वार्षिक प्रतिवेदन

ANNUAL REPORT

2022-23

उत्तर प्रदेश गन्ना शोध परिषद

शाहजहाँपुर–242001 (उत्तर प्रदेश) भारत

U.P. COUNCIL OF SUGARCANE RESEARCH

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KISAN MELA MITHAAS (MARCH 2023)

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Director Message

Sugarcane is the backbone of state economy and more than 46 lakhs sugarcane farmers are directly and indirectly dependent on cane farming. U.P. Council of Sugarcane Research, Shahjahanpur aimed at developing scientific innovations for farmers and millers to achieve twin benefits of improved productivity and higher sugar recovery. These achievements could be possible by faster multiplication of latest released varieties, creating awareness among farmers for control of major insect-pest and diseases and suggesting various diversification options to double the farmers' income in Uttar Pradesh.

The institute is constantly making efforts for developing new sugarcane varieties and making seed cane available to the farmers. A total of 237 varieties have been developed by the Institute till now, CoS 97264 ruled and many prominent varieties like CoS 767, CoS 8436, CoS 8432, CoS 88230, CoS 95255, CoSe 98231, CoSe 92423over the several decades. Sugarcane varieties have also been developed for various adverse climatic conditions like drought tolerance, water logging tolerance etc to improve the farmers' income in adverse situations also. Recently new sugarcane varieties like CoS 13235, CoS17231 (Early),CoS 14233, CoS16233, CoS 15233 (mid late) have been developed by the Institute for normal situations and a variety i.e., UP 14234 has also been developed for salinity conditions. These prominent varieties are becoming popular among the farmers and millers.

Apart from the development of varieties, research work is also going on continuously on improved planting methods, wide row spacing for newly released varieties, integrated nutrient management, crop diversification options with high value crops, occurrence of new pest and disease management, balanced fertilizer use, improved varieties for jaggery and various value added jaggery products to address multiple needs of society. Implementation of new technologies can also reduce the cost of sugarcane production, maintain ecological balance and increase farm benefits.

For rapid multiplication of sugarcane seed cane, tissue culture, single bud, bud chip, S.T.P methods are being employed. Awareness is created among farmers to adopt the recommended package of practices to avoid red rot disease in sugarcane and other pests. Farmers are being trained and advisories on critical issues have been widely published and circulated. Wide coverage on developmental issues has been emphasized through social and print media. Bio-fertilizers and bio-pesticide have been made available to farmers by the Institute to sustain the soil fertility and reduce the cost of chemical fertilizers and pesticides at farm level. Trichocard is also being produced by the Institute for biological control of borer insect-pests.

In order to quickly provide the latest information on sugarcane production to the farmers, a Facebook Live program on current topics is being organized every Tuesday at 4-5 pm, which helped in creating understanding the pertinent issues related to sugarcane growing in Uttar Pradesh and other areas as well. Facebook live programme beneficiaries have also been noticed in other states and countries.

Annual Report of 2022-23 is a report of all the experiments conducted by the Council during the year. Our priority is to conduct farmer centric research based on scientific principles having sound back ground. I am thankful to the Editorial Board, Head of Divisions/Centres, Section in-charges and other scientific/ non scientific staff of the council who made contributions in preparing the Annual Report.

Jai Hind

(Sudhir Shukla)

