

Foreword

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This issue coincides with starting of the crushing season in the state beginning in October. This season is being looked forward to face pose challenge such as manpower requirements in sugarcane agriculture and sugar industry. Assumptions pertaining to the post COVID-19 scenario challenges of agricultural workforce, inter-state movement of farm labour, risk mitigation strategies at the R&D and extension levels, sugar market and modification of the work-flow process to suit the present conditions.

Last few months monsoon was 10 to 27% more than average level so farmers have planted record acreage with crop such as rice, corn, cotton, soybeans and sugarcane. But unprecedented rains in August damaged some crops like cotton, pulses and soybean in some pockets. The rains had localized impact and the damage was not widespread.

The central Government notified the pest attack on crop as a natural disaster by the Ministry of Home Affairs & States can undertake relief operations under the State Disaster Response Fund's a positive move to assist farmers. Apart from this, the Government has extended the deadline for exporting sugar from existing stocks by three months to December 2020 to help Industry take advantage of the global supply disruption because of the COVID-19 pandemic and clear cane dues of farmers.

The opening balance for 2020-21 sugar season starting 1 October, 2020 is pegged at 105 lakh tonnes, where sugar

production is estimated to be higher at around 305 lakh tonnes as reported by ISMA.

As per Vision 2030 report of IISR, India will require nearly 33 million tonnes of white sugar only for domestic consumption. The requirement of sugarcane will increase further as National Biofuels Policy 2018; the Central Government intends to achieve ethanol with petrol blend levels of 10% by 2022 and 20% by 2030. There are limitations on increase in area under sugarcane above 50 lakh hectares and it is a great challenge to increase sugarcane productivity to the tune of 100 to 110 t/ha and average sugar recovery of 11.00%. Considering Maharashtra's contribution in National sugar production, state has also to achieve the targets of sugarcane productivity of 120 t/ha and sugar recovery of 12.50%. In this context, VSI has always played important role in guiding the sugarcane farmers, sugar industry in the state and the country.

In this issue we publish some articles on sugarcane diseases and cane development program these are useful to sugarcane growers. VSI is drawing future course of activities for the association and we are also awaiting for the government guidelines for holding large gathering events.

"Please stay safe by taking necessary precautions against Covid-19 (corona virus) as recommended by government guidelines"

(RM Devarumath)
Editor



EVENTS EVENTS

Online Workshop on M.Sc. (WBAT) Part II Syllabus Restructuring

Alcohol Technology & Biofuels Department of Vasantdada Sugar Institute, Pune organized a online workshop on “M.Sc. (WBAT) Part II syllabus restructuring” 1st July 2020. The workshop was sponsored by Savitribai Phule Pune University, Pune.

Dr. GR Pathade, BoS, Chairman, Dr. Bhushan Choudhari (BoS Member, North Maharashtra University, Jalgaon, Dr. RB Patwardhan (BoS Member), Dr. Bhushan Choudhari, Dr. Ashish Wani (New Arts & Science College, Ahmednagar), Mr. Rashresh Bacchav (Invitee, Gargi College, Nashik) and Dr. SV Patil, Head & Technical Adviser, Department of Alcohol Technology & Biofuels (ATB) and faculty members of ATB Dr. KS Konde, Mr. RV Godage, Mr. AB

Deshmukh, Mr. RV Burase and Mr. VP. Ghule were present.

Dr. GR Pathade inaugurated the workshop and gave brief introduction on the MSc. Wine, Brewing & Alcohol Technology (WBAT) Part-II syllabus. Dr. SV Patil gave brief introduction of the updated syllabus of M.Sc. (WBAT) Part II. In this workshop various issues related to teaching were discussed. The workshop concluded with vote of thanks by Dr. SV Patil. He thanked to Prof. MG Chaskar, Dean, Faculty of Science & Technology, SPPU and Dr. GR Pathade for their valuable guidance and suggestions to organize the workshop. He thanked the BoS members, invitees and all the participants for their active participation.

The 30th Institutional Bio-Safety Committee (IBSC) at VSI

The 30th meeting of Institutional Bio-Safety Committee (IBSC) of VSI was held on 11th August 2020 through webinar under the chairmanship of Mr. Shivajirao Deshmukh, DG, VSI in presence of Dr. P Suprasanna, Head, FPBS, NABTD, BARC, Mumbai and DBT nominee, Dr. Vidya Gupta, Emeritus Scientist, NCL, Pune, Dr. SK Raut, Consultant Doctor & Member, Mr. Vikas Deshmukh, Director, AST, VSI, Dr. K Harinath Babu, Senior Scientist, VSI - Member Secretary,

Dr. R M Devarumath, Scientist & Member and Dr. SG Dalvi, Scientific Officer, VSI-Member & Dr. AA Nikam, Scientist, VSI - Member participated in the meeting. In this meeting discussed about various issued related transgenic development in sugarcane work progress, Bio-Safety issues and developing collaborations for developing pest and drought tolerant sugarcane through transgenic approach.

Congratulation



Mr. Virdhaval Nalavade was awarded with Ph.D. degree on 5th Sept. 2020 in the subject of Biotechnology under the Faculty of Science & Technology from Shivaji University, Kolhapur.

His topic of the Ph.D. work is ‘**Studies on factors affecting the *Agrobacterium* mediated transformation and development of transgenic sugarcane for abiotic stress tolerance using *SoMYB18* gene**’. He worked under the guidance of Dr. K Harinath Babu, Sr. Scientist, Molecular Biology & Genetic Engineering section, VSI.



74th Independence Day

VSI celebrated 74th Independence Day of India on 15th Aug. 2018 as per guidelines issued from government due to Covid-19 situation. National flag was hoisted by Mr. Shivajirao Deshmukh, DG Mr. Vikas Deshmukh, Director, AST and staff of VSI were present.



VSI Committee Meeting

Governing Council Meeting was held on 23rd Sept. 2020. In the GC meeting Hon. President Mr. Sharad Pawar, Mr. Dilip Walse-Patil, Vice-President, Mr. Ajitdada Pawar, Dy. Chief Minister of Maharashtra and Mr. Vijaysinh Mohite-Patil participated through webinar.

Dr. Indrajit Mohite, Mr. Jaiprakash Dandegaonkar, Mr. Arun Lad, Mr. Sangramsinh Nalwade, Mr. Narendra Ghule-Patil, Mr. Shivajirao Deshmukh, Director General, Mr. Vikas Deshmukh, Director, AST and Head sections of VSI were present.





Inauguration of Sugarbeet Seed Production Program

Vasantdada Sugar Institute collaboration with USDA-ARS, USA started a new program to promote sugarbeet as supplementary crop to sugarcane in tropical region. In this context, we received seeds of ten sugarbeet breeding lines and sowing in portrays under greenhouse condition was done on 22nd Sept. 2020

at the hands of Mr. Shivajirao Deshmukh, DG VSI. On this occasion Mr. Vikas Deshmukh, Director, Agricultural Sciences & Technology Division and sectional Heads of Agronomy, Plant Pathology, Entomology and staff of Agronomy sections were present.



