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VSI

BULLETIN

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Foreword

Foreword ...

The sugar industry plays a significant role in India's agricultural economy- sugarcane and Sugar has been and continues to be important commodities of trade and livelihood. Today, the industry is a vital cog in India's rural development as the country's second largest agro-based industry, next only to cotton. It directly or indirectly impacts the livelihoods of over 5 crore farmers and their dependents, involved in cultivating sugarcane in an area of almost 55-60 lakh hectares. In addition, 5 lakh workers in sugar mills and another 10 lakh workers, through indirect means, draw their livelihoods from the sugar industry.

The National Federation of Cooperative Sugar Factories Ltd. released the latest production data on March 31. The data shows that crushing operations in all major cane-producing states are nearing closure, with 467 out of 541 sugar mills having already stopped operations. Overall production and recovery have improved, supported by higher cane availability and better operational efficiency. Total sugar output stands at 271.20 LMT, compared to 248.65 LMT during the same period last season. The average recovery rate has improved to 9.56%, up from 9.37% in the previous season.

In Maharashtra, sugar production increased to 98.95 LMT from 80.10 LMT last season, with the recovery rate remaining unchanged at 9.50%.

India continues to make steady progress in the ethanol sector, with year-on-year increases in production and blending levels alongside expanding manufacturing capacity. This advancement is transforming the country's energy landscape while supporting economic growth and fostering sustainable development in rural regions.

A look at the events, training, workshops reported in this issue will once again showcase the prominent role of VSI in capacity building through training on the domestic front. 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 sugarcane growers and industry's needs by trying to reduce the gap between the lab and land.

We are happy to place this Bulletin in the hands of our readers and look forward to their suggestions for effecting further improvements in future.

RM Devarumath

(RM Devarumath)
Editor

HOMAGE

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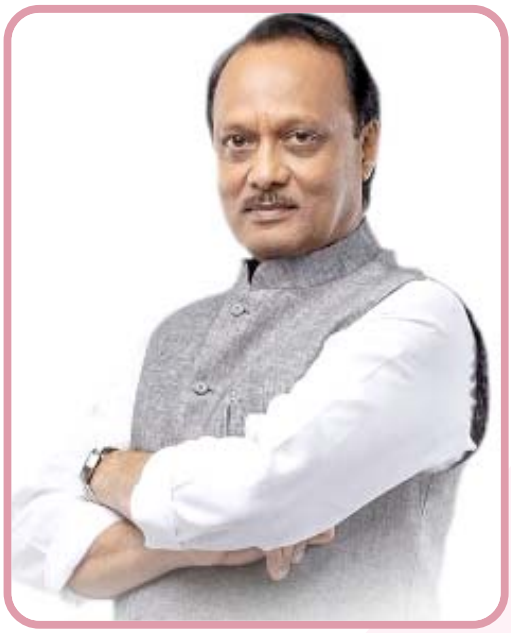


Late Ajit Anantrao Pawar

(22 July 1959 – 28 January 2026)

Late Ajit Pawar was a member of trustee, Vasantdada Sugar Institute, Pune. He was instrumental in the developmental activities of VSI's Farms. His keen interest in the institutes Agriculture section as well as in Technical Departments of VSI in connection with the sugar mills related issues.

He was born on July 22, 1959 at Deolali Pravara in Rahuri. He had to shoulder the responsibility of taking care of his family at a young age, and it was at this time, he was first exposed to the social issues around him. As he understood the plight of farmers, the seeds of empathy for their cause were sown in his mind. The journey of his dynamic leadership that began and continued with different institutions such as milk unions, various cooperative societies, sugar factories, and banks took a new direction in 1991. He was widely associated with his political stronghold, in Baramati. Since then, he has graced many more positions such as MP, MLA, and Minister of State for various critical government departments, and Deputy Chief Minister of Maharashtra four times.

Late Ajit Pawar is always in touch with the people through his *Janata Darbars*. There is no discrimination between party workers and the public. He is always insistent on increasing the speed of administrative functioning. Ajit Dada is famed for his straightforward approach and frankness, 'yes, only if the work can be completed, otherwise no'. He dedicates 16-17 hours every day to serve the people of Maharashtra and help them to solve their problems. His astounding and clear vision of development has influenced Maharashtra's political and social life over the last three decades. Famed for his punctuality in the political scenario of Maharashtra, he is the sculptor of Nava Maharashtra.

Ajit Pawar Passed away on January 28, 2026 at the age 66 in a Learjet 45 aircraft crash while attempting to land at Baramati airport. The incident was occurred during a political trip to Baramati.

On behalf of the VSI Staff members we express our condolences to the family and pray for the eternal peace of his soul.

EVENTS

The 77th Republic Day of India

The 77th Republic Day of India was celebrated on January 26, 2026. Mr. Sambhaji Kadupatil, DG hoisted the National Flag was unfurled followed by the National Anthem. On this occasion staff members and students were present in the campus.

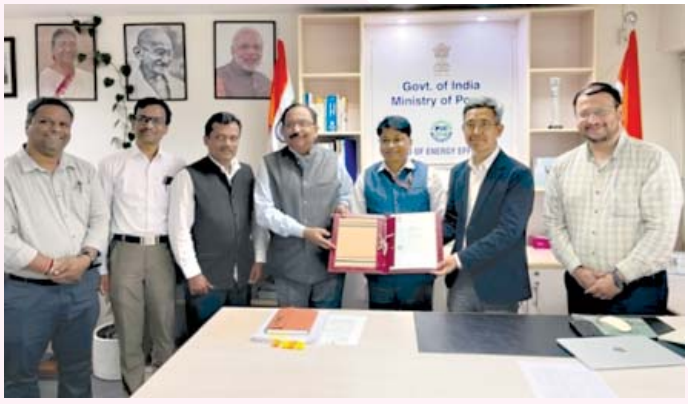
A Memorandum of Understanding (MoU) Signed between ICAR-Indian Institute of Millets Research (ICAR-IIMR), Hyderabad; Vasantdada Sugar Institute (VSI), Pune; and Indian Federation of Green Energy (IFGE), New Delhi

ICAR-Indian Institute of Millets Research (ICAR-IIMR), Hyderabad; Vasantdada Sugar Institute (VSI), Pune; and Indian Federation of Green Energy (IFGE), New Delhi, signed a Memorandum of Understanding (MoU) to collaborate on the production of CBG (Compressed Biogas) and ethanol based on sweet sorghum on March 6, 2026. This agreement was executed in the presence of Mr. Nitinji Gadkari, Hon. Union Minister for Road Transport and Highways. Mr. Sambhaji Kadupatil, Director General of VSI; Dr. Tara Satyavathi, Director General of ICAR-IIMR, Hyderabad; and Mr. Sanjay Ganju, Director General of IFGE, Delhi, signed the MoU. Under this agreement, the potential for producing CBG and ethanol from various varieties of sweet sorghum will be studied.

ICAR-IIMR will contribute expertise in genetic improvement, feedstock development, agronomy, and sustainable production technologies. VSI will undertake the validation of technologies and contribute to the processes and scaling-up required for CBG and ethanol production. IFGE will facilitate market integration and promote the CBG ecosystem. Through this integrated approach, the objectives of accelerating commercialization, establishing viable value chains, enhancing farmers' income, strengthening energy security, supporting national biofuel targets, and fostering environmentally sustainable growth can be achieved. It will help to yield benefits for farmers, industry stakeholders and the nation.

A Memorandum of Understanding (MoU) signed between the Bureau of Energy Efficiency (BEE) and the Vasantdada Sugar Institute (VSI)

Memorandum of Understanding (MoU) signed between Bureau of Energy Efficiency (BEE) and Vasantdada Sugar Institute (VSI) to promote and strengthen energy efficiency initiatives on March13, 2026 at New Delhi



The collaboration will focus on research, development, demonstrations, training, energy audits, potential assessment, and knowledge exchange, aligned with national energy efficiency goals and statutory provisions and also focus on development

of tools, models, benchmarks, databases and digital platforms to support the implementation and monitoring of energy efficiency programmes.