About UPCSR

U.P. Council of Sugarcane Research was established as a research centre in 1912 by George Clark, the then Agricultural Chemist and later Director of Agriculture. With the enforcement of Sugar Tariff Act in 1931, the sugar Industry developed at a rapid pace and sugarcane became a major cash crop of the State in early thirties. Realizing the importance of this crop the state Government appointed an Economic Botanist (Sugarcane) in the same year at Shahjahanpur with the number of research schemes on different aspects of sugarcane. Thus it became possible to intensify sugarcane research activities in the State. Under this intensive programme, some new disciplines like Agronomy, Mycology, Soil Science and Statistics were added during the period of 1931 to 1941. Two sub stations i.e. Muzaffarnagar (1934) and Gorakhpur (1939) also came into existence. In 1944, the State Govt. posted the first Director of Sugarcane Research, U.P. at Shahjahanpur under the administrative control of Director of Agriculture, U.P., Lucknow. Untill December, 1972, the U.P. Sugarcane Research Organization was under the administrative control of Director of Agriculture, U.P., Lucknowand Director, U.P. Institute of Agriculture Sciences, Kanpur but in the same month it was transferred under the administrative control of Cane Commissioner, U.P. Lucknow with a view to integrate Sugarcane Research with Cane Development to enhance the productivity. In order to intensify sugarcane research in UP, a committee headed by the Chairman, Indian Sugarcane Development Council along with members gave number of recommendations emphasizing on the need of suitable sugarcane varieties for different tracts of Uttar Pradesh based on studies made from August 07 to 14, 1974. The Chairman, Indian Sugarcane Development Council in a committee consisting of four members visited Deoria from June 03 to 06, 1975 & gave its recommendations in as "Supplementary Report" on Sugarcane Development and the need of Sugarcane Breeding in East U.P. The subcommittee gave 07 recommendations on the different aspects of development/evolution of sugarcane varieties. The first and most important recommendation was "The sugarcane Breeding Station" should be located at Seorahi. Based on above recommendation, the U.P. Govt. sanctioned a scheme for the establishment of Sugarcane Breeding Station at Seorahi, Deoria in 1976 with the objective of breeding high yielding, high sugared and disease resistant sugarcane varieties suitable for different agro climatic zones of Uttar Pradesh.

In December 1976, Mahamahim Rajyapal, U.P. sanctioned the establishment of U.P. Council of Sugarcane Research at Shahjahanpur to speed up the research work by way of attracting highly qualified, experienced scientists and avoiding the administrative restriction on financial help.

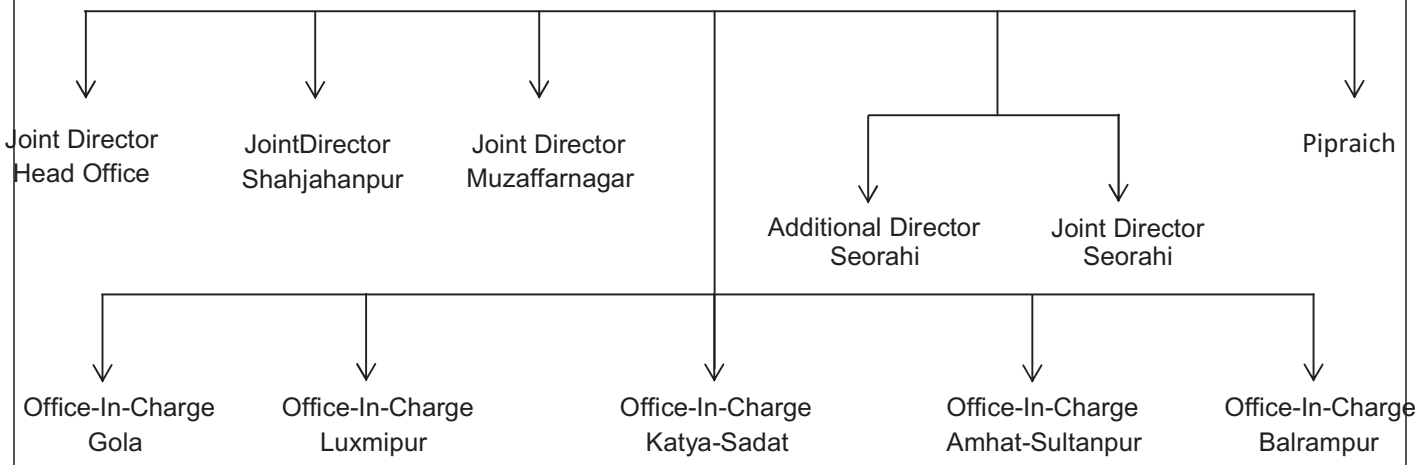
The objectives of U.P. Council of Sugarcane Research are to:

- Conduct research on various aspects of sugarcane in relation to breeding and productivity.
- Evolve varieties for different agro climatic zones of the State.
- Produce and multiply nucleus seed of improved varieties to raise the foundation nurseries at growers' field.
- Disseminate the research findings through various communication media.
- Impart training to the farmers and cane development staff.