Adviser : Mr. Shivajirao Deshmukh
Editor : Dr. RM Devarumath, Mr. AA Prabhavalkar
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Committee :
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Mr. RA Chandgude, Dr. PS Deshmukh, Mr. US Manjul,
Mr. RB Bhoite,

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Key Factors to Cane Development Programme

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Sugarcane being commercially cultivated in 83 countries are producing sugar through sugarcane. The world sugar production during 2018-19 is 175.12 million tonnes (raw value) with a drop of 4.74 million tonnes as compared to 2017-18 season.

In India, during 2018-19, sugarcane crop was planted on 51.14 lakh hectares of area. The country produced 33 million tonnes (white value) of sugar from production of 4001.57 lakh tonnes of cane production. The cane productivity was 78.25 t/ha. In forthcoming 2019-20 season, global sugar output is expected to be 175.12 million tonnes with a drop of 9.83 million tonnes as compared to 2018-19. The reduction in sugar output will likely to be in India and Australia by 18 & 2.5% respectively. It is estimated that, sugar output of India will decrease around 27 million tonnes in 2019-20. The Indian sugar output could fall due to drought in major sugar producing states viz. Maharashtra and Karnataka.

India occupied the second position among the sugar producing countries in the world after Brazil. India contributes about 18% of world sugar output by sharing 40-44 % sugar production of Asia. The country's major sugar producing states are Uttar Pradesh, Gujarat, Maharashtra, Karnataka and Tamil Nadu which contributes around 85-90% of total sugar production. Maharashtra's sugar contribution to the country's net sugar production was always remained in range of 30-35%. In season 2018-19, Maharashtra produced 107.20 lakh tones of sugar and contributed share of 32.48% in country's sugar output.

In Maharashtra, shortage of cane becomes serious limitation on sugar production for the season 2016-17. During 2016-17 season, drought condition in major pockets of Maharashtra (mainly in Marathwada &

Khandesh) affected the production of cane and productivity of state was 83t/ha with average sugar recovery of 11.32%. In 2017-18, sugar industry of state faced problem of excess sugarcane production. In this year, area under sugarcane was increased to 9.02 lakh ha from 6.33 lakh ha over the previous season with improvement in cane yield of 92 t/ha. State produced 107.20 lakh tones of sugar and made historic record consecutively 2017-18 and 2018-19 seasons.

Sugar requirement and yield targets in India

Projections of requirement of sugar and sugarcane by year 2030 are dependent on human population and per capita consumption of sugar. As per Vision 2030 report of IISR, India will require nearly 33 million tonnes of white sugar only for domestic consumption. The requirement of sugarcane will increase further as National Biofuels Policy 2018, the Central Government intends to achieve ethanol with petrol blend levels of 10% by 2022 and 20% by 2030. There is limitations on increase in area under sugarcane above 50 lakh hectares and its great challenge to increase sugarcane productivity to the tune of 100 to 110 t/ha and average sugar recovery of 11.00%. Considering Maharashtra's contribution share of national sugar production, state has also to achieve the targets of sugarcane productivity of 120 t/ha and sugar recovery of 12.50%.

The adoption of cane development in sugar industry has to play a crucial role in bringing all round development in management practices to be followed by cane growers at large and to develop a good quality sufficient raw material for the sugar mill in the operational area every year. The success of the cane development programme centers on the concept of mass participation of all the efforts to be made.



Farmer's needs to be continuously fed through new innovations by holding farmers rally, conducting demonstrations/ trials on cultivator's field and group meetings.

For the implementation of result oriented cane development programme, there is a dire need to pay attention to crop season planning, varietal planning, three-tire seed production program on scientific basis, crop supervision, adoption of water saving measures like drip irrigation, pest and disease management, adequate use of soil test reports, post harvest care of cane and adoption of pre harvest maturity test. Since the sugar is produced in the field, so its management schedule that needs improvement, constant modification.

Cane development is a herculean task and we need very good financial support. It is observed that, the development section is a very weak link in an organization of sugar mill management. The development wing should be strengthen to take its own decision and should be provided more resources to implement the programme speedily and in time. Development work is a slow process. There may be a need of doing several things to bring about an overall improvement in production. This is not an easy task unless all involved in the process possess the required competence.

Limitations for the cane production

- Unpredictable monsoon
- Excessive use of water and chemical fertilizers.
- Non availability of quality seed of required variety of sugarcane
- Lack of awareness about high yielding varieties and season of planting
- Monoculture of sugarcane on same piece of land year after year
- Non availability of inputs in time
- Slow rate of adoption of high yielding and high sugared varieties
- Improper agronomic practices

- Negligence towards management of the ratoon crop
- Inadequate funds for R&D in sugarcane.
- Lack of efficient technology transfer mechanism/ extension mechanism
- Ignorance about pest and disease control

Cane development program and their execution

Farmer's level : Farmers should make efforts to apply modern methods of cane production on his farm and plan his crop as per programmes suggested by factory. He should fit in his farming system within the framework suggested by factory. Selection right type of seed of right variety, seed treatment, cultivation packages, irrigation management, plant protection, soil health care etc. should be followed strictly as per the guidance of agricultural experts/extension agency.

Sugar Mills level: For systematic, result oriented development programme, appropriate data, its proper analysis, interpretation is required. The detailed agricultural data of farmers/survey number wise is not available with factories. These data should be collected on priority to group the categories of farmers, soils, problems, resources etc. based on this information, the entire cane development programme need to be planned and monitored. Computerization of data can be compiled for formulation of strategies of development programmes, their follow up evaluation etc.

Based on sound data and their analysis, needs or problems of the factory, the cane development/area development programmes should be formulated. The central point for these programs should be farmer. This programme will include the availability of inputs, farm power, plant protection, harvesting schedule, cropping systems for individual farmers.

Service centers: The crop inputs, plant protection appliances, farm machinery are becoming very costly and beyond the purchasing power of small/marginal



farmers. The exercise of service cooperatives is not very effective. Under these circumstances, the cooperative factories should help the farmer by establishing custom hiring centers thereby providing the farm machinery on nominal hire charges and establishment of service centers managed by efficient experts under its control and supervision. This approach will also definitely help in planting planning and improvement of soil fertility.

Training to staff & Farmers: It is the need of hour to appoint qualified and dedicated manpower for sugarcane development wing. Giving training to this staff about modern technologies in sugarcane cultivation is very essential to improve quality and competence of the field workers. Farmers should be trained and constantly made aware about the modern techniques of the sugarcane cultivation



Seed nurseries and operational research: Due to negligence in use of quality seed material presently, the seed replacement ratio in Maharashtra state is only 6%. Sugarcane seed should be replaced once after every three years, due to which yield increased by 10-15% and sugar recovery by 0.5-1 unit.

Sugarcane planting is an important input in sugarcane operation. The factories should create the facility for production of foundation seed and certified seed nurseries. This can be done by establishing seed nurseries-cum-operational research farms at one place or several places in operational area of the factory. The adoption of three tire seed nursery

programme will help to plan and execute variety and season planting to obtain desired yield level of sugar and sugarcane. Seed produced by this system should be free from pest and diseases.



