon. President of VSI and other Governing Council members were present. VSI,



The Technical Committee meeting for Technology Departments

The Technical Committee meeting, under the chairmanship Mr. Jayantrao Patil was held on May 18, 2023 and other members present were Mr. Diliprao Deshmukh, Mr. Balasaheb Patil, Mr. BB Thombare, Mr. Shivajirao C. Deshmukh, Adviser and Mr. Sambhaji Kadupatil, DG, VSI, Pune. The members present for

Technical Committee meeting held on June 19, 2023 were Mr. Rajesh Tope, Mr. Balasaheb Patil, Mr. Harshvardhan Patil, Mr. Ashokrao Pawar, Mr. Shivajirao C. Deshmukh, Adviser and Mr. Sambhaji Kadupatil, Director General, VSI, Pune.

Mr. RA Chandgude, Head, Sugar Engineering Department, VSI, Pune welcomed Chairman, committee members, Head of the departments of VSI Pune, Professors & Research Students of COEP Technological University, Pune.

The HODs of the technical departments presented the review of completed experiments during 2022-23; ongoing technical performance of each experiment and future research program for 2023-24 of Sugar Engineering, Sugar Technology, Alcohol Technology &

Biofuels, Environmental Science and Electronics & Computer Departments .In Technical committee meeting, each department presented ongoing and proposed R & D projects.

In meeting, Technical committee members have given some suggestions and instructions for various projects. Also they appreciated the work carried out in the projects. The meeting was concluded with vote of thanks.



The Technical Committee Meeting of Agriculture Science & Technology Division

The Technical Committee Meeting (AST &D) was held on May 20, 2023 under the chairmanship of Dr. Indrajit Y. Mohite and other members viz., Mr. Babanrao V. Shinde, Mr. Sambhaji Kadupatil, Director General and Mr. Shivajirao Deshmukh, Advisor, VSI were present. Dr. RS Hapase, Head and Principal Scientist (Pl. Br.) & Coordinator, Technical Committee welcomed the

Chairman and the Members of the Technical Committee. In this meeting, Agricultural Sciences and Technology Divisions were presented their progress research work and extension activities of their Section. During presentation/discussion the committee members gave their suggestions and guidelines for the research work

Meeting of Managing Directors of Sugar Mills

The meeting of Managing Directors of co-operative and private sugar mills was held at VSI on April 11, 2023 for discussing the issues related with 3rd International Conference to be scheduled at VSI during January 12-14, 2024 as directed by Mr. Sharad Pawar, Hon. President of VSI. The Organizing

Committee was constituted under the chairmanship of Mr. Dilip Walse-Patil. In the meeting, a discussion was take place about theme of the conference, National & International speakers and sponsorship, stalls, live crop demonstration and conference arrangements. The meeting was concluded by vote of thanks



VSI PARTICIPATION

Global Sugar Summit, Dubai

Mr. Sambhaji Kadupatil, DG, and Dr. KS Konde, Head, Professor & Technical Adviser, Department of Alcohol Technology & Biofuels, VSI attended a conference on 'Global Sugar Summit' on May 8-10, 2023. They participated & presented in two sessions of 'Global sugar market dynamics' held on May 9, 2023 and 'Ethanol, other renewable fuel & technology innovation: The challenge & way forward', held on May 10, 2023.

Mr. Sambhaji Kadupatil was among the 8 guest panelists in the session of 'Global sugar market dynamics'. In this session, he discussed various points related to sugar market. He focused on the health paradox as in India sugar is listed under the Essential Commodities Act pushing down the prices of sugar to keep it within the reach of the common consumer. He discussed on sugar crop interest for farmers and consumers, capacity utilization due to increase in sugarcane production. He also discussed lower operating days utilized by sugar mills due to increasing capacity of sugar mill. He also discussed there should

be balance between sugar and ethanol production. He told that bio refinery based complex with bio-circular economy concept & use of alternative feedstocks. In addition, sugarcane will be a good solution for Industries in which not only ethanol will be produced but also CBG, hydrogen, butanol & various value added chemicals can be produced.

In another session 'Ethanol, other renewable fuel & technology innovation: The challenge & way forward', there was 4 panelists among them Mr. Sambhaji Kadupatil and Dr. KS Konde participated. Dr. KS Konde talked on 'Hydrogen production opportunities in sugar & allied industry'. He discussed various possible routes of green hydrogen production in sugar complex i.e. electrolysis using cogeneration electricity, biogas to hydrogen via steam methane reforming and via biogas gasification. He also explained the economics and production cost of all three routes. He further informed about all the initiatives taken up by VSI towards the field of green hydrogen.



Research Meeting at MPKV, Rahuri

The Pre-release proposal of CoVSI 18121 a midlate maturing, high sugared, erect growing highly promising genotype along with research work done in plant Breeding, VSI on different aspects of varietal

improvement like Multi location trials (SAU's and Factories), Zonal Varietal Trials (ZVT) under All India Coordinated Research Project on Sugarcane [AICRP(S)] trials and nucleus seed production of

sugarcane varieties for the year 2021-22 was presented in various meetings like 'Pre-Research Review Meeting' (March 13, 2023), 'Research Review meeting' (RRC) (April 24, 2023), 'Research Finding Release Committee (RFRC)' (April 29, 2023) and 'Joint Agresco meeting' (May 26 - 28, 2023) held at Mahatma Phule Krishi Vidyapeeth (MPKV), Rahuri. The Pre-release proposal of CoVSI 18121 was presented, discussed and accepted in these meetings

and the proposal was submitted through Sugarcane Specialist, CSRS, Padegaon; Head, Agril, Botany, MPKV, Rahuri and Director of Research, MPKV, Rahuri, which was included in the Joint Agresco meeting held at Mahatma Phule Krishi Vidyapeeth, Rahuri during May, 26 - 28 2023. The Scientists from plant breeding attended all these meetings to present the research achievements and approval for the Technical program for next year.