With the establishment of U.P. Council of Sugarcane Research concerted efforts have been made for varietal evolution suitable for different agro climatic regions of the State and technologies to boost up the sugar and sugarcane production. The State has its own hybridization garden which is supporting the varietal evolution programme with the help of National Hybridization Garden at Sugarcane Breeding Institute, Coimbatore. With the result 237 varieties have been developed and released for general cultivation in the state, so far. Some of the varieties viz; CoS 767, CoS 8436, CoSe 92423, CoS 08272, CoS 08279, and CoS 88230 have crossed the State boundary due to their performance over wide range of agro climate.

Recently elite sugarcane varieties viz: CoS 13235,CoS 17231, UP 14234, CoS 10239, CoS 16233 CoS 15233 were released for general cultivation in different tracts of U.P.

Organizational Structure



Research & Other Disciplines under UPCSR (Shahjahanpur)

1	Genetics & Cytogenetic	11	Biotechnology
2	Tissue Culture	12	Central Lab
3	Breeding	13	Plant Pathology
4	Agronomy	14	Entomology
5	Sugar Chemistry	15	Biological Control
6	Soil Chemistry	16	Soil Microbiology
7	Gur and Khandsari	17	Seed Production
8	Biochemistry	18	Extension
9	Pesticides Chemistry	19	Economics
10	Plant Physiology	20	Statistics

Affiliated Research Institute and Seed Multiplication Centers

S. No.	Stations	Year of Establishment	Total Area (ha)	Cultivated Area (ha)
1	SRI, Shahjahanpur	1912	101.35	78.83
2	Muzaffarnagar	1334	40.20	32.42
3	Gola-Research (LakhimpurKheri)	1961	104.74	89.20
4	Gola-Seed (LakhimpurKheri)	1974		
5	GSSBRI, Seorahi (Kushi Nagar)	1975	114.58	89.12
6	Luxmipur (Kushi Nagar)	1968	30.10	22.31
7	Amhat (Sultanpur)	1987	14.17	13.23
8	Katya Sadat (Ghazipur)	1987	39.58	24.32
9	Balrampur	2002	16.58	5.99
10	Sirsa (Bareilly)	2018	14.80	14.50
11	Pipraich (Gkp)	2020	16.57	15.00
	Total		**492.24**	**393.31**

Salient Achievements (2022-23)