The MoU was formalized during a meeting held in New Delhi, bringing together officials and scientists from both institutions. The VSI delegation comprised Mr. Sambhaji Kadupatil, Director General, VSI; Mr. Rajendra Chandgude, Head of the Sugar Engineering and Renewable Energy Department, VSI; and Dr. Kakasaheb Konde, Head of the Alcohol Technology and Bio-fuel Department, VSI. Representing BEE were Dr. Ashok Kumar, Director, BEE; Dr. Vivek Negi, Joint Director, BEE; and Mr. Ashish Ranjan Srivastava, Senior Sector Expert (Sugar), BEE. All the members were present at the BEE office in New Delhi for the signing of the MoU.

Expert team of Savitribai Phule Pune University, Pune

The team of experts from Savitribai Phule Pune University, comprising of Dr. Waydande Devidas Bhimrao (Chairman) Mugutrao Sahebrao Kakde College, Someshwarnagar, Baramati; Dr. Gacche Raju Nivarti, Department of Biotechnology Savitribai Phule Pune University, Pune; Dr. Kulkarni Abhijeet Prabhakar Bioinformatics Centre Savitribai Phule Pune University, Pune and Dr. Shinde Shubhangi Rajkumar, Pune District Education Associations Annasaheb Magar College, Hadapsar, Pune. The team visited VSI on February 18, 2026 for the renewal of recognition the Savitribai Phule Pune University, for M.Sc. Courses (Wine Brewing and Alcohol Technology and Environmental Sciences) and Center of Post Graduate Research Centre in the subject of Environmental Sciences and Biotechnology. The team members welcomed by Mr. Sambhaji Kadupatil, DG and felicitated them. He briefed the activities of VSI. Later the team visited premises of the campus including Library, Hostels, Alcohol Technology & Biofuels Dept, Encrimemetal Sciences, MB & GE and Tissue culture Section to know the activities related to student. They also visited classrooms and laborites. All the Heads of the Departments / Section HODs explained the activities of their Departments. Then they visited to Education Department for official work. During the discussion Dr. RM Devarumath, Principal briefed the activities of education related courses in presence of HODs of the concerns subjects were present. After discussion committee recommended the continuation of affiliation of SPPU.

TRAINING
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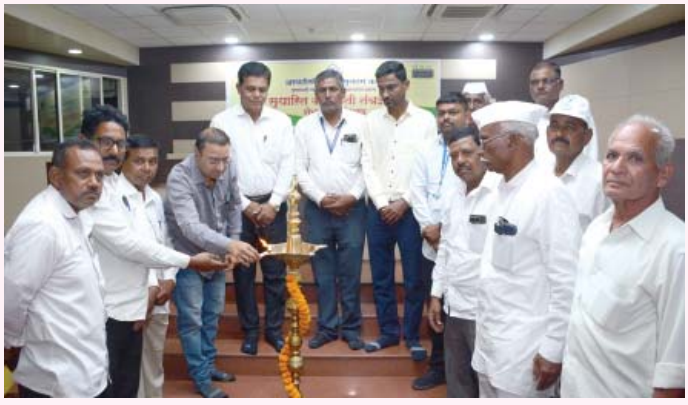
Modenrn Technologies in Sugarcane Agriculture

The three days residential training programs were organized for staff members and farmers from Baramati, Indapur, Malshiras and Akluj Tahsils in Maharashtra states under ITC, Development Support Center, Pune. The objective of the training was to train the participants about advanced technologies in sugarcane agriculture. The three days training programs were conducted on February 25-27, 2026. Total 93 participants from ITC, Development Support Center, Pune (50) and ITC, Development Support Center, Solapur (43) were present

The training was inaugurated by the Dr. AD Kadlag, Principal Scientist, Crop Production and Crop Protection. Dr. GS Kotgire., Scientist, Plant Pathology section welcome all the participants and others. Modern and scientific sugarcane cultivation technology was taught during the training period which covered the lectures and practical's on various topics like sugarcane varieties and varietal planning, nursery management, tissue culture, modern planting techniques, soil fertility and fertilizer management, irrigation water management, use of bio-fertilizers, farm mechanization, ratoon management and integrated disease and pest management during three days training program. All the agriculture scientists conducted theory lectures in Hindi with the help of power point presentation. More emphasis on practical's and field demonstrations was given during the program.

In the plenary session, the participants resolved their doubts from the subject experts. In the concluding function, the representative trainees expressed their satisfaction about the training, lodging and boarding facilities provided to them. VSI discussed with participants during farewell function about Mechanization and AI (Artificial Intelligence) technology and difficulties faced by them in sugarcane agriculture in their area and appealed them to adopt modern technologies in sugarcane. The certificates were distributed to the trainees. The event was concluded with vote of thanks

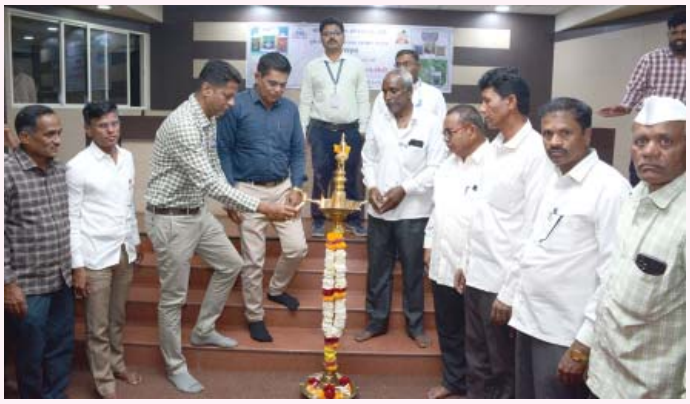


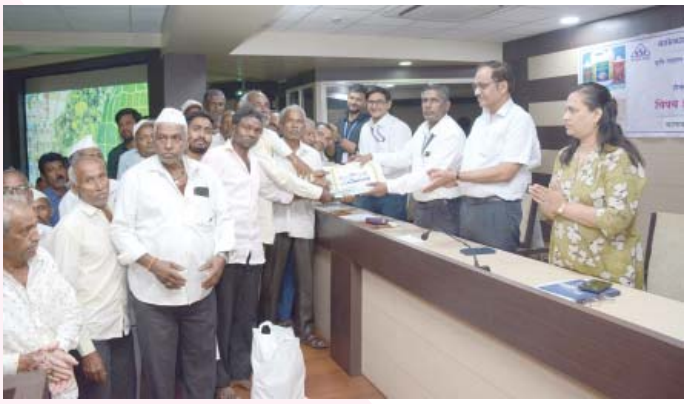
Advanced Technologies in Sugarcane Agriculture

The **two days** residential training programs were organized for farmers from **Kolhapur** district under Agricultural Technology Management Agency (ATMA). The objective of the training was to train the participants about advanced technologies in sugarcane agriculture. The three days training programs were conducted during on 13th March12-13, 2026. Total 120 participants from Radhanagari Tahsil (80), Bhudargad Tahsil (20) and Ajara Tahsil (20) were attended the training.

The training was inaugurated by the Dr. AD Kadlag, Principal Scientist, Crop Production and Crop Protection, ASTD . Dr. GS Kotgire., Scientist, Plant Pathology section welcome all the participants and others. Modern and scientific sugarcane cultivation technology was taught during the training period which covered the lectures and practical's on various topics like sugarcane varieties and varietal planning, nursery management, tissue culture, modern planting techniques, soil fertility and fertilizer management, irrigation water management, use of bio-fertilizers, farm mechanization, ratoon management and integrated disease and pest management during three days training program. All the agriculture scientists conducted theory lectures with the help of power point presentation. More emphasis on practical's and field demonstrations was given during the program.