Visit to Japan

Mr. RA Chandgude, HOD and PG Patil, Technical Advisor Electrical from Sugar Engineering Department, VSI has been invited by Yaskawa, Japan to visit their drive manufacturing and Robotics manufacturing company. In the delegation there were other equipment manufacturers and end users of robotics in automobile sector across India.



They met with Mr. Urakawa (Yaskawa, drive president), Mr. Salvi (Yaskawa, India Head) and Mr. Yamada San (Yaskawa, group head for drive division) and discussed regarding MV drive in sugar mill and fibrizer

applications with its techno-economy. They also had a Meeting and discussions with Nonaka San (Technical service Head for Yaskawa Asia) for sugar and distillery applications & features of VFD. Presentation attended on smart drives with field protection facility for remote communication and avoiding down time.

They Visited to Robot village factory and experience center for robots and attended technical presentation and discussions on use of robot/ cobot in sugar industry in coming future especially area like sugar handling.

Participation in National Webinar

Dr. GS Kotgire, Scientist, Plant Pathology section, VSI has participated in the IDP-NAHEP sponsored National Webinar: Maharana Pratap Memorial Lecture-2023 on 'Future of Indian Agriculture: Challenges and Opportunities' on May 22, 2023 organized by Directorate of Students' Welfare, Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan.

Dr. GS Kotgire, Scientist also participated in the IDP-NAHEP sponsored second National Webinar on 'Mainstreaming Agro biodiversity - An integrated approach to reduce climate vulnerability, improve nutrition, livelihoods, and ecosystem services' on May 23, 2023 organized by Directorate of Research, Maharana Pratap University of Agriculture and Technology, Udaipur, Rajasthan.

VISITORS TO VSI

Visit of Mr. Shankar B. Patil Munenkoppa

Mr. Shankar B. Patil Munenkoppa, former Sugar Minister, Government of Karnataka was visited to VSI on May 31, 2023. On this occasion Dr. RV Dani welcomed & felicitated the guest in presence of all HODs & HOSs of the Section the board room.

Later they visited Department of Alcohol Technology & Biofuels. Dr. KS Konde gave the information of the various activities conducted by the Department and facilities of R & D, pilot winery and nano brewery to the guests.



Visit of Fiji Sugar Corporation, Fiji

The delegates of technical experts as Mr. Vinod Prasad (Process), Mr. Anberson (Mechanical) and Mr. Shiu (Procurement) from Fiji Sugar Corporation, Fiji visited VSI on June, 8-9, 2023. Mr. Sambhaji Kadupatil, DG welcomed the delegates in presence of Mr. Shivajirao Deshmukh, Adviser, and other members of technical division. During their visit they discussed regarding new green field sugar project along with Cogeneration, Distillery project and Ethanol project to be established by Fiji Sugar Corporation, Fiji Islands. Fiji Sugar Corporation needs help from Vasantdada Sugar Institute for technical

assistance and guidance for selection of promising and non-exploiting plant & machinery supplier for their upcoming projects. They also visited to Daund Sugar Pvt. Ltd. to see the modern sugar plant with cogeneration, distillery (ethanol) plant. They also visit to Thyssenkrupp Industries (TKII) and Ulka Industries - the plant and machinery manufacturers in Pune. The delegates visited Sugar Engineering Department, Alcohol & Biofuels Department and Sugar Technology Department and discussed relevant advanced technologies related to sugar and allied Industry.



Visit of Dr. Imad Eujayl, USDA-ARS, USA

Dr. Imad Eujayl, Research Molecular Biologist, USDA-ARS, USA visited VSI on June 19-24, 2023. Mr. Sambhaji Kadupatil, DG, welcomed & felicitated. During visit, he discussed regarding sugarbeet status worldwide, ongoing sugarbeet seed production project and finalize the future line of work with Agronomy, Soil Science, Plant Breeding, Agriculture Engineering, Tissue Culture, Molecular Biology, Plant Pathology and Entomology sections. On June 22, 2023 Dr. Imad visited along with VSI representative Dr. PS Deshmukh, Sr. Scientist & Head, Soil Science Section and Dr. AS Patil, Scientific Officer & I/C Head,

Agronomy at VSI's Lonarwadi farms for understanding the practical aspects of soil preparation, sugar cane cultivation practices, Irrigation methods etc. He also visited M/s. Daund Sugar Pvt. Ltd. Mr. Veerdhaval Gagdale, Director of sugar mill welcomed and visited various sections of the sugar mill and farmers field in the operational area. Dr. Imad discussed with Director about sugarbeet cultivation, their importance in the near future and briefed about work of USDA and VSI in sugarbeet. He expressed his satisfaction regarding Welcome, Hospitality and expertise of VSI in the sugar industry and cane and beet development.