Practical implementation of cane development program

Selection of sugarcane varieties, planting planning and harvesting program:

As we know, in sugar factory, there is an over availability and sometimes shortage of raw material for crushing; only reason is lack of planting planning and harvesting program. So, for uniform supply of raw material to factory during crushing period there is a need to be proper planning to grow and harvest the crop/varieties according to their maturity period, which increases the sugar recovery and sugarcane yield.

Soil fertility and fertilizer management: Soil degradation, problem soils is an emerging issue so; there is a need to manage this on sustainable basis by maintaining the soil organic carbon between 0.75 to 1.00 percent by incorporating organic manure, green manure, bio compost and trash management to achieve targeted yield. Addition of organic matter in to soil improves soil physical, chemical and biological properties of soil and also water holding capacity, which has positive effect on microbial count and nutrient availability.

Out of total cost of cultivation farmers spend nearly 20-30% on fertilizer but they didn't get expected results, and also they give more emphasis on major nutrient (N,P & K) and hardly go for secondary and



micro nutrient, results over application happens which affects soil properties. For that purpose there is a need to integrate organic, inorganic and biological nutrient management or should be carried out on the basis of soil test values. Foliar fertilization is also useful when crop is under stress. Nutrient/ fertilizer management through drip irrigation (fertigation) not only saves the water but also increases the fertilizer use efficiency and saves 30% of the fertilizer. Silicon @ 400 kg/ha (commercial) can also be applied in sugarcane. or it is applied through 1.5 t bagasse ash with 2.5 lit/ha silicon solubilizing bacteria makes the plant able to tolerate abiotic and biotic stress.

Drip irrigation: Water is a main component of successful crop production, but in recent world it's a scare thing, because of irregularity of monsoon, scanty rainfall, uneven distribution of rainfall and increased frequency of drought so, careful and optimum use of water is necessity and drip irrigation is a better option for this situation. Drip irrigation saves 40-50% of water and gives 90-95% of irrigation efficiency, as compared to conventional method of irrigation besides that it improves the soil health. Fertilizer application is also possible through this system; it saves the fertilizers up to 40% and increases the yield by up to 30%.



Agronomic practices: Timely implementation of agronomic practices is a key factor of higher cane productivity includes sett treatment with fungicide and insecticide reduces the incidence of pest and diseases at initial growth stage which offer healthy crop growth. Light earthing up is carried out at 45-60 DAP when

tillering starts, which helps to support the tillers, reduces the incidence of early shoot borer and fertilizer will mixed with soil. At grand growth stage crop needs support otherwise lodging occur, affects on yield, so for that final earthing up is carried out at 120 DAP which helps to reduce the unnecessary tillers, reduce lodging and helps in soil aeration. All the tillers cannot become good millable canes. 50 % of tillers converted into trash after final earthing up. Thus there is wastage of Nutrients, Irrigation water. Plant population in cane field should be maintained by removing the extra tillers after final earthing up operation.

Plant protection: Sugarcane is hardy crop but recently due to climate change crop attacked by several serious pest and diseases like smut, grassy shoot, pokkah boeng, white grub, shoot borer, wooly aphid and recently army worm attacked on large scale. We cannot increase the yield by controlling pest and disease but stop the losses caused by them, so for sustenance of the crop and ecosystem there must be integration of all the pest control measures (Chemical, Biological, physical) to keep the pest population below economic threshold level.

Ratoon management: Ever year out of total sugarcane area 40% is under ratoon crop. Both farmers and mill owners are benefited by ratoon crop, by keeping the ratoon crop save the production cost by 35-40%. Following points to be considered for sustainable ratoon productivity ;

- After harvesting of plant cane don't burn the remaining trash, it can be used as mulch in ratoon.
- To obtain better yield from ratoon, stubbles which remains above the ground level after harvest, needs to be shaved immediately at soil surface level. Infected stubbles must be removed and burned.
- Form one hectare of land we get 8-10 tons of trash which is a good source of organic manure, help in built of organic carbon and increases beneficial microbial population and nutrient availability.

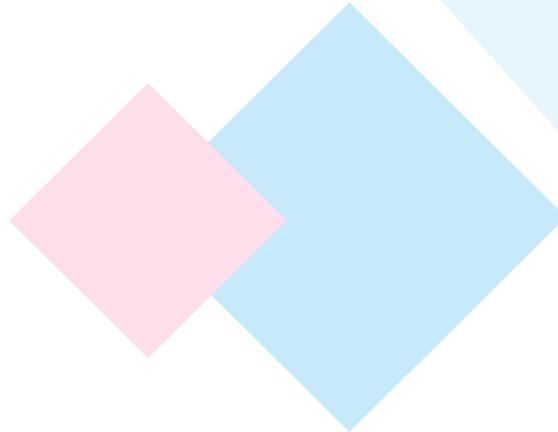


- Wide row planting (4' and more), paired row planting (2.5' or 3') system are better to manage the trash in situ.
- For faster decomposition of trash apply 80 kg urea, 100 kg SSP and 2.5 lit of decomposing culture per ha, also apply well decomposed manure, press mud @ 5-7 t/ha which accelerates the rate of decomposition.

Ratoon management under water stress condition

- In conventional method of planting, keep the trash in alternate rows and do not go for off barring which save the water otherwise increases evaporation losses.
- In paired row planting trash mulching is restricted to only open (patta) space and mulching in all the furrows in case of wide row planting.
- In wide row planting irrigate the alternate rows and in paired row only pair rows of sugarcane

- If ratoon crop experiences the stress, spray the crop with 2% white potash (20 g in 1 lit of water) in 1000 lit. of water per ha. at 21 days interval 3-4 sprays can be given. Also application of 125 kg/ha extra MOP will tolerate the crop under water stress situation.
- Use of anti transparent like kaolin @ 6% (60g in 1 lit. of water) in 1000 lit. of water per ha. also be beneficial. 3-4 sprays at 21 days interval reduces the loss of water through transpiration.
- If trash is burnt, sowing of any green manuring crops in ratoon as an intercrop and mulching it after 1 month will serve the purpose.
- First and second dose of chemical fertilizer should be applied to crop as per the availability of irrigation water. if water is available to single irrigation apply only basal dose to crop and second dose will apply whenever water is available to crop or after commencement of monsoon.





Integrated Control of Sugarcane White Fly

Uday Manjul and Sudha Ghodke

Agricultural Microbiology

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Sugarcane White fly, *Aleurolobus barodensis* Maskell (Aleurodidae: Hemiptera) occurrence is sporadic in Maharashtra, while it is regular pest in North-East Maharashtra as major pest assuming severe status to reduce the crop yield and sugar recovery from last two decades. In India, three species of sugarcane white flies are noticed, *Aleurolobus baradensis* Maskell, *Neomaskellia bergii* Sign and *Neomaskellia andropogonis* Corbett. Out of these, *A. barodensis* is causing a major damage to sugarcane, while other two species are minor one. Sporadic incidence of *N. bergii* is also noticed in central Maharashtra.