In the plenary session, the participants resolved their doubts from the subject experts. In the concluding function, the representative trainees expressed their satisfaction about the training, lodging and boarding facilities provided to them. Officials asked questions about organic sugarcane agriculture and appealed to scientists to focus on it. The certificates were distributed to the trainees. The event concluded by Vote of thanks .





WORKSHOP

Modern Technologies For Boosting Sugarcane Productivity

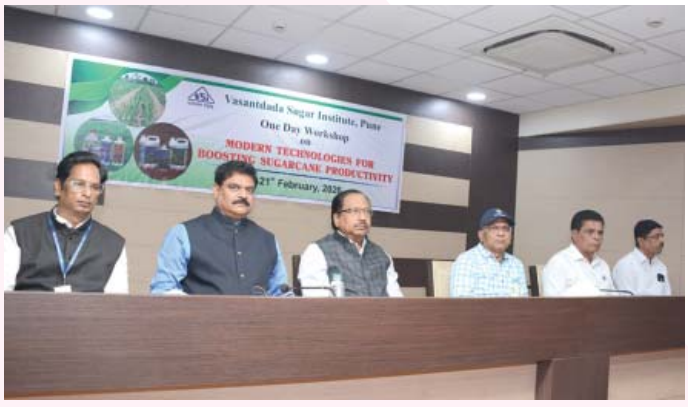
A one-day workshop on 'Modern Technologies for Boosting Sugarcane Productivity' was organized by AS & T Division on February 21, 2026. Mrs. JP Kharade, Scientist, Soil Science Section welcomed Hon. Director General, key speakers, Heads of Sections in AS & T Division and all the participants. Dr. AD Kadlag, Principal Scientist, Crop Production and Protection welcomed chief guest and lead speaker Dr. Dr. PM Chaudhary, Agronomist, NARP, Ganeshkhind, Pune, Dr. HK. Kausadikar, Head SSAC Dept . , VNKV, Parbhani , Dr. Ashok Bankar, Associate Prof. Microbiology, A. Garware College, Pune, Mr. Sambhaji Kadupatil, Director General, VSI, Pune, Mr. NA Lagad, Cane Development Officer, Vitthalrao Shinde SSK. HODs/HOSs of Sections from AST & D and all the participants.

The workshop was inaugurated by Mr. Sambhaji Kadupatil, Director General, VSI. In the inaugural speech, he highlighted the modern technologies such as AI and sensor and how we can use these technologies for boosting the sugarcane production. Total 36 participants from 17 sugar mills were present during workshop.

Dr. PM Chaudhary, presented his talk on 'Modern Sugarcane Cultivation Practices and Ratoon Management'. In his presentation briefly explained the important cultivation practices which were carried out in preseason and suru sugarcane. He also explained the different agronomical management practices for maximizing the ratoon crop yield. The utilization of beneficial microbes as a biofertilizer has become essential in sugarcane agriculture for sustainable crop production.

Dr. HK Kausadikar talk on 'Role of Micronutrient and Microorganism in Sugarcane'. iHe explained briefly on types of beneficial and pathogenic microorganism and there industrial application. He also explained the role of micronutrients in sugarcane production and how they impact on sugarcane productivity and quality.

Dr. Ashok Bankar presented his talk on 'Advanced Microbial Technology for Sustainable Agriculture Solution'. He explained briefly about the Advanced microbial technology for sustainable agriculture solution. He highlighted the application of advanced microbial technologies including Plant Growth Promoting Rhizobacteria (PGPR) based nanofertilizers, nanobiocontrol agents, biofertilizers, biofilm fertilizers and encapsulated fertilizers as transformative tools for sustainable agriculture.



Mr. NA Lagad presented their work on 'Advanced Technologies for Sugarcane Production' and he explained the various scheme implemented under cane development program in operational area of sugar mill for increasing the sugarcane production.

The interactive session was held in presence of workshop coordinator and co-coordinator. The participants raised their queries regarding on various modern technologies and their application and which was replied by concern experts. The program was concluded with a vote of thanks.

Harnessing Sugarcane Varietal Potential for Improvement in Yield and Quality

A one-day workshop on 'Harnessing Sugarcane Varietal Potential for Improvement in Yield and Quality' was organized at the Vasantdada Sugar Institute on March 24, 2026. The workshop was inaugurated by Dr. AD Kadlag Principal Scientist (Crop Production and Protection) in the presence of distinguished dignitaries Dr. SB Patil, Principal Scientist (GPB), ARS, Nippanni (Karnataka); Dr. Praful Kumar, Senior Scientist, Dept. Genetics and Plant Breeding, College of Agriculture, Indira Gandhi Krishi Vishwavidalaya, Raipur (Chhattisgarh); Dr. SS Ubale, Sugarcane Breeder, Central Sugarcane Research Station, Padegaon, Satara. Total 69 delegates representing 27 sugar mills across Maharashtra actively participated in the workshop.

Dr. AD Kadlag welcome and greeted the participants and introduced the speakers. He emphasized the critical role of developing sugarcane varieties tailored to the evolving needs of the sugar industry, particularly in enhancing productivity and quality.

Dr. SB Patil, highlighted the importance of systematic planting planning and harvesting programmes for improving cane yield and sugar recovery. He also stressed upon the future need for developing varieties suited for specific by-products such as high ethanol and high fiber. Additionally, he elaborated the significance of tissue culture plantlets in rapidly expanding the cultivation area under newly released varieties.

Dr. SS Ubale overviewed the currently cultivated sugarcane varieties in Maharashtra along with recent varieties developed by the Central Sugarcane Research Station, Padegaon and VSI, Pune. He further underlined the importance of quality seed material in achieving higher cane yield.

Two representatives from sugar mills, Mr. Sujaykumar T Patil, CDO, Shree Chhatrapati Shahu SSK, Kolhapur and Mr. SS Gawali, CDO, S. M. Shankarrao Kolhe SSK Ltd., Kopargaon, Ahilyanagar, shared their practical experiences regarding cane development activities. They particularly discussed the performance of different sugarcane varieties under their respective operational areas.

During the concluding session, The detailed discussions was held during concluding session. The following recommendations were finalized:

- Agriculture Officers should prepare planting and harvesting programmes in consultation with VSI every season to achieve targeted cane yield and sugar recovery.
- Newly released sugarcane varieties should be incorporated into planting planning after confirmation of their suitability to local soils and agro-climatic conditions.
- Sugar mills should implement a three-tier seed nursery programme to ensure quality seed supply and improved productivity.
- Adoption of tissue culture plantlets should be promoted to expand the area under newly released varieties and enhance yield and recovery.

There is a pressing need for developing sugarcane varieties with specific traits such as earliness,

drought and salinity tolerance, high fiber content and suitability for mechanical harvesting. Sugarcane Research centres in Maharashtra should focus on breeding such varieties through conventional and biotechnological approaches.

VSI COMMITTEE MEETINGS

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VSI Committee a meeting of investment committee meeting was held on February 26, 2026. The Technical committee meeting of Agriculture Section was held on February 26, 2026 under the chairmanship of Dr. Indrajit Mohite. In this meeting HODs of Agriculture section were presented the work progress of their section. Building and Purchase committee meeting was held on March 07, 2026. Selection Committee Meeting was held on March 27, 2026. Departmental Review Meeting was organized at *Sakhar Sankul, Shivaji Nagar, Pune* under the chairmanship of Hon. President of VSI Mr. Sharad Pawar . *In this review meeting different departments present their work progress and apart from this various developmental activities across all the VSI farms.* Governing Council and Board of Trustees Meeting was held at Yashwantrao Chavan Center, Mumbai on March 31, 2026 under the chairmanship of Mr. Sharad Pawar, Hon. President of VSI.