Visit of Scientist from USA

Team comprising of Dr. Larry Walker, Rtd. Professor, Cornell University & an Adjunct professor, Michigan University, USA; Dr. Lisa Tiemann, Associate Professor of the Soil Biology, Department of Soil and Microbial Science, Michigan University, USA; Dr. Nandkumar Kunchge, Director, KJ Somaiya Institute of Applied Agricultural Research, Sammerwadi, Karnataka, along with other members as Dr. Adivappa Asangi,

Sr. Soil Scientist, Dr. Paravati JR, Assistant Director, Ms. Geethalakshmi K, Research and teaching Associate; Dr. Sanjay Rode, Coordinator of the Dept. of Economics visited VSI on June 20, 2023. Mr. Sambhaji Kadupatil, DG welcomed & felicitated the delegates in presence of HODs & HOSs of the sections. Later they visited all the departments to know the activities of VSI.



Visit of Schneider Global Team, France

Mr. Florent Lacharme, IDPAC Offer (DCS) Category Director, Schneider Global, France has visited VSI on June 23, 2023 along with Mrs. Ranjana Sutar, India head for CPG(consumer packaged goods/food and braveries), Mr. Vikas Verma business development

manager automation section and Mr. Niranjan Gadgil proprietor Stretto automation Pune. During the meeting with VSI Team discussions were held on Automation business and Digital Transformation in sugar industry. Mr. Sambhaji Kadupatil, DG welcomed & felicitated the delegates.



Visit of VSI Team, Gujarat

The team from VSI visited Shree Chalthan Vibhag Khand Udyog Sahakari Mandali Ltd., Chalthan, Tal. Palasana, Surat, Gujarat on June 24, 2023 for the meeting regarding land requirement for VSI's proposed centre in Gujarat.

The following members were present for the meeting Viz., Mr. Ketanbhai Patel, Chairman of Shree Chalthan Vibhag Khand Udyog Sahakari Mandali Ltd. and Vice president National federation of Co-op. Sugar Factories Ltd.; Mr. Ghanshyambhai Patel, Chairman



of Narmada Khand Udyog Sahakari Mandali Ltd., Gujarat; Mr. Shivajirao Deshmukh, Advisor, VSI; Mr. Sambhaji Kadupatil, Director General, VSI; Mr. Prakash Naiknavare, Managing Director, National Federation of Co-op. Sugar Factories Ltd.; Mr. RV Chandgude, Technical Advisor and Head, Sugar Engineering, VSI; Mr. PP Shinde, Scientist and Head, Agril. Engineering, VSI; Mr. BMC Pandey Managing Director, Shree Chalthan Vibhag Khand Udyog Sahakari Mandali Ltd. and Mr. Narendrabhai Patel, Managing Director, Narmada Khand Udyog Sahakari Mandali Ltd., Gujarat.

Following Visitors were visited VSI during April-May-June 2023.

Address of the Visitors	Designations	Total
January -2023		
JSPM Commerce and Science College,Hadapsar, Pune	Lecturers and Students	43
Institute for Social and Economic Change, Bangalore	Ph.D. Students	2
Pune Knowledge Cluster, Pune	Officers	4
CPCB, New Delhi, Govt. of India	Officers	6
Shankarao Mohite Mahavidyalaya, Akuj, Dist: Solapur	Lecturers and Students	33
Pratapsinh Mohite-Patil Mahavidyalaya, Karmala, Dist., Solapur	Faculties and Students	43
Individual Farmers from Maharashtra State	Farmers	252
May - 2023		
Dr. Sharadchandra Pawar Krishi Mahavidyalaya, Baramati,Dist: Pune	Facuties and Students	84
MIT School of Bioengineering Science & Research, Loni Kalbhor, Pune	Lecturers and Students	34
GM Sugar Uganda Ltd: Uganda	Owner, Secretary and Officers	4
MIT School of Food Technology, MIT Arts, Design & Technology, Loni Kalbhor, Pune	Lecturers and Students	31
Rana Sugar Ltd., Punjab	Officers	2
Individual Farmers from Maharashtra State	Farmers	388
June - 2023		
The Shahabad Sugar Mills Ltd., Shahabad , Haryana	Directors, Officers and farmers	30
Somaiya Vidya Vihar University, Vidya Vihar, Mumbai	Members	11
Dr. SS Solimat, Secretary, Indian Association of Karnataka	Secretary	1
Former Sugar Minister of Karnataka	Minister and team	2
College of Agriculture, Naigaon Dist., Nanded	Lecturers and Students	82
Individual Farmers from Maharashtra State	Farmers	316
Total		1368