- A total of 526 accessions of germplasm including *Saccharumofficinarum, S. sinense, S. barberi, S. robustum and S. spontaneum,* along with Indian and foreign commercial hybrids were maintained in pure condition at Sugarcane Research Institute, Shahjahanpur.
- Hundred sugarcane accessions were characterized morphologically using 27 DUS (Distinctiveness, Uniformity, and Stability) traits in the year 2022-23. Under molecular characterization, DNA isolation of 129 sugarcane accessions was done and DNA amplification profiles of nineteen accessions were generated with the help of 10 ISSR markers. Out of ten markers, two markers ISSR UBC 810 and ISSR UBC 815 were found as polymorphic at a primary stage of genetic diversity experiment.
- Fresh cultures of elite sugarcane varieties CoLK 14201, CoS 13235 and Co 15023 were established for in vitro micro propagation. A total of 30000 (Thirty thousand) plantlets of varieties CoLK 14201, CoS 13235 and Co 15023 and transplanted at the farm of sugarcane research institute Shahjahanpur.
- In the year 2022-23 total of 0.91 hectare area was planted under tissue culture raised seedlings of varieties CoLK 14201, CoS 13235 and Co 15023 . Total 640 quintal seed of varieties CoLK 14201 and CoS 13235 was obtained from tissue culture raised seedlings planted in the year 2021-22 from which total 9.10 ha area was planted under breeder seed production programme in the year 2022-23.
- Four elite sugarcane varieties viz. CoS 17231 (early), CoS 16233, CoS 15233 and UP 14234 (mid late) were released by 'State Varietal Release Committee' in 2022-23 former three for general cultivation in various tracts of UP and later one for the usar soil.
- A total of three genotypes viz: CoS 22231 (S.27/17)-(CoS 91269 xCo 87268), CoS 22232 (S.45/17)-(CoS 91269xCo 87268) and CoS 22333(S.161/17)-(CoLk 94184 x Co 62198) were accepted for Inclusion in IVT of North West Zone of AICRP(S).
- Genotype S. 01/18 (Co09022 x Co62198) was proposed in the State Varietal Trial for multi-location testing at various Research Institutes/ Stations of UPCSR and Ten sugar factory farms across the eastern central and western Uttar Pradesh.
- A total of 2741.5 g. (2376.5+365.0 local) fluff of 88 crosses from different crossing sites viz; Coimbatore, Agali and Shahjahanpur was sown, which resulted of 18660 seedlings. A total of 16,522 (11259 at Shahjahanpur+3006 at Muzaffarnagar + 2257 at Gola) seedlings were transplanted for further studies and evolution of elite sugarcane varieties in future.
- Promising genotype CoSe 11453 from Seorahi under mid –late group has been identified and sent for gazette notification by Central Varietal Release Committee (CVRC). Two genotypes CoSe 22451 (Early) and UP 22452 (Mid-late) have been accepted in Biennial workshop of AICRP.
- DNA Sequencing of two bacterial strain B2132 and B2133 were performed by 16s rDNA/ITS gene sequencing protocol by ICAR-National Bureau of Agriculturally Important Microorganisms, Mau (UP) and DNA sequencing of *Stenotrophomonas maltophilia* strain B2132 was published on National Center for Biotechnoogy Information with the accession number of OP457179.1 under title of "*Stenotrophomonas maltophilia* strain B2132 16S ribosomal RNA gene, partial sequence".
- Variety CoS 17231 produced significantly higher cane yield (92.20/ha) in deep furrow paired row planting at 67:134 cm plant geometry with 100% recommended NPK + 25% N through organic manure + Biofertilizers (Azotobactor + PSB @ 10 kg/ha each) at Shahajahanpur
- Significantly higher cane yield (86.60 t/ha) was recorded with 100% recommended dose of NPK through inorganics + sagarika@25kg/ha then that of 100% RDF of P_2O_5 and K_2O through inorganics + spraying nano urea @5ml/ lit water at 60 DAP and 90 DAP with cane yield of 71.30t/ha at Shahajahanpur
- Significantly highest cane yield (122.013 t/ha), CCS yield (13.05 t/ha) and net profit (Rs250502/ ha) were recorded by "Deep furrow planting at 75 cm". Maximum cane yield of 93.148 t/ha, CCS yield (12.392t/ha) and net profit (Rs. 158260/ha) was recorded by CoS17231 variety when its planting at 30:120 cm spacing in trenches with 100% RDF + 25 kg N/ha through organics + Bio fertilizers (Azoto.&PSB)@ 10 kg /ha each at Shahajahanpur.