Progress Review Meeting on AI in Sugarcane Farming

A progress review meeting on Artificial Intelligence in Sugarcane Farming was held at the VSI Main Campus, Manjari Bk., Pune, On March 24, 2025 drawing 69 participants from 27 sugar mills.

The session was led by a distinguished panel including Dr. AD Kadlag (Principal Scientist, VSI), Mr. Tushar Jadhav (Head AI Project, ADT Baramati), and technical experts Mr. Avinash Panagrkar (Fasal), Mr. ArunPadol (MapMyCrop), and Mrs. Tejaswini Upadhye (Krushik App).

Dr. Kadlag opened the proceedings with a comprehensive review of the AI project's progress, followed by Mr. Jadhav, who detailed the practical implementation and field-level successes of these digital interventions in sugarcane cultivation.

The meeting transitioned into an interactive Q&A session, where participants sought clarity on several technical fronts. Experts also addressed the mechanism for receiving real-time pest and disease alerts via AI-driven platforms. A significant resolution was passed to conduct quarterly online meetings with farmers to maintain consistent engagement and monitor progress. The event concluded with a vote of thanks, marking a successful collaborative step toward modernizing sugarcane farming through technology.

VSI PARTICIPATION

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Technical Visit to Chemelil Sugar, Kenya

Mr. K Gangadharam, Head & Technical Adviser from the Sugar Technology Department of VSI undertook a technical visit to Chemelil Sugar Company Ltd., Kenya on January 13-17, 2026. A unit of the Chatthe Group, upon the request of the management of the company to assess & improve the performance of sugar mill. The visit provided an excellent opportunity to closely study the operating practices, equipment configuration, and overall process performance of the factory, while engaging in detailed technical discussions with the management and operating teams.

The visit focused on reviewing critical areas of sugar manufacturing, with particular emphasis on mill house operations, juice clarification, evaporation, pan boiling, centrifugal performance, sugar handling, water management, and energy utilization. Detailed interactions were held with factory management, engineers, technologists, and shop-floor personnel to understand plant-specific challenges and operational constraints. The visit enabled a comprehensive assessment of existing practices and identification of opportunities for process optimization and performance improvement.

During the course of the visit, extensive discussions were carried out on maintaining stable process parameters, improving operational discipline, reducing sugar losses, and enhancing overall sugar recovery. Special attention was given to pan boiling practices, massecuite handling, control of final molasses purity, and their direct impact on sugar recovery and product quality. The importance of consistent process control, equipment maintenance, and trained manpower was highlighted during interactions with operating personnel.

The visit also served as a platform for knowledge sharing, during which technical guidance was provided to factory officers and operating teams on best practices in modern sugar manufacturing. Discussions were also held on water conservation, energy efficiency, and improved housekeeping practices. During the interaction, VSI also proposed conducting a technical training program for the factory personnel to further strengthen operational capabilities. The proposal was positively received by the Director of Chemelil Sugar Company, who expressed interest in organizing such a program in collaboration with VSI. Overall, the visit proved to be productive and mutually beneficial, strengthening professional engagement between VSI and the Chatthe Group and further reinforcing VSI's role in providing technical support and knowledge dissemination to the sugar industry globally.

Sugar & Bioenergy Summit 2026 at Goa

VSI team consisting of Mr. Sambhaji Kadupatil, Director General and Dr. Kakasaheb Konde, Department of Alcohol Technology & Biofuels participated in Sugar & Bioenergy Summit 2026 which was organized at Goa during January 16-17, 2026. The summit was focused on the latest advancements and market trends in the sugar and bioenergy sectors which bring together industry leaders, technology manufacturers, experts, and stakeholders to explore cutting-edge technologies, market trends, and sustainable practices. In this conference Mr. Kadupatil delivered his speech as the invited speaker on the topic "Circular bio-economy approach for product diversification in sugar and allied industry. There was various key themes & sessions such as Ethanol Economy, Market Outlook, Farm & Mill Innovation, Bioenergy & Sustainability, Policy & Regulation.

All India One-Day Seminar on Bio-CNG in circular Economy-Challenges & Way Forward at Kolhapur

VSI team consisting of Mr. Sambhaji Kadupatil, Director General and Dr. Kakasaheb Konde, Department of Alcohol Technology & Biofuels participated in the One-Day Seminar on 'Bio-CNG in circular Economy-Challenges & Way Forward' which was organized by the Sugar Technologists Association of India (STAI) at Hotel Sayaji, Kolhapur on January 19, 2026. The seminar was focused on Bio-CNG production based on various potential biomass and organic wastes which closely aligns with the Govt. of India's initiatives SATAT (Sustainable Alternative towards Affordable Transportation). In this conference Dr. Konde delivered his speech as the invited speaker on the topic 'Sugar industry: CBG production opportunity'. The seminar not only addressed waste management challenges but also contributed to energy security, rural development and sustainability in line with the Govt. of India's vision of *Atmanirbhar Bharat* .

Visit to Nikhil Analytical Research Laboratory at Sangli

Dr. Sunita Sakure, Sr. Scientist & Head and Mr. Dattatray S. Jadhav, Field Assistant, Agricultural Microbiology visited to Nikhil Analytical Research Laboratory, Sangli on January 23, 2026. The objective of the visit was to discuss the biofertilizers export policy and related regulatory requirements, address queries regarding biofertilizer production and quality standards. She discussed in detailed with Mr. Suhas Khambe regarding procedures and compliance requirements associated with the export of biofertilizers. The deliberations covered export documentation, certification and quality assurance protocols, microbial count standards, shelf-life validation, packaging and labeling requirements, and storage and transportation standards for international markets.

The discussion also focused on strengthening domestic production capacity to meet export demand and highlighted opportunities for collaboration between research institutions and private laboratories for quality testing and certification support. The interaction provided valuable insights for improving production strategies and enhancing awareness of export regulations.

Visit to Yashvantrao Chavan College of Science at Satara

Dr. Sunita Sakure, Sr. Scientist & Head, and Mr. Dattatray S. Jadhav, Field Assistant, Agricultural Microbiology visited Yashvantrao Chavan College of Science, Satara January 23, 2026. Dr. Sakure served as the External Examiner for the poster presentations of M.Sc. Microbiology students. The posters were evaluated based on research methodology, experimental design, data interpretation, and practical applicability in agriculture and allied sectors. During the visit, a detailed discussion was also held with the college authorities regarding the possibility of sending M.Sc. Microbiology students for an Training Program at VSI, Pune. The importance of industry exposure, skill development, and practical training in Biofertilizer production and quality testing was emphasized. The college authorities expressed keen interest in facilitating student participation in such training programs.

Short Course on Recent Advances in Biotechnological and Breeding Strategies for Sustainable Climate Resilient Sugarcane Cultivation at ISRI, Lucknow

VSI officials comprising of Mr. GE Atre, Plant Pathology Section, Dr. AS Patil, Agronomy Section, and Mr. US Manjul, Plant Breeding Section attended 10-day short course on 'Recent Advances in Biotechnological and Breeding Strategies for Sustainable Climate Resilient Sugarcane Cultivation, organized under the Council's HRD program, held at the Indian Sugarcane Research Institute (ISRI), Lucknow, from February 17 to 26, 2026.

This intensive training brought together 15 participants from diverse national research Institute. The curriculum was specifically designed to address the breeding strategies to improve sugarcane yield & recovery, transgenic sugarcane development, climate resilient sugarcane cultivation and crop protection in sugarcane. They actively engaged in the technical sessions.

Seminar on Safe and Efficient Use of Boilers at Pimpri-Chinchwad, Pune

A two-day seminar on 'Safe and Efficient Use of Boilers' was organized by the Joint Director of Boilers, Regional Office, Pune, under the Labour Department of the Government of Maharashtra on March 5-6, 2026 at the Auto Cluster Development and Research Institute, Pune.