उन्हाळा हंगामात ऊस पिकावर आढळणारे रोग व नियंत्रणाचे उपाय

गणेश कोटगिरे आणि भरत पवार

कृषिशाला व तंत्रज्ञान विभाग

वसंतदादा शुगर इन्स्टिट्यूट, मांजरी बु.॥, पुणे

ऊस हे देशातील व प्रामुख्याने महाराष्ट्रातील प्रमुख नगदी पीक आहे. भारतात मागील गळीत हंगामात साधारणपणे ५५ लाख हेक्टर क्षेत्रावर ऊस पिक घेतले होते. ऊस पिक लागवड आणि साखर उत्पादन याबाबतीत महाराष्ट्र हे राज्य देशात नेहमीच आघाडीवर राहिलेले आहे. लागण हंगाम २०२१-२२ मध्ये राज्यात १४.८८ लाख हेक्टर क्षेत्र उसाखाली होते. ऊस या पिकांवर आधारित सहकारी आणि खाजगी साखर कारखानदारी महाराष्ट्रातील ग्रामीण भागात यशस्वीपणे चालल्यामुळे काही हंगामाचा अपवाद वगळता या पिकाखालील क्षेत्रामध्ये सातत्याने वाढ झाली. साखर उद्योगाने महाराष्ट्राच्या ग्रामीण भागात आर्थिक, सामाजिक, शैक्षणिक, क्रीडा आणि सांस्कृतिक क्षेत्रात भरीव अशी प्रगती केलेली आहे. राज्याच्या सर्वांगीण उत्कर्षात साखर उद्योगाचे योगदान अत्यंत महत्वाचे आहे. साखर उद्योगाचे यश हे गाळप हंगामात कारखान्याच्या गरजेप्रमाणे शेतकऱ्यांनी निर्माण करून पुरवठा केलेल्या परिपक्व उसाच्या पुरवठ्यावर अवलंबून आहे.

महाराष्ट्रात गळीत हंगाम २०२२-२३ मध्ये एकुण २१० (१०२ खाजगी आणि १०८ सहकारी) साखर कारखान्यांनी गाळप केले. आत्तापर्यंत राज्यातील ऊस पिकाच्या १४.८८ लाख हेक्टर नोंद क्षेत्रातून १०५४.७५ लाख मे. टनाचे गाळप होवून १०५.४८ लाख मे टन साखरेचे उत्पादन झाले; सरासरी साखर उतारा १०.३८ टक्के इतका होता तर प्रति हेक्टरी सरासरी उत्पादकता साधारणपणे ८५ टन इतकी होती.

राज्यात अपेक्षित प्रति हेक्टरी सरासरी ऊस उत्पादकता समाधानकारक नाही. ऊसाचे व साखरेचे हेक्टरी उत्पादन घटण्याची अनेक कारणे आहेत. यापैकी ऊस पिकांवर होणाऱ्या रोगांचा वाढता प्रसार व प्रादुर्भाव हे एक महत्वाचे कारण आहे. अलिकडे ऊस पिकांवर आढळणाऱ्या रोगांच्या संख्येत तसेच प्रमाणात वाढ झाल्याचे दिसून येते. एकाच भागात या पिकाखालील वाढलेले क्षेत्र, एक पिक पद्धती, पिक फेरपालटीचा अभाव, ऊस बेण्याची कमतरता, अशुद्ध व निकृष्ट बेण्याचा वापर, शिफारशीत नसलेल्या ऊस जातींची लागवड, ऊस बेण्यांची अनिर्बंध ने-आण, समस्यायुक्त जमिनी, सेंद्रिय, रासायनिक आणि जैविक खतांचा असंतुलित व अवेळी वापर, अपुरी पूर्व व आंतरमशागत, किडींचा वाढता प्रसार व प्रादुर्भाव,

पाण्याचा ताण, अति पाण्याचा वापर, अतिवृष्टी व पूर परिस्थिती, पिक संरक्षण या विषयाबाबत शेतकऱ्यांना मिळणारी अपुरी माहिती, रोग नियंत्रणाबाबत शेतकऱ्यांची उदासिनता, रोग नियंत्रण उपायांचा कमी प्रमाणात अवलंब, हवामानातील बदल अशा विविध कारणांमुळे रोगाच्या वाढीस व प्रसारास योग्य वातावरण तयार झाल्याने ऊसावरील रोगांचा प्रसार व प्रादुर्भाव वाढत आहे.

ऊस पिकात बुरशी, सूक्ष्मजंतू, विषाणू, फायटोप्लाझमा, सूत्रकृमी, अन्नद्रव्यांची कमतरता, परोपजीवी वनस्पती आणि हवामानातील बदल यामुळे रोग तसेच विकृती तयार होतात. रोगामुळे ऊसाच्या व साखरेच्या उत्पादनात रोगाच्या प्रसार आणि तीव्रतेनुसार कमी-अधिक प्रमाणात घट येते. हंगामनिहाय ऊस रोग परिस्थिती वेगवेगळी असते तसेच वेगवेगळ्या रोगांची लागण आणि प्रमाणदेखील कमीअधिक असते

महाराष्ट्रात उन्हाळी हंगामात ऊस पिकास पडणारा ताण ही नेहमीची बाब आहे. उन्हाळ्यात पाण्याचा ताण, हवेचे वाढलेले तापमान, गरम हवा यामुळे पिकाच्या शारिरिक क्रिया मंदावतात, पेशींची वाढ कमी होते, पानांतील हरितद्रव्ये कमी होतात, अन्न तयार होण्याचा व वहनाच्या मार्गात अडथळा निर्माण होतो, पिकाच्या मुळांना इजा होते पर्यायाने पिक अशक्त होवून त्याची रोगप्रतिकारक क्षमता कमी झाल्याने पिक अनेक रोगास बळी पडते; तसेच रोगाची तिव्रतादेखील वाढते. उन्हाळ्यात ऊस पिकांवर चाबूक काणी, गवताळ वाढ, मर, रेड रॉट (ऊस रंगणे), मोझेक, यलो लीफ सिंड्रोम किंवा यलो लिफ डिसेज, लिफ स्काल्ड (पांगशा फुटणे), रटून स्टॅटींग (वाढ खुंटणे) हे प्रमुख रोग आढळतात. तसेच उन्हाळ्यात लागवड झालेल्या उसात पिक ताणग्रस्त राहिल्याने पावसाळा हंगामात या पिकात पोक्का बोंग आणि तांबेरा रोग वाढल्याचे आढळून आलेले आहे.