Nature of damage and losses: The sugarcane whitefly, *A. barodensis* is the most destructive foliage-sucking pest of sugarcane. Heavy rainfall followed by 75-80% humidity, intermittent drought periods, high temperatures (26-30°C) and wind movements favor rapid pest buildup of white fly. Owing to the limitations of insecticidal molecules the efficient strains of entomopathogenic fungi are developed with suitable formulation as that could be cost effective and non-hazardous, eco-friendly against sugarcane white fly, *A. barodensis* infestations based on abiotic and biotic stress. White flies damage sugarcane by extracting large quantities of phloem sap from leaves which can result in greater than 50% yield reduction when the pest population was 5.00 per cm². Due to sucking of sap leaves turn yellow; in severe cases of infestation the leaves show pinkish discoloration and infested leaves gradually dry up. White fly infestation not only retards plant growth but also reduces sugar content in canes to the tune of 1.5-3.5%. Nymphs suck the cell sap from lower side of the leaf.

High sugared sugarcane varieties are more susceptible to the attack. A loss of 23.4 per cent in

cane yield and 2.9 units in sucrose has been recorded in South Bihar, when there was 80 per cent leaf infestation with 17.5 puparia per square inch. The sucrose per cent loss is 1.45 to 1.75 units.



Figure 1: eggs of white fly



Figure 2: White fly nymph



Figure 3: white fly pupae



Figure 4: White fly adult

Alternate host: Sporadic incidence is also noticed on *Sorghum bicolor*.

Biology: Formation of 'T' shaped split in dorsum of the incipient pupation. Adult have pale yellow body with dirty white wings. Adult longevity is 24-28 hrs. Eggs are yellowish later on turn to blackish. Conical eggs with rounded base laid in 2-16mm and are in linear rows. Egg period: 8-12 days. Neonate nymphs are tiny, with three pair of legs. The color of nymphs is shiny black when settled on lower surface of leaf. Secretion of white wax appears in the form of pair of white rounded specks on mid-dorsal line of nymphet body. It undergoes four moultings and forth instar resembles incipient pupation. Life cycle is completed in 25-47 days and there are 8 to 9 generations in year.

Population built up: Late planting and late harvesting, this helps in built up of pest. Neglected crop and unmanaged ratoon suffers more. Water logged conditions, ill drained soils and excess alkalinity favors the pest build up. Low or excess use of nitrogenous fertilizers caused heavy incidence. Severe drought in summer and dry spells during monsoon with adverse physiological conditions are congenial for white fly infestation. Monoculture in sugarcane and high humidity favors the heavy multiplication.

Control Measures: Due considerations to the limitations of cultural, mechanical and developing resistance to insecticidal molecules and resurgence of sporadic sucking pests, particularly, white fly. The

inductive releases @ 2500 eggs or larvae per hectare, of predatory Green lace-wing, (*Chrysoperla carnae*) are helpful in successful bio-control. Naturally occurring nymphal-puparial predators like brown lace-wing, *Micromus igoratus*, a hover fly, or syrphid fly *Allograpta obliqua* (Say) are the natural enemies recorded to reduce the white fly incidence in field in favorable abiotic and biotic stress conditions in sugarcane eco-system. The probable constraints in mass multiplication of predators in laboratory are factious host, searching ability and cannibalism, a sustainable IPM package involving bio-control agents, like entomopathogenic fungal parasites like green muscardine fungus, *Metarrhizium anisopliae*, *Verticillium lecanii*, *Fusarium coccociphalum*, *Aspergillus flavus*, *Cladosporium tenuissimum* Cooke, *Fusarium chlamydosporum* Wollenw. & Reinking. have shown scope and prospectus in successful bio-control of sugarcane white flies. Best practice of spraying of bio-pesticide like BVM to be included in Bio-IPM of this pest without causing annoyance to the parasites and predators in sugarcane eco-system. Spraying of bio-pesticide including consortium *Metarhizium anisopliae* + *Lecanicillium lecanii* + *Aspergillus flavus* + *Cladosporium tenuissimum* + *Fusarium chlamydosporum* @ 5 ml/lit of water (1×10^8 CFU) found equally effective as spraying of individual formulation of *Cladosporium tenuissimum* @ 5 ml/lit of water (1×10^8 CFU) and Thiamethoxam 30 % FS @ 0.5 ml/lit of water.

Management practices for White fly:

1. Follow proper surface drainage under water logged conditions.
2. Avoid spraying of chemical insecticides in green lace wing *Chrysoperla carnea* eggs or larvae released plots.
3. Follow detrashing of dried lower side leaves along with the pest stages.
4. Use yellow sticky traps @ 25/ha.
5. Initially the border rows and area should be sprayed with botanical insecticides like,



Neemark-(1500 PPM) @ 5 to 7.5 ml/litre of water.

6. In severe infestations spraying of Dimethoate 30EC @ 2.65 ml/litre or Imidacloprid 17.8SL @ 0.28 ml/litre of water along with addition of 2% urea are recommended for control measure for this pest. However, it will suppress the populations of beneficial insects, in sugarcane eco-system and hence, spray of BVM bio-pesticide @ 5 ml/litre of water is found effective to reduce the pest

population below economic threshold level without causing annoyance to the beneficial insects.

अधिक माहितीसाठी :

कृषी सूक्ष्मजीवशास्त्र विभाग

वसंतदादा शुगर इन्स्टिट्यूट, मांजरी (बु), पुणे

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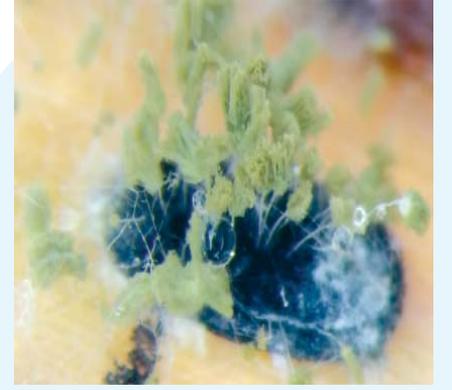
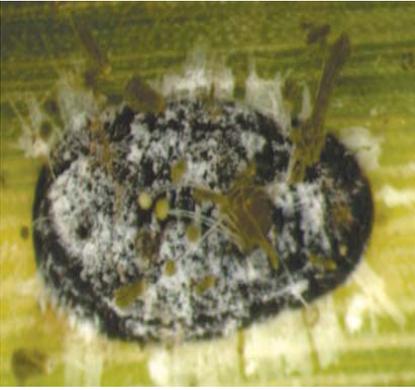


Figure 5: Growth of consortia of entomopathogenic bio-control agents (BVM)