The seminar brought together boiler engineers, safety officers, boiler attendants, technical experts, and representatives from various industries, creating a valuable platform to discuss best practices, regulatory requirements, and recent developments in boiler safety and efficient operations.

On this occasion Mr. Sambhaji Kadupatil, Director General of the Vasantdada Sugar Institute, attended the event as the Chief Guest. Several senior officials, technical experts, and representatives from the industry were also present. In his inaugural address, he emphasized the importance of strict adherence to boiler safety protocols and the need to prioritize both equipment safety and human safety in industrial operations. He highlighted that proper training and skill development of technical staff play a crucial role in preventing industrial accidents.

Drawing on his experience in public service,

Mr. Kadupatil also spoke about the initiatives undertaken by the Vasantdada Sugar Institute in conducting training programs and professional courses for boiler attendants and safety officers. He stressed the importance of adopting modern technologies and advanced safety practices to ensure safe and efficient boiler operations, particularly in sugar factories and other industrial sectors.

On the second day of the seminar, Rajendra Chandgude, Technical Advisor and Head of the Sugar Engineering Department and Renewable Energy Department, VSI attended as the Special Guest. In his address, he highlighted the significance of proper boiler operation, routine maintenance and strict compliance with established safety procedures. Mr. Chandgude also emphasized the role of continuous technical training and the use of modern monitoring systems in enhancing both the safety and operational efficiency of boilers in sugar factories and related industries. Sharing insights from his extensive practical experience, he encouraged industry professionals to adopt innovative technologies and proactive safety measures.

The seminar concluded with an interactive session in which participants discussed practical challenges faced in boiler safety management and explored possible solutions to improve efficiency and safety standards in boiler operations. The session facilitated meaningful exchanges of knowledge and experiences among industry professionals and technical experts.

Seminar on Climate Resilient Sugarcane Technology at Patna (Bihar)

The seminar on 'Climate Resilient Sugarcane Technology' was organized jointly by Sugarcane Industries Department, Bihar and Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, Bihar on March 9-10, 2026.

Mr. Sambhaji Kadupatil, Director General;

Dr. AD Kadlag, Principal Scientist (Crop Production and Protection); Dr. JM Repale, Senior Scientist (Pl. Br.) and Dr. SG Dalvi, Scientist (Tissue Culture) participated in the seminar.

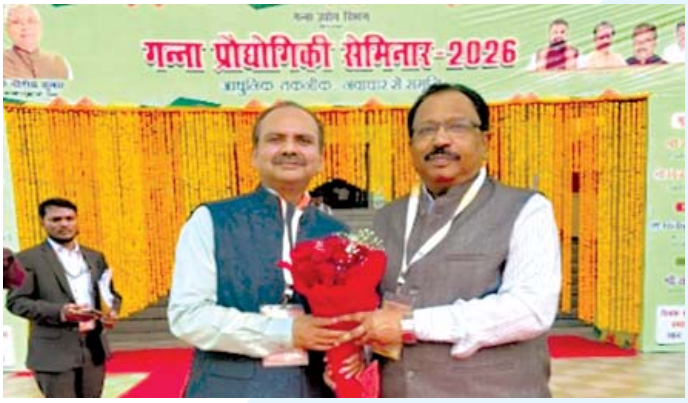
Mr. Vijay Kumar Sinha, Hon'ble Dy. Chief Minister, Bihar; Mr. Samrat Chaudhary, Hon'ble Dy. Chief Minister, Bihar and Dr. Dilip Kumar Jaiswal, Hon'ble Minister, Industry Department, Bihar inaugurated the seminar in presence of Mr. Pratyaya Amrit, IAS, Chief Secretary, Bihar; Mr. K Senthil Kumar, IAS, Additional Chief Secretary, Sugarcane Industries Dept.; Mr. Mihir Kumar Singh, IAS, Development Commissioner, Bihar; Mr. Anil Kr. Jha, Cane Commissioner, Bihar and Dr. PS Pandey, Hon. Vice-Chancellor, Dr. Rajendra Prasad Central Agricultural University (Dr. RPCAU), Pusa, Samastipur (Bihar).

The seminar was aimed to focus on the on strengthening the sugarcane sector and safeguarding the interests of farmers and revitalize the sugar industry in the State to establish the sick sugar mills in next five years.

Lead lectures presented in the seminar by Dr. AD Kadlag on 'Applications of Artificial Intelligence in Sugarcane Agriculture', Dr. JM Repale on 'Breeding Approach for Development of High Yielding, High Sucrose Sugarcane Varieties' and Dr. SG Dalvi on 'Tissue Culture-Based Production of Disease Free Seed Material in Sugarcane and Climate-Resilient Strategy for Sustainable Sugarcane Production'.

Mr. Sambhaji Kadupatil, Director General, VSI chaired the Technical Session VI on 'Industrial advancement in processing, product development and diversification, resource and energy management in sugar and its integrated industries, green energy alternatives, bio-based products' and provided guidance on the future prospects of sugarcane by-products in the near future.

The discussions with the Cane Commissioner of Bihar and the Hon. Vice-Chancellor, Dr. Rajendra Prasad Central Agricultural University, Pusa, Samastipur, on initiating collaborative work in sugarcane through the signing of MoU with the Ministry of Sugarcane Industry, Bihar and the Dr. RPCAU, Pusa, Samistipur.



Seminar on Decarbonizing the Sugar Industry through Cogeneration and Bio-CBG Technologies at Chennai

The South Indian Sugar Technologists' Association, Chennai, and the Cogeneration Association of India, Pune, jointly organized a seminar on 'Decarbonizing the Sugar Industry through Cogeneration and Bio-CBG Technologies' at the Hyatt Hotel, Chennai on March 25, 2026.

The Chief Guest, Mr. Sambhaji Kadupatil, Director General VSI, graced the occasion along with Mr. Jayprakash Dandegaokar, Vice President of the Cogeneration Association of India; Mr. Sanjay Kathal; and Mr. Kumbhar. In this seminar total sixteen papers were presented, focusing on cogeneration, compressed biogas (CBG), and carbon sequestration. Technology providers showcased innovative solutions, instilling hope in the financially challenged sugar industry. Mr. RA Chandgude, co-chairing the technical session and the seminar explored carbon-neutral energy production options to boost economic growth while maintaining a clean environment.

Participation in BIS Strategic Roadmap Meeting on Sustainable Agriculture

BIS has recently constituted the Environment and Ecology Division Council (EEDC) with the objective of developing a roadmap for the formulation of Indian Standards across various domains related to environment and ecology. Under this council, nine specialized panels have been established to address key thematic areas.

Mr. RA Chandgude, Head and Technical Advisor, Sugar Engineering and Renewable Energy Dept., Dr. DS Nimbalkar, Sr. Scientist & Head, Environmental Science Dept. and Dr. AS Patil, Scientific Officer, Agronomy Section, participated in a virtual meeting on March 11, 2026 and theme of the meeting was 'Strategic Roadmap for Standardization in the Field of Sustainable Agriculture'. The meeting was convened by the Bureau of Indian Standards (BIS). The Sustainable Agriculture Panel has been entrusted with the responsibility of preparing a strategic roadmap for the development of Indian Standards aimed at promoting sustainable agricultural practices, efficient resource management, and environmentally responsible farming systems. The meeting deliberated on the scope, priorities, and framework required for drafting the roadmap document to guide future standardization initiatives in the field of sustainable agriculture.

Special Lecture: Intellectual Property Rights: Law, Strategy and Impact

An expert lecture on 'Intellectual Property Rights: Law, Strategy, and Impact' was organized by the Agricultural Science & Technology Department, Vasantdada Sugar Institute (VSI) on February 16, 2026 in the Auditorium of VSI. The program was organized to enhance awareness among the scientific community regarding the importance of protecting innovations, research outcomes, and technological developments by means of Intellectual Property Rights (IPR).