उन्हाळा हंगामात ऊस पिकावर आढळणारे महत्वाचे रोग व त्याबाबत सविस्तर माहिती खालीलप्रमाणे

१. चाबूक काणी किंवा काजळी

हा बुरशीजन्य रोग स्पेरिसोरियम सिटॅमिनी मुळे होत असून महाराष्ट्रात हा रोग ऊस पिकांवर सर्वत्र आढळतो. राज्यात लागवडीखाली असणाऱ्या सर्वच जाती या रोगास कमी-अधिक

प्रमाणात बळी पडतात. ऊस पिक वाढीच्या सर्व अवस्थेत या रोगाचा प्रादुर्भाव आढळून येतो. लागण पिकापेक्षा खोडवा पिकात काणी रोगाचे प्रमाण जास्त आढळते, कारण लागण पिकातील रोगग्रस्त बेटे काढली जात नाहीत, तसेच खोडवा पिकाचा सुरुवातीचा काळ उन्हाळ्यात राहतो; हवेतील व जमिनीचे तापमान वाढते, तेव्हा या रोगास पोषक वातावरण तयार होवून या रोगाचा प्रसार व प्रादुर्भाव जास्त होतो. खानदेश आणि मराठवाडा भागात रोगाचा प्रादुर्भाव जास्त आढळून येत आहे.

काणी रोगाची लागण झालेल्या ऊसाच्या शेंड्यामधून चाबकासारखा चकचकीत चांदीसारखे पातळ आवरण असलेला व शेंड्याकडे निमुळता होत गेलेला पड्डा बाहेर पडतो. या पट्ट्यावरील आवरण तुटल्यानंतर आतील काळा भाग दिसतो, तो भाग म्हणजेच या रोगाचे बीजाणू. रोगामुळे उसाची पाने अरुंद व आखूड राहतात व त्यामुळे रोगट बेटातील ऊस कमी जाडीचे राहतात. कधी-कधी खोडवा पिकात रोगग्रस्त बेटात जास्त प्रमाणात फुटवेदेखील आढळतात. उभ्या उसास रोगाची लागण झाल्यास कांड्यावरील डोळ्यातून काणीयुक्त पांगशा फुटतात. रोगट बेटे कालांतराने वाळून जातात. त्यामुळे उसाच्या उत्पादनावर व साखर उताऱ्यावर विपरीत परिणाम होतो. काणी रोगामुळे लागण व खोडवा ऊस पिकाचे उत्पन्न अनुक्रमे २९ ते ७० टक्केपर्यंत घटल्याची नोंद आहे. साखर उतारादेखील ४ युनिटपर्यंत घटतो. तसेच रसाची शुद्धता घटते. या रोगाचा प्रसार मुख्यत्वेकरून दूषित बेण्यामार्फत तसेच वारा, पाऊस, पाणी, किटक व जमिनीमार्फत होतो.

काणी रोगाचे नियंत्रण:

- बेणेमळ्यातील बेणे लागणीसाठी निवडावे. मुलभूत बेणे तयार करण्यासाठी ऊस बेण्यास लागणीपूर्वी बाष्प उष्ण हवा प्रक्रिया संयंत्राद्वारे ५४ सें.ग्रे. तापमानास १५० मिनिटे प्रक्रिया करावी. त्यानंतर बेण्यास कार्बोडॅन्झिमयुक्त बुरशीनाशकाची ०.१ टक्के या प्रमाणात प्रक्रिया करावी. मुलभूत बियाणे तयार करण्यासाठी उती संवर्धित रोपांचा पर्याय निवडावा.
- मध्यम रोगप्रतिकारक जातींची उदा. कोसी ६७१, को ८६०३२, व्हीएसआय ४३४, कोएम ०२६५, कोव्हीएसआय ०३१०२, को १५०१२ लागण करावी.
- नियमितपणे ऊस पिकाची पाहणी करून रोगग्रस्त बेटे मुळासहित काढावीत व जाळून नष्ट करावीत. काणीचे फोकारे बाहेर पडण्यापूर्वी बेटेनिर्मुलन झाले तर रोगाचा प्रसार कमी होण्यास

मदत होते. याकरिता, प्रथम काणीयुक्त फोकारे प्लॅस्टीकच्या पोत्यात किंवा पिशवीत काढून घ्यावीत व नंतर बेटे काढावीत. साखर कारखान्याच्या माध्यमातून सामुहिक पद्धतीने काणीग्रस्त बेटे निर्मुलनाचा कार्यक्रम हाती घेतल्यास रोगाचे नियंत्रण प्रभावी करता येईल.