वाढळी पावसामुळे ऊस पिक लोळणेबाबत निरिक्षणे आणि उपाय योजना

बी.एच. पवार
ऊस रोगशास्त्र विभाग

वसंतदादा शुगर इन्स्टिट्यूट, मांजरी बु.११, पुणे

महाराष्ट्र राज्यातील काही भागात यावर्षी ऑगष्ट महिन्याच्या शेवटच्या आडवड्यापासून एक विशिष्ट प्रकारचे हवामान बदल अनुभवास आले. वातावरणातील सरासरी तापमान आणि सापेक्ष आर्द्रतेत झालेली वाढ यामुळे दररोज कुठेनाकुठे तरी मोठ्या प्रमाणात वादळ आणि कमी कालावधीत अतिवृष्टी झालेली आहे. ढगफुटीसारख्या घटना देखील घडलेल्या आहेत. जोराचा पाऊस आणि वादळामुळे राज्यात अनेक ठिकाणी सर्वच पिकांचे कमीअधिक प्रमाणावर नुकसान झालेले आहे/होत आहे. राज्यातील अनेक साखर कारखान्यांच्या कार्यक्षेत्रात वादळी पावसामुळे ऊस पिक देखील लोळलेले आहे; तसेच काही ठिकाणी उसाची बेटे उन्मळून पडलेली आहेत. साखर कारखाने आणि काही शेतकरी ऊस पिक लोळण्याबाबत आणि पिकाचे नुकसान टाळण्याबाबत मार्गदर्शन करण्यासाठी विचारणा करत आहेत.



ऊस पिक लोळणेबाबत काही निरिक्षणे आणि उपाययोजना खालीलप्रमाणे

१. मागील लागण हंगामातील आडसाली आणि पूर्व हंगामी ऊस पिकात लोळण्याचे प्रमाण सुरु आणि खोडवा पिकापेक्षा जास्त असल्याचे दिसून येत आहे.
२. अति वादळ झालेल्या ठिकाणी व ज्या पिकात वाळवी, बुडखा कांडी आणि हुमणी किडींचा व उंदराचा उपद्रव आहे अशा ठिकाणी ऊस पिकाची बेटे उन्मळून पडलेली आहेत.
३. ऊस लोळण्याचे प्रमाण जातिनिहाय कमीअधिक असले तरी सर्व जातीचे ऊस पिक लोळलेले आहे.
४. काळ्या आणि भारी जमिनीत असलेल्या, वरचेवर जास्त पाणी दिलेल्या, आणि ठिबक सिंचनाखाली असलेल्या ऊस पिकात लोळण्याचे प्रमाण जास्त आहे.
५. ऊस पिकाची मोठी भरणी योग्य प्रकारे न झालेल्या पिकाचे लोळण्याचे प्रमाण अधिक आहे.
६. साधारणपणे चांगली वाढ झालेला ऊस लोळणे ही बऱ्याच प्रमाणात नैसर्गिक बाब असली तरी पाऊस आणि वादळ झाल्याने लोळण्याची तीव्रता वाढलेली आहे.

उपाय योजना

१. जे ऊस पिक लोळलेले आहे, परंतु जमिनीस टेकलेले नाही, त्या ठिकाणी पिकाचे नुकसान भावी काळात अत्यल्प होईल. जो ऊस उन्मळून पडलेला आहे, तो वाळण्याची व कुजण्याची शक्यता आहे.
२. लोळण्याने जमिनीस टेकलेल्या कांड्यांना मुळ्या फुटतील तसेच कांड्या सूर्यप्रकाशात उघड्या पडतील आणि कांडी किडीचा प्रादुर्भाव असलेल्या व पोक्का बोंग रोग झालेल्या उसावरील डोळ्यातून पांगश्या फुटण्याचे प्रमाण वाढेल. ऊस लोळला तरी तो एकमेकांवर टेकलेला आहे, जमिनीस टेकण्याचे प्रमाण कमी आहे..
३. जे ऊस पिक १० महिन्यापेक्षा कमी वयाचे आहे. तो ऊस शक्य असेल तर मजूरंकरवी जमिनीत पुरेशी ओल असतांना किंवा पाणी देवून उभा करता येईल.
४. आडसाली आणि पूर्व हंगामात लागण झालेल्या पिकाची वाढ जास्त झालेली आहे. तो लोळलेला ऊस उभा करतांना



मुळांना इजा होण्याची जास्त शक्यता आहे, तसेच ते काम फार खर्चाचे आणि कष्टाचे आहे. अशा पिकामध्ये ऊस उभा करता येणार नाही. नजिकच्या काळात पिकाच्या नैसर्गिक वाढीच्या प्रवृत्तीमुळे उसाची वाढ होईल , परंतू पूर्ण ऊस उभा होणार नाही.

५. जास्त लोळलेल्या उसाचे कारखान्याने सर्वेक्षण पूर्ण करून ५० टक्क्यांपेक्षा जो ऊस जास्त लोळलेला आहे, त्या उसाची तोडणी गाळप हंगाम सुरू झाल्यावर प्राधान्याने करावी लागेल.
६. मागील हंगामात लागण झालेल्या उस पिकास नेहमीच्या पिक पद्धतीत खतांच्या मात्रा दिलेल्या असतील. परंतू, लोळलेल्या उसास कार्यक्षम मुळांची संख्या वाढण्याच्या दृष्टीने एकरी २५ किलो या प्रमाणात स्फुरदाची मात्रा देणे फायदेशीर ठरेल. ऊस लोळण्यामुळे खतांची मात्रा देणे अडचणीचे असले तरी खताचे द्रावण करून पाण्यासोबत द्यावे. यासाठी डायअमोनियम फॉस्फेट एकरी ५० किलो प्रति एकर पाण्यात विरघळवून प्रवाही सिंचनासोबत द्यावे. ठिबक सिंचन ज्या

शेतात आहे, त्या ठिकाणी एकरी ४० किलो या प्रमाणात फॉस्फरिक ॲसिडची (६१% चे) मात्रा द्यावी. जे पिक १० महिन्यापेक्षा कमी वयाचे आहे, अशा पिकास एकरी ५० किलो अमोनियम सल्फेटची मात्रा स्फुरदसमवेत (४० किलो फॉस्फरिक ॲसिड अथवा ५० किलो डायअमोनियम फॉस्फेट) पाण्यात विरघळवून द्यावी.

७. सध्या उभ्या असलेल्या पिकाचे वादळाने लोळण्यापासून संरक्षण करण्यासाठी चार ते पाच सरीचा ऊस ४५ अंशापर्यंत एकमेकावर दाबावा/लोटावा, जेणेकरून ऊस पिकातून वादळी वारे निघून जाण्यास मदत होईल आणि ऊस लोळण्याचे प्रमाण कमी राखता येईल.
८. शेतात जर पावसाचे पाणी साचले असेल तर त्याचा निचरा करावा.
९. लोळलेल्या पिकात भविष्यात उंदरांचा प्रादुर्भाव होणार नाही; याबाबत काळजी घ्यावी.

अधिक माहितीसाठी :

ऊस रोगशास्त्र, कृषिशास्त्रे आणि तंत्रज्ञान विभाग,
वसंतदादा शुगर इन्स्टिट्यूट, मांजरी (बु. ११), पुणे
येथे संपर्क साधावा.