- Significantly highest tillers (179756/ha), number of millable canes (132871/ha), cane yield (98.380t/ha), CCS yield (13.29 t/ha), net profit (Rs 146757/ha) and benefit ratio (1: 0.69) were obtained by treatment T8- 100% recommended dose of NPK through inorganics (conventional) + Sagarica @ 25 kg/ha at Seorahi.
- Trench planting in paired row at 150 (30:120) cm produced significantly higher cane yield than conventional and other planting methods. Early promising genotype CoSe 17451 performed better in cane yield as compared to variety CoS17231 at seorahi institute.
- CoS 09232 (10.25) and Co 0238 (11.37) produced the highest jaggery output (t/ha). The variety Co0238 (82.58) had the greatest Pol% jaggery, followed by CoS767 (79.82), CoS 09232 (79.43) and CoS 08272 (79.16) in terms of qualitative parameters. The invert sugar % was lowest in CoS 09232 (2.38) Co 0238 (2.48), however, colour of jaggery was also minimum in these varieties and they were found to be better for commercial production of jaggery at Shahajahanpur.
- As regards to gur % in cane, the sugarcane variety Co 0238 produced higher (11.83) followed by CoS13235 (11.77), CoS 15233 (10.62) and CoS 16233 (10.40). In respect of gur yield t/h, highest was obtained in Co 0238 (9.64) followed by CoS 13235 (9.55),CoS 15233 (7.80), CoS 17236 (16233) over standard CoS 767 (6.13) at Muzaffarnagar.
- Varieties CoLk 14201, CoS 16233 and CoS 18231 gave higher yield under water stress condition along with minimum yield reduction percent hich indicated their water stress tolerant.Varieties CoS 08279, CoSe 96436 and CoSe 11453 showed better response than other tested varieties under water logging condition.
- Varieties CoLk 14201, CoS 16233, CoS 10239 and CoS 18231 gave higher yield under saline soil condition. These varieties are found relatively more tolerant to saline soil condition.
- Leaf area, specific leaf area, specific leaf weight and leaf area index was found comparatively higher in variety CoS 08279 then others under deficient moisture condition. Cane yield was also higher in the variety CoS 08279 than others. LAI was positively correlated with the yield components.
- A total of 4432 samples of cane juice were analyzed for Brix, sucrose and purity coefficient, 779 cane samples were analyzed for pol % in cane, and 779 cane samples were estimated for fibre % in cane.
- Percent juice sucrose of early maturing varieties ranged between 14.59% (Co 0238) to 15.86% (Co15023) during October and gradually increased until March and ranged between 19.62 % (CoS 16233) to 20.93% (Co 0238).
- Percent juice sucrose of mid-late maturing varieties ranged between 13.29% (CoS 767) to14.34% (CoS 09232) in October and increased to 18.58% (CoS 17234) to 19.55% (CoS 09232) in March.
- The highest yield of 95.92 t/ha (Co 0238) was observed in autumn planted cane, followed by spring 85.40 t/ha and late 78.39 t/ha planted cane.
- The post-harvest study shows a significant decline in the weight of the canes. The losses ranged between 4.45 to 10.35 per cent during low (Jan) and 8.09 to 16.80 percent during high (April) temperatures.
- The maximum loss was found to be in the uncovered (T1) CoS 13231 (10.35) percent) during low and in T1, CoSe 11453 during high (16.80 per cent) temperatures was found to be minimum in the variety Co 0118 during low (4.45 percent) and high (8.09%) temperatures.
- The application of ortho silicic acid solution increased the cane height. Findings suggested that the application of ortho silicic acid (silixol, 0.8%) not only helps improve the cane yield and juice quality of sugarcane but also helps reduce the quality deterioration in harvested cane up to a significant level.
- Six sugar mills viz; (1). Avadh Sugar Energy Ltd. Unit-Hargaon, (Sitapur) (2). U.P. State Sugar Corporation Ltd., Unit- Pipraich, (Gorakhpur), (3). Yadu Sugar Ltd, Bisauli, (Badaun), (4). Dwarikesh Sugar Ind. Ltd, DwarikeshDham, (Faridpur), (5). The Kisan Sahkari Chini Mills Ltd, Tilhar, (Shahjahanpur) and (6). Kisan Sahkari Chini Mills Ltd, Sampurna Nagar, (Kheri) of Uttar Pradesh, was evaluated for sugar recovery.
- A total of 1296 soil samples were analyzed of different sugar mills/farmers and revenue of Rs. 64800.00 was generated for council and also Rs. 60000.00 was generated through recovery testing of

three sugar factories from western zone.