- खोडवा पिकाचे नियोजन शास्त्रोक्त पद्धतीने करावे.
- उन्हाळ्यात ऊस पिकास पाण्याचा ताण पडू देऊ नये. पिकास ताण सहन करण्यासाठी शिफारशीनिहाय कृषि उत्पादनांचा वापर करावा.

२. गवताळ वाढ

गवताळ वाढ किंवा गवतीवाढ हा रोग बेण्याद्वारे व किडीद्वारे पसरणाऱ्या फायटोप्लाझमामुळे होतो. को ४१९, कोएम ०२६५, कोसी ६७१, को ८६०३२ व व्हीएसआय ४३४ या जातीत या रोगाचे प्रमाण जास्त आढळते. महाराष्ट्रात या रोगाचे प्रमाण सरासरी १० टक्केपर्यंत आहे आणि ते वाढत असल्याचे दिसून येत आहे. या रोगाचा प्रसार प्रसार मुख्यत्वेकरून दूषित बेण्यामार्फत व किडीद्वारे (मावा, तुडतुडे) होतो.

गवती वाढ रोगामुळे पिकाच्या सुरुवातीच्या काळात ऊस बेटात प्रमाणापेक्षा जास्त फुटवे दिसतात व बेटास गवताच्या ठोंबाचे स्वरूप येते. बेटांत फुटव्यांची संख्या कधी-कधी १०० पेक्षा जास्त आढळते. रोगामुळे उसाच्या पानामध्ये हरितद्रव्य कमी प्रमाणात तयार होत असलेने पाने पिवळी किंवा पांढरी पडतात. रोगट बेटात गाळण्यालायक ऊस तयार होत नाहीत. रोगट ऊसावरील पाने अरुंद व आखूड होतात. पूर्ण वाढ झालेल्या रोगाचा प्रादुर्भाव झाल्यास, पोंग्यातील पाने पिवळी पडतात व कांड्यावरील डोळ्यातून पिवळसर (केवड्यासारख्या) पांगशा फुटतात. रोगट ऊस नंतर पोकळ पडतो व वाळतो. गवताळ वाढ रोगामुळे ५ ते २० टक्केपर्यंत ऊस उत्पादनात घट येते. खोडवा पिकात रोगामुळे जास्त प्रमाणात बेटे पिवळी पडतात व मरतात. खोडवा पिकात रोगाचे प्रमाणदेखील सुरुवातीच्या काळात जास्त आढळते. रोगग्रस्त खोडवा पिकातील ऊसांची संख्या कमी झाल्याने उत्पादनात घट येते.

गवती वाढ रोगाचे विचित्रण :

- बेणेमळ्यातील रोगमुक्त बेणे लागणीसाठी निवडावे. बेणेमळ्यासाठी मुलभूत बेणे तयार करण्यासाठी लागवडीपूर्वी बेण्यास बाष्प उष्ण हवा प्रक्रिया ५४ सें.ग्रे. तापमानास १.५ तास मिनिटे करावी किंवा उती संवर्धित रोपांचा वापर करावा.
- बेण्यास कार्बोडॅन्झिमयुक्त बुरशीनाशकाची ०.१ टक्के या प्रमाणात

प्रक्रिया करावी. याकरिता १०० ग्रॅम बुरशीनाशक १०० लिटर पाण्यात मिसळावे व त्या द्रावणात बेणे १५ मिनिटे बुडवून प्रक्रिया करावी.

- उसाची उगवण झालेनंतर नियमितपणे ऊस पिकाची पाहणी करून रोगट बेटे काढावीत व जाळून नष्ट करावीत. सामुहिक पद्धतीने बेटे निर्मुलनाचा कार्यक्रम हाती घेतल्यास रोगाचे नियंत्रण प्रभावीपणे करता येईल.
- उसावरील रस शोषण करणाऱ्या किडींचा बंदोबस्त वेळीच करावा, जेणेकरून रोगाच प्रसार होणार नाही.
- रोगाचे प्रमाण २० टक्क्यापेक्षा जास्त असल्यास त्या पिकाचा खोडवा घेवू नये. पिकाची फेरपालट करावी जेणेकरून रोगाचे प्रमाण पुढील पिकात कमी राहिल.

३. मर

हा रोग फ्यूजॅरियम सॅकॅराय या जमिनीद्वारे आणि बेण्याद्वारे 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 जास्त होतो व रोगाची लागण होते. कोसी ६७९ आणि को८६०३२ या ऊस जातीत हा रोग महाराष्ट्रात अत्यल्प प्रमाणात आढळलेला आहे. एकेकाळी गुजरात राज्यात या रोगाने कोसी ६७९ या जास्त साखर उतारा जातीच्या पिकाचे मोठ्या प्रमाणावर नुकसान झाले होते त्यामुळे या जातीच्या लागवडीस प्रतिबंध केला होता.

दुर्लक्षित पिकात मर या रोगाचा प्रादुर्भाव जमिनीतील कांड्यामध्ये प्रथमतः होतो. रोगग्रस्त उसाच्या बेटातील ऊसाची 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 वाळत जातात. शेतात जागोजागी बेटे सुकलेली व वाळलेली दिसून येतात. वाळलेल्या उसाचा काप घेतल्यास पोकळ कांड्यात 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.