फोन नं. : (०२०) २६९०२१००, २६९०२२६८,

फॅक्स : (०२०) २६९०२२४४,

मोबाईल नं. : ९८९०४२२२७५, ८७८८५७४८२७

ऊस पिकांवर आढळणारे तांबेरा आणि तपकिरी ठिपके रोग

बी.एच. पवार
ऊस रोगशास्त्र विभाग

वसंतदादा शुगर इन्स्टिट्यूट, मांजरी बु.॥, पुणे

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

सध्या पावसाळा हंगाम सुरू असून सततचे ढगाळ हवामान, अधुनमधुन पडणारा पाऊस, हवेत सापेक्ष आर्द्रतेचे वाढलेले प्रमाण, शेतात पाणी साचून मुळांची कार्यक्षमता घटणे, तसेच हलक्या, वालुकामय, मुरमाड जमिनीतून पिकास आवश्यक असणारी अन्नद्रव्ये निचरा होणे पर्यायाने पिकाचे पोषण व्यवस्थित होत नाही, पिक अशक्त बनते. अश्या परिस्थितीमुळे ऊसामध्ये पानांवरील रोगांचा प्रादुर्भाव आणी प्रसार वाढलेला आहे. महाराष्ट्रात सध्या ऊस पिकाच्या पानांवर तांबेरा आणि तपकिरी ठिपके हे दोन प्रमुख रोग आढळून येत आहेत. या रोगांबाबत सविस्तर माहिती या लेखात देत आहोत.

तांबेरा रोग

तांबेरा हा रोग पुकसिनीया मॅलॅनोसिफॅला या हवेद्वारे पसरणाऱ्या बुरशीमुळे होतो. मागील काही वर्षांपासून या रोगाचा प्रसार जादा साखर उतारा देणाऱ्या ऊस जातींवर वाढत असून, ही चिंतेची बाब आहे. तांबेरा रोगामुळे ऊस पिकाचे ४० टक्केपर्यंत नुकसान होवू शकते. सततच्या पावसामुळे ऊस शेतात दलदल तयार झाल्याने, तापमान कमी झालेने आणि ढगाळ हवामानामुळे रोगाची बुरशी मोठ्या प्रमाणावर वाढते. महाराष्ट्राच्या पश्चिम भागात तसेच जास्त



रोगग्रस्त पिक



पानांवरील लक्षणे

पाऊस झालेल्या इतर भागात हा रोग उसपिकावर मोठ्या प्रमाणावर वाढलेला दिसून येतो. कोसी ६७१, को ४१९, कोव्हीएसआय९८०५, को९२००५ आणि व्हीएसआय४३४ या ऊस जाती रोगास जास्त बळी पडतात; तर अलिकडे को ८६०३२, कोएम ०२६५, एमएस१०००१, व्हीएस आय ०८००५ या ऊस जातींवरदेखील या रोगाचा प्रादुर्भाव दिसत आहे. कोव्हीएसआय०३१०२ आणि एमएस९०५७ या जातीमध्ये या रोगाचे प्रमाण नगण्य आहे. मुरमाड आणि हलक्या जमिनीत घेतलेल्या उसपिकात रोगाची तिव्रता जास्त आढळून येते.

तांबेरा रोगाची लक्षणे:

रोगाचा प्रादुर्भाव पिकाच्या पानांवरच आढळतो. सुरुवातीस पानांवर लहान व लांबट पिवळे ठिपके पानाच्या खालच्या बाजूस दिसून येतात. कालांतराने ठिपक्यांची लांबी वाढते व त्यांचा रंग लालसर तपकिरी किंवा तपकिरी दिसून येतो. ठिपक्यांचा भाग बुरशीच्या



आणि बिजाणूंच्या वाढीमुळे फुगीर होतो. त्यामुळे पानांचा ठिपक्यालगत भाग फुटून त्यातून नारिंगी किंवा तांबूस-तपकिरी रंगाचे बिजाणू बाहेर पडतात. रोगग्रस्त पानाच्या पाठीमागच्या पृष्ठभागावरून बोट फिरविले असता बिजाणूची पावडर सहजपणे बोटास चिकटते. रोगाची तीव्रता वाढून पाने करपून वाळतात. यामुळे ऊसाच्या उत्पन्नात व साखरेच्या उतान्यात लक्षणीय घट येते. तांबेरा रोगाचा प्रादुर्भाव व प्रसार पावसाळ्यानंतर ढगाळ वातावरण, जास्त आर्द्रता व थंड हवा असताना जास्त प्रमाणात दिसून येतो. कोरड्या व उष्ण हवामानात रोगाची तीव्रता कमी होत जाते. उस पकळेच्या काळात या रोगाचा प्रादुर्भाव वाढल्यास पानांमध्ये साखर तयार करण्याचे कार्य मंदावते व त्याचा विपरीत परिणाम साखर उतान्यावर होतो. रोगाचा प्राथमिक प्रसार हवा, पाणी, पाऊस व किटकांद्वारे होतो.

तांबेरा रोग नियंत्रणाचे उपाय:

१. रोगाचा प्रादुर्भाव जास्त येणाऱ्या भागात रोगप्रतिकारक जातींची (को ८६०३२, कोव्हीएसआय०३१०२ आणि एमएस९०५७) लागण करावी. शिफारशीत नसलेल्या ऊस जातींची लागण करू नये.
२. पिकाचे वय लहान असताना पाण्याचा ताण पडू देऊ नये, तसेच शेतात पाण्यामुळे दलदल होऊ देऊ नये. रात्रीच्या वेळी तुषार सिंचन करू नये.
३. तांबेरा रोग दिसून आल्यावर रोगग्रस्त ऊसाची वाळलेली पाने काढावीत व नंतर ०.२५ टक्के प्रमाणात प्रोपिनेब (अॅट्राकॉल, १ लिटर पाण्यात २.५ ग्रॅम बुरशीनाशक) किंवा ०.३ टक्के प्रमाणात मॅकोझेब (डायथेन एम ४५, १ लिटर पाण्यात ३ ग्रॅम बुरशीनाशक) फवारावे. बुरशीनाशकाच्या १० दिवसांच्या अंतराने स्टीकर वापरून २ ते ३ फवारण्या कराव्यात.
४. पिकास खतांची मात्रा माती परिक्षणानुसार योग्य वेळी द्यावी. नत्रयुक्त खताचा तसेच इतर खताची मात्रा उशिरा देऊ नये.
५. शेतात साचलेल्या पाण्याचा निचरा करावा.
६. सिलिकॉन, सल्फर तसेच जैविक किंवा अजैविक ताण सहनक्षमता वाढविणेसाठी कायटोसानयुक्त कृषिउत्पादनांचा (उदा. वसंत उर्जा) वापर करावा.