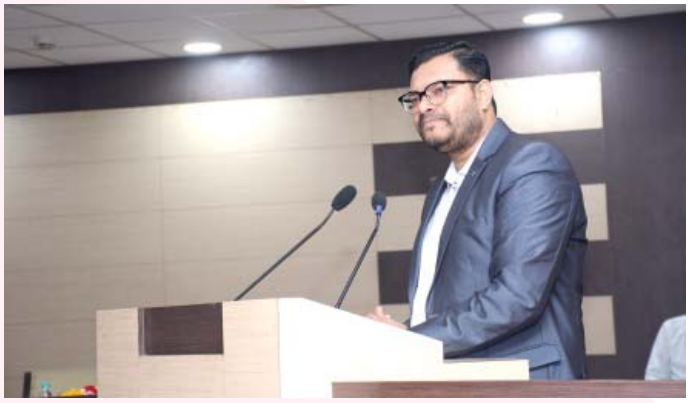
The lecture was delivered by Adv. Swapnil Mahadeo Sanap, Intellectual Property Attorney from IP Shastra Advocates & IP Attorneys, who shared valuable insights on intellectual property protection, legal frameworks, and strategic management of innovations in research and technology development.

Outline of the Lecture

The presentation covered the following key themes:

- **Introduction to Intellectual Property (IP):** Concept and significance of intellectual property in research, innovation, and knowledge-based economies.
- **Intellectual Property Rights (IPR):** Legal rights granted to creators and inventors to protect their intellectual creations.
- **Types of Intellectual Property Rights:** Overview of different forms of IP protection, including copyright, trademarks, patents, trade secrets, and geographical indications (GI).
- **Patent System:** Importance of patents in protecting technological innovations and enabling commercialization.
- **Essentials of a Patent:** Fundamental requirements such as novelty, inventive step, and industrial applicability.
- **Patent Application Process:** Major steps involved in filing a patent application, including invention disclosure, drafting, filing, publication, examination, and grant.
- **IP Strategy and Impact:** Role of intellectual property in strengthening research outcomes, promoting technology transfer, and enhancing institutional innovation capacity.
- **Economic aspects of IPR:** Economic aspects of IPR: The lecture highlighted that in India the approximate official filing fees are 500 for copyright, 4,500 for trademarks, and 1,000 for industrial design patents, making IP protection an affordable and strategic investment. The speaker also emphasized that once patents, trademarks, or industrial design rights are filed and granted, they provide exclusive legal protection and enable appropriate legal action against unauthorized use, thereby supporting innovationdriven growth and technology commercialization.

The lecture concluded with an interactive discussion in which participants engaged with the expert on various aspects of patent filing, intellectual property strategy, and the practical implications of IP protection in scientific research and industrial development. The program served as an important initiative by Vasantdada Sugar Institute to promote IP awareness and innovation culture among researchers and students, encouraging them to protect and translate their research findings into impactful technologies.



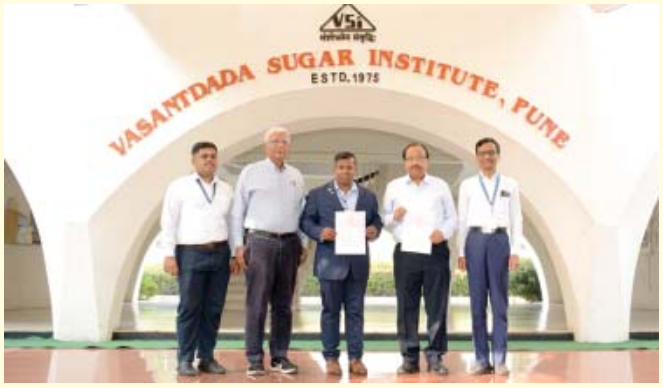
VISITORS TO VSI

VISITORS TO VSI

Ms. Sangita Choure, Deputy Comptroller and Auditor General (C&AG) (Retd.), Govt. of India visited VSI on January 27, 2026. Mr. Sambhaji Kadupatil, Director General, VSI Welcomed and felicitated her and briefed the activities of VSI. Later she visited Tissue Culture Section, Alcohol Technology, Farm Section- Single Eye Bud activity, and Agril. Microbiology section to know more the activities of VSI

Mr. Sanjay Kolte, Commissioner of Sugar, Maharashtra State visited VSI on January 14, 2026. The visit highlighted the institute's pivotal role in advancing the agricultural and sugarcane sectors in Maharashtra. The visit underscores the emphasis on transparency, R&D the state's sugar industry. The meeting of all Head of Sections from Technical as well as Agricultural Sciences and Technology were gathered in Board Room on the occasion of his welcome and introductory interactions of each section activity. Hon. Director General, VSI, Pune offered a bouquet and welcomed him to VSI and Dr. AD Kadlag, Principal Scientist (Crop Production and Protection) elaborated each sectional activity and other supporting technical Head sections explained the their project and activity related to sugar mill. All the Head of Sections of VSI highlighted the departmental activity, research outcome and recommendations to the farmers and sugar industry for the benefits of Maharashtra State. Later Mr. Kolte visited Tissue Culture Section, Alcohol Technology, Farm Section- Single Eye Bud activity, Artificial Intelligent Demonstration Plot, International Student Hostel, Boys and Girls Hostel and newly farmers guest house.

The delegates, Mr. YB Ramakrishna, Former Chairman, Working group on biofuels, Ministry of Petroleum & Natural gas, Government of India and Dr. Saju Varghese, NovelYeast b.v., Belgium visited to Vasantdada Sugar Institute, Pune on February 02, 2026 to discussed about demo plant on isomaltulose and other R&D areas such as xylitol, onsite enzyme production for 2G ethanol and 2,3 Butanediol. Non-Disclosure Agreement (NDA) was signed between VSI and NovelYeast. During their visit the delegates visited Department of Alcohol Technology & Biofuels.



Dr. Jorge Ferreira, Chief Scientific Officer (CSO) of Norwegian Mycelium AS (NoMy), along with Mr. Prasun Agarwal, visited the Vasantdada Sugar Institute (VSI), Pune, on February 2, 2026, to discuss the establishment of a demo plant for mycoprotein production using sugar industry side streams such as spent wash and molasses. Shri Sambhaji Kadupatil, Director General, VSI, welcomed the guests. During the visit, the delegates toured the Department of Alcohol Technology & Biofuels and other laboratory facilities. Both parties agreed to

sign a Memorandum of Understanding (MoU) for collaborative work on mycoprotein production and the installation of a demo plant at VSI.

Mr. Jeffrey Simoneaux, Manager, Sugar Harvesting Engineering-John Deere Thibodaux, USA with his team visited VSI on February 24, 2026. Mr. Sambhaji Kadupatil, Director General, VSI Welcomed the guests. Dr. AD Kadlag, Principal Scientist, Agriculture Division, along with all HoDs/ HoS's from the Departments/Sections was present. During the meeting Dr. AD Kadlag delivered the presentation on 'Mechanized Sugarcane Harvesting in India'. The discussion on the problems associated with the use of present Sugarcane Harvester in India the required modification, key implementation/ features in Sugarcane Harvester to reduces the losses and development of small sugarcane harvester. The delegates visited various departments and discussed with scientist on research and development. They expressed satisfaction with the Welcome, Hospitality and Expertise of VSI in the field of Sugarcane Agriculture, Alcohol and Bio-fuels etc. They also sought and cooperation for development of new small sugarcane harvester suitable for use in small sugarcane farms.

Following institutions Boards Director, Officers, farmers and students visited to Vasantdada Sugar Institute, Pune, during last three months (Jan-Feb-Mar: 2026).