मर रोगाचे नियंत्रण:

- बेणेमळ्यातील बेणे लागणीकरिता वापरावे. नवीन लागण करतांना ऊस बेण्यास लागणीपूर्वी बुरशीनाशकाची प्रक्रिया

करावी.

- लागण केलेल्या जमिनीचा पाण्याचा निचरा होण्यासाठी व्यवस्था असावी.
- जमिनीतील कांड्या पोखरणाऱ्या 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.
- मर रोग झालेल्या उसाचा खोडवा न घेता त्या शेतात द्विदल धान्याचे पीक घेऊन फेरपालट करावी.

४. रेड रॉट (लाल कुज)

या बुरशीजन्य रोग महाराष्ट्रात कमी प्रमाणात सोलापूर आणि कोल्हापूर या जिल्ह्यात नव्यानेच आढळलेला होता. सध्या या रोगाचा प्रादुर्भाव राज्यात ऊस पिकामध्ये दिसून येत नसला तरी हा रोग अतिशय महत्वाचा असून या रोगामुळे अनुकूल परिस्थितीत ऊस पिकाचे १०० टक्केपर्यंत नुकसान होवू शकते. हा रोग कलेटोट्रिकम फालकॅटम या ऊस बेणेद्वारे पसरणा-या बुरशीमुळे होतो. या रोगास उसाचा कर्करोग असेही म्हणतात. महाराष्ट्राव्यतिरिक्त हा रोग भारतात इतर सर्व ऊस पिकविणाऱ्या राज्यात ऊस पिकावर आढळलेला आहे. या रोगामुळे ऊस पिकाचे मोठ्या प्रमाणावर नुकसान होते; तसेच तसेच रसाची शुद्धता आणि साखर उतारा यामध्ये जास्त घट संभवते. रेडरॉट या रोगाची लक्षणे पिकाच्या पानांवर तसेच कांड्यावरती दिसून येतात.

पानावरील लक्षणे : सुरुवातीस पानाच्या शिरेवर वरच्या बाजूस लालसर रंगाचे २ ते ३ मिमी लांबीचे आणि ०.५ मिमी रुंदीचे ठिपके आढळतात. कालांतराने ठिपक्यांची लांबी वाढत जाते; त्यानंतर पाने वाळतात. रोगाची तीव्रता वाढल्यावर शेंड्याकडील सर्व पाने वाळतात.

कांड्यावरील लक्षणे:

- रोगट उसाची पाने वाळल्यानंतर कांड्यावरती तपकिरी किंवा लालसर तपकिरी पट्टे आढळतात. कांड्या सुकतात आणि आकसून जातात.
- रोगग्रस्त उसाच्या कांड्याच्या आतील भाग पाहिला असता त्यावर लाल रंगाचे अनियमित आकाराचे ठिपके किंवा पट्टे आढळतात. कांड्यांच्या आतील भाग पोकळ होवून त्यामध्ये कापसासारखी आणि करड्या रंगाची बुरशीची वाढ आढळून येते.
- कांड्याच्या आतील भागाचा वास अल्कोहोलसारखा येतो.
- रोगाची तीव्रता वाढल्यावर आकसलेल्या कांड्यावरती काळ्या

रंगाच्या असेरुलाई तयार होतात. रोगग्रस्त उसाची बेटे निस्तेज होवून वाळतात.

रेड रॉट रोगाचे नियंत्रण:

- बेणेमळ्यातील बेणे लागणीकरिता वापराने. लागणीपूर्वी ऊस बेण्यास बुरशीनाशकाची (कार्बेन्डेझिम ०.१ टक्के) १५ मिनिटे प्रक्रिया करावी.
- लागण केलेल्या जमिनीचा पाण्याचा निचरा होण्यासाठी व्यवस्था असावी
- रोगट बेटे खणून काढावीत व त्या ठिकाणी कार्बेन्डेझिम किंवा कॉपर ऑक्झिक्लोराईड यापैकी एका बुरशीनाशकाचे ०.१ टक्के द्रावण घालावे. तसेच ट्रायकोडरमा व्हीरीडी या जैवबुरशीनाशकाचा वापर करावा.
- रेड रॉट झालेल्या उसाचा खोडवा न घेता त्या शेतात द्विदल धान्याचे पीक घेऊन फेरपालट करावी.
- पानावर रोगाची लक्षणे आढळल्यानंतर लगेचच कार्बेन्डेझिमयुक्त बुरशीनाशकाची ०.१ टक्के या प्रमाणात १५ दिवसांच्या अंतराने स्टीकर वापरून २ ते ३ फवारण्या कराव्यात.

५. येलो लीफ डिजीज (येलो लीफ सिंड्रोम)

हा रोग विषाणूजन्य असून येलो लीफ व्हायरसमुळे (प्रकार : लिटीओव्हिरीडी) होतो. हा व्हायरस मावा (मेलानाफीस सॅकाराय आणि होफॅलोसिफम मायडीस) या किडीद्वारे पसरतो. तसेच बेण्याद्वारे देखील हा रोग पसरतो. या रोगामुळे ४ ते १० टक्केपर्यंत उसाचे आणि साखरेचे उत्पादन घटल्याची उदाहरणे आहेत. लागण पिकापेक्षा खोडवा पिकात या रोगाचे प्रमाण जास्त आढळते. दक्षिण भारतात या रोगाचे प्रमाण झपाट्याने वाढत असून को ८६०३२ ही उसाची प्रमुख जात धोक्यात येणाची शक्यता आहे.