- During the year 2022-23 a total 41560 kg of Ankush, 7100 kg of Azotobacter, 9596 kg of PSB,3721 kg of Organo decomposer and 2714 Kg of *Beauveriabassiana & Metarrhiziumanisopliae* (total 64,691 kg) were supplied to the various farmers/ sugar mills and earned an amount of Rs. 38,26,488.00 (Thirty eight lakhs twenty six thousands four hundred eighty eight) which is highest production and revenue per year till now.
- The nowel bacterial strain B2132 inhibits the primary infection of red rot, in constrast the secondry infection was spreaded during rainy seaseon under humid condition. Hence, almost all the treatments were found affected by the secondary infection of red rot, ranging from 22.59 per cent (T_3) to 77.96 per cent (T_7) at Shahajahanpur
- Extensive survey work was conducted during pre-monsoon and post-monsoon in twenty three sugar factory zone of central UP. Red rot incidence was recorded up to 100% in Co 0238 Sampurna Nagar and Khambarkheda sugar mills area.
- At Shahajahanpur fifty three new isolates (R 2201 to R 2253) of *C. falcatum* were isolated from variety Co 0238, CoS 08279, Co 0118, CoPk 05191, Co 98014, CoLk 94184, CoS19233 and CoJ 85 from different sugar factory areas. The isolates such as Cf 08279 (1), Cf 19233 (1), Cf 98014 (1), Cf 05191 (2) and Cf 08436(1) exhibited almost similar disease behaviouras Cf 0238 on host differentials. It has been expected that all isolates has been originated from prevalent pathotypes CF 13 (Cf0238).
- The varieties namely Co 0118, Co 98014, Co 62399, CoC 671, CoS 08279 and CoS08272 exhibited susceptible reaction and CoLk 15201, CoPk 05191, Co 05011 displayed. MS reaction to CF 13 and other two Cf 0238 isolates. The results very clearly indicated that resistant variety like Co 0238, Co 0118, Co 98014,CoS 08272 and CoS 08279 suffer due to the origin of new strain of *C. falcatum* (CF 13)and also susceptible varieties CoC 671 and Co 94012 suffered severely against novelstrain under field condition .
- Drenching of Thiophanate Methyl at planting and 45 and 90 DAP followed by soakingwith Thiophanate Methyl was found better against the primary incidence of red rot.
- The product "Provax 200 FF (Carboxin 17.5% + Thiram 17.5% FF)" was recordedeffective against red rot and pokkahboeng diseases, which offers not only a disease management but also it improves plant vigour and quantitative attributes of sugarcane crop. "Suton", dose of 0.1% of this natural organic product established better to inhibit pokkahboeng in field condition after foliar application at the appearance of this disease under the pot experiment at Shahajahanpur.
- Extensive survey of 13 sugar factories of western U.P. was conducted and red-rot was recorded on Co 0238 in Gangetic plains (Meerut and Saharanpur region) in many sugar factory zones with stray to mild. The variety Co 0118 was also found succumbed with red rot in stray in upland villages of Kinoni sugar factory. The incidence of Pokkahboeng disease, yellow leaf disease, bacterial rot, smut, GSD and leaf binding disease were also observed in with various incidence levels on most popular cultivar.
- In the year 2022-23 four clones (Seo 21/19, Seo 51/19, Seo 218/19, Seo 255/19) were found moderately resistant against red rot at seorahi institute.
- Sett treatment in Sett Treatment Device with fungicide Propiconazole along with soil drenching with Carbendazim was found effective to control wilt in variety CoS 08279.
- During the year 2022-23 statistics division of Shahjahanpur institute received about 478 data of research experiments in various statistical designs mainly from Shahjahanpur institute and Gola center and some data from Muzaffarnagar station. Statistics division also analyzed around 240 data of All India Coordinated Research project from concerned divisions.
- 15 training programmes were conducted and trained to 1310 farmers about sugarcane cultivation and also conducted training programme at farmer's field regarding Trichocard production.
- To provide sugarcane technology in audio visual form to the farmers a weekly live programme started through UPCSR Facebook page on every Tuesday. Subscriber of this page is now 22574. Highest reach of a single programme is 10 lakh.Farmers of other countries like Nepal, Pakistan, Saudi Arabia, UAE,Kenya, Kuwait, Canada, Afganistan and Ethopia also watchedFace

book live programme.