Name of Institutions	Visitors	No. of Visitors	Total
January - 2026			
Annasaheb Magar Mahavidyalay, Manjari Bk., Tal.: Haveli, Dist.: Pune	Students & Faculties	75+2	77
Aspee Shakilam Biotechnology Institute, Navsari, Gujrat	Students & Faculties	44+2	46
Asian College of Science & Commerce, Narhe, Tal.: Haveli, Dist.: Pune	Students & Faculties	40+2	42
Farmers interstate education tour through AATMA, Dist: Satara	Farmers & representative	95+2	97
Anand Arts, Sardar Dalipsingh Commerce & Science College, Dist.: Chhatrapati Sambhajinagar	Students & Faculties	33+4	37
Vivekanand College, Kolhapur	Students & Faculties	26+4	30
M.M. College of Arts, N.M Institute of Science, H.R.J. College of Commerce, Bhavsan's College , Mumbai	Students & Faculties	33+5	38
Individual Farmers from Maharashtra State	Farmers	87+72+91 +91+61	402
FEB-2026			
Shankarao Mohite Mahavidyalay, Akluj, Dist: Solapur	Students & Faculties	39+3	42
Symbiosis School of Culinary Arts and Nutritional Sciences	Students & Faculties	15+1	16
Smt. Kasturbai Walchand College of Art and Science, Dist.: Sangli	Students & Faculties	41+3	44
Waghire College of Arts, Commerce and Science, Pune	Students & Faculties	22+1	23
S. M. Joshi College, Hadapsar, Pune	Students & Faculties	81+5	86
Smt. Kasturbai Walchand College of Arts and Science, Sangli	Students & Faculties	40+4	44
Dr. Ghali College, Gadhinglaj, Dist.: Kolhapur	Students & Faculties	20+2	22
College of Engineering, Manjari Bk., Dist.: Pune	Students & Faculties	150+8	158
College of Engineering, Manjari Bk., Dist.: Pune	Students & Faculties	120+8	128
Vivekanand College of Agriculture Business, Hiwara Bk, Tal.: Mehkar, Dist.: Buldhana	Students & Faculties	63+3	66
Spicer Adventist University, Aundh, Dist.: Pune	Students & Faculties	45+5	50
College of Animal Husbandry, Baramati, Dist.: Pune	Students & Faculties	40+5	45
Individual Farmers from Maharashtra State	Farmers	97+75+ 105+92	369
MARCH – 2026			
JSPM, University, Wagholi, Pune	Students & Faculties	60+2	62
Jayawantrao Sawant Commerce And Science College, Pune	Students & Faculties	35+5	40
MIT School of Bioengineering Sciences & Research	Students & Faculties	30+2	32
Individual Farmers from Maharashtra State	Farmers	92+72+72+ 77+16	329
	Total :		**2325**

VASANTDADA SUGAR INSTITUTE
संशोधनेन संवृद्धिः
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उन्हाळा हंगामात ऊस पिकावर आढळणारे रोग व नियंत्रणाचे उपाय

उन्हाळा हंगामात ऊस पिकावर आढळणारे रोग व नियंत्रणाचे उपाय

ऊस हे भारतातील महत्वाचे नगदी पीक असून ते अनेक राज्यात लागवडीखाली आहे. या पिकाखालील क्षेत्रातदेखीत सातत्याने वाढ होतेय, परंतू, देशात ऊस पिकाचे दरमहा दरहेक्टरी उत्पादन मात्र अपेक्षेपेक्षा खूपच कमी म्हणजे मागील गळीत हंगामात ते ७५ मे.टन. इतके होते. महाराष्ट्रात मात्र ऊस उत्पादकता हेक्टरी ८५ मे.टन. इतकी होती. ऊसाचे व साखरेचे प्रति 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 रोग ऊस पिकावर आढळलेले आहेत. 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 कमिअधिक 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 चाबुक काणी, गवताळ वाढ, मर, रेड रॉट (ऊस रंगणे), मोझेक, यलो लीफ सिंड्रोम किंवा यलो लिफ डिसीज, लिफ स्कार्ल्ड (पांगशा फुटणे), रटून स्टंटींग (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 त्याबाबबत सविस्तर माहिती खालीलप्रमाणे

१. चाबूक काणी किंवा काजळी

हा बुरशीजन्य रोग स्पोरिसोरियम 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 सुरूवातीचा 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 पट्टा बाहेर पडतो. या पट्ट्यावरील आवरण तुटल्यानंतर आतील काळा भाग दिसतो, तो भाग म्हणजेच या रोगाचे बीजाणू. रोगामुळे उसाची पाने अरूंद 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 लागणीपुर्वी बाष्प उष्ण हवा प्रक्रिया सयंत्राद्वारे ५४ सें.ग्रे. तापमानास १५० मिनिटे प्रक्रिया करावी. त्यानंतर बेण्यास कार्बेंडॅझिमयुक्त बुरशीनाशकाची ०.१ टक्के या प्रमाणात प्रक्रिया करावी. मुलभुत बियाणे तयार करण्यासाठी उती संवर्धित रोपांचा पर्याय निवडावा.
- मध्यम रोगप्रतिकारक जातींची उदा. कोसी ६७१, को ८६०३२, व्हीएसआय ४३४, कोएम ०२६५, कोव्हीएसआय ०३१०२, पि. डी. न १५०१२, व्हीएसआय ८००५, कोव्हीएसआय १८१२१, पि. डी. न १३००७ जातींची लागण करावी.
- नियमितपणे ऊस पिकाची पाहणी करून रोगग्रस्त बेटे मुळासहित काढावीत व जाळून नष्ट करावीत. काणीचे फोकारे बाहेर पडण्यापूर्वी बेटे निर्मुलन 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, पि. डी. न १५०१२, व्हीएसआय ८००५, पि. डी. न १३००७ व कोव्हीएसआय १८१२१, 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 दुषित बेण्यामार्फत व किडीद्वारे (मावा, तुडतुडे) होतो.

गवती वाढ रोगामुळे पिकाच्या सुरूवातीच्या काळात ऊस बेटात प्रमाणापेक्षा जास्त फुटवे दिसतात व बेटास गवताच्या ठोंबाचे स्वरूप येते. बेटांत फुटव्यांची संख्या क्वचीत-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 अरूंद 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 सुरूवातीच्या काळात जास्त आढळते. रोगग्रस्त खोडवा पिकातील ऊसांची संख्या कमी झाल्याने उत्पादनात घट येते.

गवती वाढ रोगाचे नियंत्रण :

- बेणेमळ्यातील रोगमुक्त बेणे लागणीसाठी निवडावे. बेणेमळ्यासाठी मुलभूत बेणे तयार करण्यासाठी लागवडीपूर्वी बेण्यास बाष्प उष्ण

हवा प्रक्रिया ५४ सें.ग्रे. तापमानास १.५ तास मिनीटे करावी किंवा उती संवर्धीत रोपांचा वापर करावा.

- बेण्यास कार्बेंडॅझिमयुक्त 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 राहील.