तपकिरी ठिपके

ऊस पिकांवर आढळणाऱ्या तपकिरी ठिपके या रोगाची नोंद १९०६ साली इ. जे. बटलर या शास्त्रज्ञाने भारतात सर्वप्रथम महाराष्ट्रात ऊस पिकावर केली. हा रोग सरकोस्पोरा या बुरशीवर्गातील अनेक प्रजातीमुळे होतो. पूर्वी या रोगाची नोंद एक सामान्य रोग (आर्थिकदृष्ट्या नुकसान

न करणारा रोग) म्हणून केलेली होती; कारण या रोगापासून ऊस पिकाचे नुकसान अत्यल्प होत असे. सुरुवातीस या रोगाचे नांव पानावरील ठिपके असे होते. तदनंतर पानांवर आढळणाऱ्या तांबूस-तपकिरी रंगामुळे याचे नांव बदलण्यात आले. हा रोग ऑस्ट्रेलिया आणि तैवान या देशाव्यतिरिक्त ऊस पिकविणाऱ्या सर्वच देशात ऊस पिकांवर आढळलेला आहे. पूर्वीच्या संदर्भानुसार या रोगाचा प्रादुर्भाव उसपिकावर वर्षभर आढळत असला तरी पावसाळ्यात अतिवृष्टीनंतर या रोगाची तीव्रता वाढते. जादा आर्द्रता आणि २५ ते ३० सेंग्रे दरम्यानचे तापमान या रोगास प्रादुर्भावास आणि प्रसारास अनुकूल आहे. महाराष्ट्राशिवाय या रोगाची लागण ऊस पिकावर कर्नाटक, गुजरात आणि गोवा राज्यात आढळलेली आहे.

तपकिरी ठिपके रोगाची लक्षणे :

या रोगाची लागण महाराष्ट्रात पावसाळा हंगामात जुलै महिन्यापासून दिसून आलेली आहे. कोएम ०२६५ या जातीवर या रोगाचे प्रमाण लक्षणीयरीत्या वाढलेले आहे. सध्यातरी या रोगाचा प्रादुर्भाव पावसाळा



रोगग्रस्त पिक



पानावरील लक्षणे



हंगामात दिसून येतोय. रोग करण्याच्या बुरशीची लागण सर्वप्रथम जुन्या पानांवर होते. रोगाची लागण पानावर झाल्याने लाल-तपकिरी रंगाचे ठिपके उसाच्या पानांवर दिसून येतात. ठिपक्यांचा आकार टाचणीच्या टोकापासून ते ३ ते ५ मिमि इतका आढळतो. पानावरील ठिपके अंडाकृती किंवा लंबगोलाकार असून त्यांच्या सभोवतालचा भाग पिवळा दिसतो. जुन्या ठिपक्यांचा मध्य भाग वाळलेल्या काडासारखा, त्याबाहेरील भाग लाल आणि शेवटचे आवरण पिवळे दिसते. सामान्यपणे पानाच्या दोन्ही बाजूस ठिपके सारखेच दिसतात. उसाच्या कोवळ्या पानांपेक्षा जुन्या पानांवर ठिपके जास्त प्रमाणात दिसतात; तसेच ठिपके पानांवर सर्वत्र सारख्या प्रमाणात विखुरलेले आढळतात. रोगाची तीव्रता वाढल्यांवर ठिपके पानाचा पुर्ण भाग व्यापतात आणि ते एकमेकात मिसळतात. तदनंतर पाने पुर्णपणे करपतात आणि वाळतात. दूरवरून रोगग्रस्त पिक तांबेरा रोगाने ग्रासल्यासारखे दिसते. पाणांची पुर्ण वाढ होण्याआधीच पाने पिवळी पडतात आणि पानाकरवी होणारे प्रकाश संश्लेषणाचे आणि साखर तयार करण्याचे काम मंदावते किंवा थांबते; पर्यायाने पिकाचे उत्पन्न घटते. ऊस पक्कतेच्या काळात या रोगाची तीव्रता वाढत, ही चिंतेची बाब आहे. ऊस जातनिहाय रोगाची तीव्रता कमीअधिक आढळते. हा रोग फक्त पानावरच आढळतो.

तपकिरी ठिपके रोग नियंत्रणाचे उपाय :

१. रोगप्रतिकारक जातींची (को ८६०३२, कोसी६७१, कोव्हीएसआय ०८००५, एमएस१०००१, एमएस१०५७) लागण करावी.

शिफारशीत नसलेल्या ऊस जातींची लागण करू नये.

२. लागणीसाठी बेणेमळ्यातील बेणे वापरावे. रोगग्रस्त शेतातून तसेच खोडवा पिकातून बेणे घेऊ नये. लागणीपूर्वी ऊस बेण्यास कार्बेन्डेझीमयुक्त बुरशीनाशकाची प्रक्रिया करावी. याकरिता १०० ग्रॅम बुरशीनाशक १०० लिटर पाण्यात मिसळावे आणि तयार होणाऱ्या द्रावणात बेणे १० मिनिटे बुडवून प्रक्रिया करावी.
३. पिकास सेंद्रीय, रासायनिक आणि जैविक खताची मात्रा माती परिक्षणानुसार वेळेवर द्यावी. उशीरा रासायनिक खत देवू नये.
४. रोगग्रस्त उसावरील वाळलेली पाने काढावीत; जेणेकरून रोगाच्या प्रसारास आळा बसेल. तसेच रोगग्रस्त पिक कापणीनंतर उरलेले पाचट शेताबाहेर काढून त्यापासून शास्त्रीय पद्धतीने कंपोष्ट करावे. शेतात पिक फेरपालट करावी.
५. पिकास आवश्यकतेनुसार पाणी द्यावे. पावसाळा हंगामात शेतात पाणी साचणार नाही अशा पद्धतीने निचरा व्यवस्था करावी.
६. रोगाची लागण दिसून आल्यावर लगेचच ताप्रायुक्त बुरशीनाशकाच्या ०.२% या प्रमाणात उदा. कॉपर ऑक्झीक्लोराईड २ ते ३ फवारण्या १५ दिवसांच्या अंतराने स्टिकरचा वापर करून कराव्यात. फवारणीपूर्वी उसावरील रोगग्रस्त वाळलेली पाने काढावीत. या बुरशीनाशकाशिवाय मॅकोझेबयुक्त बुरशीनाशकसुद्धा उदा. डायथेन एम ४५, ०.३% या प्रमाणात रोगाच्या नियंत्रणासाठी परिणामकारक ठरू शकते.

अधिक माहितीसाठी :

ऊस रोगशास्त्र, कृषिशास्त्रे आणि तंत्रज्ञान विभाग,
वसंतदादा शुगर इन्स्टिट्यूट, मांजरी (बु. ११), पुणे
येथे संपर्क साधावा.

फोन नं. : (०२०) २६९०२१००, २६९०२२६८,
फॅक्स : (०२०) २६९०२२४४,
मोबाईल नं. : ९८९०४२२२७५, ८७८८५७४८२७
इमेल : bh.pawar@vsisugar.org.in,
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Sugarcane Breeding Center, Amboli

RS Hapase

Plant Breeding Section

Vasantdada Sugar Institute, Manjari Bk., Pune

Currently Maharashtra state has 199 sugar factories located throughout the state. Most of the sugar factories are widening the scope of their products- sugar, ethanol, electricity and many chemicals as byproducts. Out of the six sugarcane research stations in the state, only two centers viz., Padegaon and VSI, Pune participate in the breeding and selection program. Until 2004 the location specific selection program did not result in the identification of any commercially grown sugarcane varieties in the state. All the varieties grown in the state was bred at SBI, Coimbatore.