येलो लीफ डिजीज रोगाची लक्षणे: या रोगाची लक्षणे पिकाचे वय ७ ते ८ महिन्याचे झालेवर दिसावयास लागतात. रोगाची लागण झालेवर सुरुवातीस पानाची मध्यशिर खालच्या बाजूने पिवळी पडते. प्रथमतः ३ ते ६ नंबरच्या पानांवर रोगाची लक्षणे आढळतात. कालांतराने पिवळेपणा मध्यशिरेपासून बाजूस वाढत जावून पूर्ण पान पिवळे पडते. हळूहळू उसाची सर्व पाने पिवळी पडतात व शेड्याकडून वाळत जातात. काही वेळेस रोगग्रस्त पाने शिरेलगत लालसर दिसतात. किडींचा प्रादुर्भाव, अतिथंडी तसेच अन्नद्रव्याचा ताण याबाबींमुळे रोगाची तीव्रता वाढते.

येलो लीफ डिजीज रोग नियंत्रणाचे उपाय:

- उती संवर्धित रोपापासून बेण्याची वाढ केलेल्या बेणेमळ्यात

रोगाचे नियंत्रण होते, म्हणून अश्या बेणेमळ्यातून लागणीसाठी बेणे घ्यावे.

- पिक ताणग्रस्त राहणार नाही याबाबत काळजी घ्यावी

उन्हाळा हंगामात ऊस रोग प्रतिबंधात्मक उपाय :

- ऊस लागवडीकरिता निचरायुक्त जमिनी असाव्यात. ऊस पिकाचा कालावधी मोठा असल्याने जमिनीच्या समस्या टाळण्यासाठी जमिनीची पुर्वमशागत चांगली करावी. जमिनीत सेंद्रिय कर्बाचे प्रमाण वाढवावे त्यामुळे इतर फायद्याव्यतिरिक्त पाणी धारण क्षमता वाढविणे शक्य होते.
- पाण्याची उपलब्धतत लक्षात घेवून पिक क्षेत्राचे नियोजन करावे.
- ऊस लागवडीकरिता रूंद सरी किंवा पट्टा पध्दतीची रानबांधणी करावी.
- ऊस बेण्यास लागणीपूर्वी कार्बेन्डेझिम बुरशीनाशकाची (बावीस्टीन १०० ग्रॅम) व कीटकनाशकाची (इमिडाक्लोप्रिड ७०%, ३६ ग्रॅम) १०० लिटर पाण्यात मिसळून १० ते १५ मिनिटे प्रक्रिया करावी.
- सेंद्रिय, रासायनिक व जैविक खतांचा वापर माती परिक्षण अहवालानुसार व वेळेवर करावा.
- पाण्याची कमतरता असल्यास पोटॅश या अन्नद्रव्याची मात्रा ज्यादा द्यावी. तसेच पोटॅश अधिक केओलीन या प्रतिबाष्परोधक रसायनाची फवारणी करणे
- आंतरमशागतीची कामे उदा. तणनिर्मुलन, उसाची बाळबांधणी व मोठी बांधणी वेळेवर करावी.
- खोडवा पिकाचे शास्त्रीय पध्दतीने पिक नियोजन करावे.
- ऊस पिकावरील किडींचे नियंत्रण वेळीच करावे; जेणेकरून रोगाच्या प्रसारास आळा बसेल.
- पिकास जैविक तसेच अजैविक ताण सहन करण्याची क्षमता वाढविण्यासाठी कायटोसानयुक्त तसेच सिलिकॉनयुक्त कृषिउत्पादनाचा वापर करावा.*

अधिक माहितीसाठी :

ऊसरोग शास्त्र विभाग

वसंतदादा शुगर इन्स्टिट्यूट, मांजरी (बु), पुणे

येथे संपर्क साधावा.

फोन नं. : (०२०) २६९०२१००, २६९०२२६८

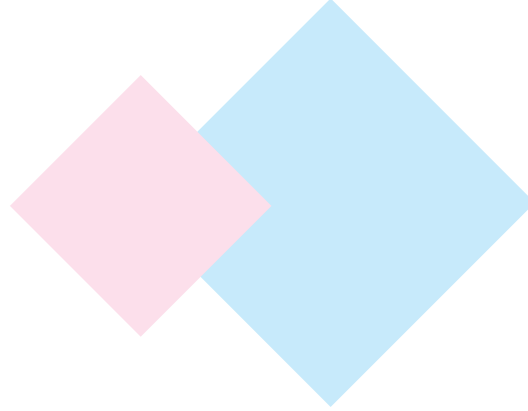
फॅक्स : (०२०) २६९०२२४४

मोबाईल नं.: ९९६०८३३३०९/९८९०४२२२७५

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1. **Jainani Deepa** (2023) How Sweet 2.0- Technological Pathbreakers of Indian Sugar Story (2ndEd.) Lucknow: Grey Parrot Publishers, (p. 191₊10)
2. **DSTA - Deccan Sugar Technologists' Association (India) Pune** (2021) DSTA Proceedings- 66th Annual Convention on 30th and 31st October 2021; Pune, DSTA (p. 376)



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VSI Bulletin is published by the Vasantdada Sugar Institute, Pune.

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