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 ऊसाच्या जमिनीतील कांड्यास इजा झाल्यास या रोगास कारणीभूत असणाऱ्या बुरशीचा शिरकाव जास्त होतो व रोगाची लागण होते. कोसी ६७१ आणि को८६०३२ या ऊस जातीत हा रोग महाराष्ट्रात अत्यल्प प्रमाणात आढळलेला आहे. एकेकाळी गुजरात राज्यात या रोगाने कोसी ६७१ 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 प्रथमत: होतो. रोगग्रस्त ऊसाच्या बेटातील ऊसाची शेंड्याकडील पाने निस्तेज दिसतात व हळूहळू पिवळी पडण्यास सुरूवात 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 ऊसाचा 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 कार्बेंडेझिम किंवा कॉपर ऑक्झिक्लोराईड यापैकी एका बुरशीनाशकाचे ०.१ टक्के द्रावण घालावे.
- मर रोग झालेल्या ऊसाचा 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 अनुकुल परिस्थितीत ऊस पिकाचे १०० टक्केपर्यंत नुकसान होवू शकते. हा रोग कलेटोट्रिकम फालकॅट्म 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 ऊसाची पाने वाळल्यानंतर कांड्यावरती तपकिरी किंवा लालसर तपकिरी पट्टे आढळतात. कांड्या सुकतात आणि आकसून जातात.
- रोगग्रस्त ऊसाच्या कांड्याच्या आतील भाग पाहिला असता त्यावर लाल रंगाचे अनियमीत 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 वापरावे. लागणीपूर्वी ऊस बेण्यास बुरशीनाशकाची (कार्बेंडेझिम ०.१ टक्के) १५ मिनीटे प्रक्रिया करावी.
- लागण केलेल्या जमिनीचा पाण्याचा निचरा होण्यासाठी व्यवस्था असावी
- रोगट बेटे खणून काढावीत व त्या ठिकाणी कार्बेंडेझिम 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 कार्बेंडेझिमयुक्त बुरशीनाशकाची ०.१ टक्के या प्रमाणात १५ दिवसांच्या अंतराने स्टीकर वापरून २ ते ३ फवारण्या कराव्यात.

५. येलो लीफ डिसीज (येलो लीफ सिंड्रोम)

हा रोग विषाणूजन्य असून येलो लीफ व्हायरसमुळे (प्रकार : लिटीओव्हिरीडी) होतो. हा व्हायरस मावा (मेलानाफीस सॅकाराय आणि ह्रोफॅलोसिफम 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 डिसीज रोगाची लक्षणे: या रोगाची लक्षणे पिकाचे वय ७ ते ८ महिन्याचे झालेवर दिसावयास लागतात. रोगाची लागण झालेवर सुरूवातीस पानाची मध्यशिर खालच्या बाजूने पिवळी पडते. प्रथमत: ३ ते ६ नंबरच्या पानांवर रोगाची लक्षणे आढळतात. कालांतराने पिवळेपणा मध्यशिरेपासून बाजूस वाढत जावून पुर्ण 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 डिसीज 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 कार्बेंडेझिम 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.

डॉ. गणेश कोटगिरे, शास्त्रज्ञ
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Next Generation Sugarcane Farming with Artificial Intelligence

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Introduction

Artificial Intelligence (AI) is transforming modern agriculture by enabling data-driven decision making, automation and precision management of crops. Sugarcane, being a long-duration crop with high input requirements for water, nutrients and labor, presents an ideal opportunity for the application of AI technologies.

Traditional sugarcane cultivation relies heavily on farmers' experience and generalized recommendations. However, variability in soil, climate, irrigation availability, pests and diseases significantly affects crop productivity. Artificial Intelligence integrates technologies such as machine learning, remote sensing, robotics, drones and big data analytics to provide precise and timely recommendations to farmers.

Key Components of AI in Sugarcane Agriculture

Machine Learning

Machine learning algorithms analyze large datasets to identify patterns and predict outcomes. In sugarcane farming, machine learning models can be used for:

- Yield prediction
- Disease detection
- Soil fertility assessment
- Irrigation scheduling
- Fertilizer recommendation

Remote Sensing and Satellite Data

Remote sensing involves collecting information about crops using satellite or drone imagery. AI algorithms process these images to monitor crop health and field conditions. Applications include:

- Detection of crop stress
- Monitoring crop growth
- Identifying nutrient deficiencies
- Estimating biomass production

Vegetation indices such as NDVI (Normalized Difference Vegetation Index) help determine plant vigor and health.

Internet of Things (IoT)

IoT devices collect real-time data from the field using sensors. These sensors measure:

- Soil moisture
- Temperature
- Humidity
- Soil nutrient levels
- Crop growth parameters

The data is transmitted to cloud platforms where AI algorithms analyze it and provide recommendations to farmers through mobile applications. For example, soil moisture sensors combined with AI systems can automatically determine irrigation requirements.

Drones and UAV Technology

Drones equipped with cameras and sensors are increasingly used in sugarcane agriculture for crop monitoring.
Applications include:

- Field surveillance
- Pest and disease detection
- Nutrient deficiency mapping
- Precision pesticide spraying

Drone-based monitoring allows rapid assessment of large sugarcane fields, which is especially useful for sugar mills managing thousands of hectares.

AI Applications in Sugarcane Crop Management

Land Selection and Soil Analysis

AI-powered soil analysis systems evaluate soil fertility, texture, organic matter and nutrient levels. Using this information, AI models recommend suitable sugarcane varieties.

In sugarcane farming, AI systems can assist in:

- Identifying suitable soil for sugarcane
- Determining soil nutrient deficiencies
- Recommending soil amendments

Variety Selection

Different sugarcane varieties perform differently depending on climatic and soil conditions. AI tools can analyze historical data on crop performance, weather patterns and soil characteristics to recommend the most suitable varieties for a particular region.

For example, AI systems may recommend early, mid-late or drought-tolerant varieties based on the farmer's location.

Precision Planting

AI integrated with GPS technology can guide mechanized planters to ensure:

- Uniform row spacing
- Proper planting depth
- Optimum seed rate

Precision planting improves germination percentage and crop stand establishment.

In large sugarcane farms, automated planting machines guided by AI systems can significantly reduce labor costs.

Irrigation Management

Sugarcane is a water-intensive crop. Efficient irrigation management is essential for improving productivity and conserving water resources.
AI systems use data from:

- Weather forecasts
- Soil moisture sensors
- Crop growth stages
- Evapotranspiration models

Based on this data, AI provides irrigation recommendations such as:

- When to irrigate
- How much water to apply?

Nutrient Management

Fertilizer application is one of the most critical factors affecting sugarcane yield. AI tools can analyze soil data, crop growth patterns and weather conditions to generate precise fertilizer recommendations.

Benefits include:

- Reduced fertilizer wastage
- Balanced nutrient application
- Improved soil health
- Increased crop productivity

Pest and Disease Management

Artificial Intelligence is increasingly being used for early detection and management of pests and diseases in sugarcane, which is essential for minimizing crop losses and reducing excessive pesticide use. AI-based systems use technologies such as image recognition, drones and mobile applications to identify symptoms of major sugarcane diseases. By analyzing images captured from satellites or drones, AI algorithms can quickly diagnose the problem and recommend appropriate control measures. This allows farmers to take timely action, apply pesticides or biological controls only where needed and prevent the spread of pests and diseases across the field. As a result, AI helps improve crop health, reduce production costs and promote sustainable sugarcane cultivation.

AI in Sugarcane Harvest Management

Harvest timing significantly affects sugar recovery and overall profitability.
AI models can analyze:

- Crop maturity
- Weather conditions
- Sugar accumulation patterns

Benefits of AI in Sugarcane Farming

The adoption of AI in sugarcane agriculture provides several advantages.

Increased Productivity

AI-based crop management improves yield by optimizing inputs and crop conditions.

Efficient Resource Utilization

AI helps reduce excessive use of water, fertilizers, and pesticides.

Cost Reduction

Automation and precision farming techniques reduce labor and input costs.

Early Problem Detection

AI systems can detect crop stress, pests, and diseases at an early stage.

Climate Adaptation

AI models help farmers adapt to changing climatic conditions by providing timely advisories.

Conclusion

Artificial Intelligence has the potential to revolutionize sugarcane farming by introducing precision agriculture practices. AI technologies enable farmers to make informed decisions based on real-time data and predictive analytics.

From soil preparation to harvesting and supply chain management, AI can enhance efficiency at every stage of sugarcane production.

However, successful implementation requires collaboration among farmers, researchers, sugar industries, technology providers and government agencies. With proper infrastructure, training and policy support, AI can play a crucial role in achieving sustainable and profitable sugarcane agriculture in the future.

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