Therefore, VSI took note of this alarming varietal situation in the state and decided to establish a breeding centre of its own to augment the varietal development program of the state. The state with over 200 sugar factories was dependent only on two varieties i.e. CoC 671 from Cuddalore in Tamil Nadu and Co 86032 from SBI, Coimbatore. Sugarcane yields for several years were almost stagnant.

Genetic improvement of sugarcane in India was initiated in 1912 with the establishment of Sugarcane Breeding Institute at Coimbatore. Breeding of new sugarcane varieties combining high cane yield and high sucrose content, which are adapted to the different agro climatic conditions of Maharashtra state is the primary objective of the breeding programme. In order to improve the current sugarcane productivity level of Maharashtra the emerging varieties must have resistance to major abiotic stresses- drought, salinity, waterlogging and high temperature. Breeding for multi ratooning, development of early maturing high yielding varieties, and evolving sugarcane varieties with high fibre of good quality, and biomass with for ethanol and energy must also get further emphasis.

An expert committee located a suitable site at Amboli in Sindhudurgh District (located between 16°N and 74°E and 590m above mean sea level with average annual rainfall of 14000mm) and the institute purchased 37 acres of land during January 2005. Under a memorandum of understanding made with Sugarcane Breeding Institute, Coimbatore, the institute acquired 487 germplasm clones of sugarcane and planted them at the center during March 2005. All the other operations required for the establishment of the centre was completed on a war footing and the first cross was made on November 18th 2005 within a matter of 11 months.

Over 1277 clones of sugarcane comprising of basic *Saccharum species*, related genera, interspecific and intergeneric hybrids, varieties from different states and other genetic stocks were planted to be used as parents in hybridization work. To evaluate large number of genotypes, the laboratory at the Institute were also updated with the acquisition of sucrolyser for accurate sucrose determination from large number of samples and a sugarcane cutter- grinder for fiber estimation and juice extraction.

Sugarcane Breeding Center, Amboli: Under an MOU made with Sugarcane Breeding Institute, Coimbatore (T.N.) the Institute obtained the major part of the





breeding material. A total of 1272 clones belonging of the following groups are now available at SBC, Amboli.

Saccharum species

<i>S. officinarum</i>	52
<i>S. barberi</i>	07
<i>S. spontaneum</i>	25
<i>S. robustum</i>	05

Related genera to Saccharum

<i>Erianthus sps</i>	07
<i>Narenga porphyrocoma</i>	01
<i>Sclerostachyafusca</i>	01

Inter Specific Hybrids 131

Indian Hybrids 714

Foreign Hybrids 35

Genetic stock developed by VSI 289

Intergeneric Hybrids 06

Sixty three percent of the clones are flowering from November to January. Looking to the seedlings generated from the fluff from 1988 onwards, it can be seen that it was ranged from 272 (1988) to maximum of 30720 (2003). After the establishment of the hybridization center we obtained 22594 (2006) to 73559 (2007)

Data on flowering such as tip emergence of inflorescence, date of spikelet opening, time of anthesis, pollen fertility and extent of pollen shedding etc. were recorded and documented throughout the flowering season. Mauritian cut cane technique developed by Mauritius Sugar Industries Research Institute (MSIRI) is being implemented to

get the desired cross combinations as the VSI Scientists got such training in Mauritius during 2009. Presently the marcotting technique is being used to make the crosses at Amboli.

Even though VSI has established an additional sugarcane breeding center at Amboli, the National Sugarcane hybridization garden and the National Distant Hybridisation facility at SBI, Coimbatore and at Agali continues to be the major source of genetic variability for the development of new elite sugarcane varieties.

Many of the selected clones are likely to emerge as new varieties soon after their proper evaluation in the National Streamline of AICRP(S) and State varietal trials in different agroclimatic regions for the selection of the location specific and need based varieties.

A first promising high sugared, high yielding, semispreading, sparse flowering, drought tolerant with higher fiber and midlate maturing sugarcane variety VSI 08005 (VSi 12121) has been developed at SBC, Amboli and released for commercial cultivation the State during 2018. The area under this variety has occupied more than 10 percent of the total area under the sugarcane in the Maharashtra State.

Finally, looking to the outcome of the sugarcane breeding center (SBC) at Amboli which will be an International level breeding center in future next to Sugarcane Breeding Institute in India. The interested sugarcane research stations in India can send their promising genotypes for the evaluation and confirmation of the flowering at SBC, Amboli.





VISITORS TO VSI

Mr. Ujwal Bhangre, Joint Chief Controller of Explosives, Mumbai visited VSI on 29th Sept. 2020 for inspection of Ammonium Nitrate uses and storage facilities. During the visit he inspected storage facility area and verified utilities of ammonium nitrate. He also explained guidelines for handling and storing of explosive chemicals. The



‘Safety Advisory for Storage, Handling and Management of Ammonium nitrate’ document soft file was provided by him for following necessary precaution. Mr. Shivaji Khengare, Chief Accountant, Dr. KH Babu, Head, MB & GE, Dr. PN Tawar, Head, Dr. SG Dalvi & Dr. AA Nikam, Scientist, Tissue culture section were present during the visit.

Following visitors visited VSI Campus

Months	Particulars	Visitors	Total
July - 2020	Individual farmers from Maharashtra State	Farmers	286 (75)
August - 2020	Individual farmers from Maharashtra State	Farmers	433 (102)
September - 2020	Individual farmers from Maharashtra State	Farmers	402 (92)
	Agriculture college under RAWE & AIA programme	Students	15 (2)
Total :			1136 (271)

- Bracket figures denote number of visits.

Circular

The Agricultural Microbiology Section has registered the trade names for **Liquid Biofertilizers & Liquid Biopesticide** from Trade Marks Registry No. 2280860, Trade Marks Act, 1999, Certificate of Registration of

Trade Mark, Section 23 (2), Rule 56 (1), Government of India. The following name of the products and their trade names were given below;

Sr. No.	Products	Trade Name
1	Acetobacter liquid biofertilizer	Hirakani (हिरकणी)
2	Azophospho liquid biofertilizer	Solupost (सोल्युपोस्ट)
3	Sulphur oxidizing microbial liquid biofertilizer	Bridge (ब्रीज)
4	Liquid consortia (Soil Health)	Sarvangin (सर्वांगीण)
5	Liquid consortia (Plant Health)	Haritake (हरितके)
6	Potash mobilizing bacterial liquid biofertilizer	Vishwatma (विश्वात्मा)
7	Silicate solubilizing bacterial liquid biofertilizer	Utkranti (उत्क्रांती)
8	Iron Zinc solubilizing bacterial liquid biofertilizer	Affisol (अफीसोल)
9	Liquid biofungicide	Pratikar (प्रतिकार)
10	Liquid biopesticide	Sarvatrik (सार्वत्रीक)
11	Liquid biopesticide	B.V.M. (बी.व्ही.एम.)
12	Liquid decomposing culture	Sarvasi (सर्वस्वी)