- A "Virat Kisan Mela" was conducted on 04 March 2023 in which more than 4000 farmers , sugar mill representatives were participated from all over India as well as Nepal.
- During 2022-23 from the breeder seed Cane nurseries planted 2021-22, total 5,65,60,873 single buds of CoS 13235, CoLk 14201 and Co 15023. Total 1,10,788.08qt of other varieties of breeder seed cane was produced, under UPCSR Shahjahanpur.
- During 2022-23 breeder seed cane nurseries were planted in 284.07 ha area at research and sugar mill farms, under UPCSR Shahjahanpur.
- Macronutrients utilization studies revealed that, highest average 'N' content was observed 1.30% in Co 0238 followed by Co 0118 while lowest value (1.08%) in CoS 10239. The Phosphorus content was maximum 0.32% in Co 0238 whereas lowest in CoS 08279 (0.21%). Maximum Potassium (K) content was observed in CoLk 14201 (3.74%) whereas minimum in CoS 16232 (2.61%).
- Micronutrients utilization studies showed that, Zinc content was found maximum (21.1 mg/kg) in CoS 16233 while minimum in CoSe 13452 (11.3 ppm). The Iron was found maximum in CoS 08272 (460.0 mg/kg) whereas minimum in Co 05011 (204.1 ppm). Copper was detected maximum in CoS 0238 (15.17 ppm) whereas minimum in CoS 08272 (9.1 ppm). The highest 'Mn' value was observed in CoS 16233 (32.93 ppm) and lowest in CoS 10239 variety (19.93 ppm).
- The maximum NRA activity was recorded in variety CoS 08272 (2.68 µm/gm/hr) followed by CoS 13231 and CoLk 14201 varieties while it was lowest in CoS 16232 (1.49 µm/gm/hr).
- Biochemical study showed that, at grand growth phase Sucrose Phosphate Synthase (SPS) and Sucrose Synthase (SuSy) activities in leaf was increased up to 10.037% and 11.01% respectively by application of Zn and Cu along with RDF. Acid invertase and neutral invertase activity does not showed any significant changes whereas Nitrate Reductase (NR) activity increased by the application of Zn and Cu. Germination per cent, HR Brix and Sucrose % was significantly increased in all varieties by application of Zn, Mn and Cu along with RDF.

Shahjahanpur

Collection, Maintenance and Evaluation of Germplasm

UP Council of Sugarcane Research is an important center for germplasm collection in North India. A total of 526 accessions of germplasm including *Saccharum officinarum, S. sinense, S. barberi, S. robustum and S. spontaneum,* along with Indian and foreign commercial hybrids were maintained in pure condition in an augmented block design at the research farm of Sugarcane Research Institute, Shahjahanpur.

Table 1 Details of the sugarcane germplasm maintained at Shahjahanpur

SN	Species/hybrids	No. of entries
1	*Saccharum officinarum*	03
2	*Saccharum sinense*	06
3	*Saccharum barberi*	08
4	*Saccharum spontaneum*	02
5	Inter specific hybrids	14
6	Indian commercial hybrids	445
7	Foreign commercial hybrids and others	48
	Total	**526**

Assessment of genetic diversity in the sugarcane germplasm

With the aim of value addition to germplasm collection, and to prepare a data base with description of each and every genotype, a programme was initiated in the year 2022- 23 in collaboration with breeding and biotechnology division entitled "Assessment of genetic diversity in the sugarcane germplasm" with the objectives of characterizing sugarcane germplasm for agro morphological traits and assessment of genetic diversity with the help of molecular markers.

Hundred sugarcane accessions were characterized morphologically using 27 DUS (Distinctiveness, Uniformity, and Stability) traits in the year 2022-23. Under molecular characterization, DNA isolation of 129 sugarcane accessions was done and DNA amplification profiles of nineteen accessions were generated with the help of 10 ISSR markers. Out of ten markers, two markers ISSR UBC 810 and ISSR UBC 815 were found as polymorphic at a primary stage of genetic diversity experiment.

Evaluation and utilization of sugarcane germplasm for red rot resistance

Since red rot is a major disease of sugarcane, screening of sugarcane varieties/genotypes available in the germplasm against multiple races of red rot is utmost important, so that on getting desired outcome, information could be exchanged with SBI, Coimbatore for the inclusion of respective genotype/s in National Hybridization Garden as a source of red rot resistance to be utilized in the varietal development programme.

In the year 2022-23 in collaboration with plant pathology division, sixty genotypes of sugarcane were screened against red rot pathotypes Cf 07, Cf 08 and Cf 13 under the programme "Evaluation of sugarcane germplasm for red rot resistance". Based on one year data 36 varieties were found R or MR against three races of red rot. This data will be further validated in the second year and sixty new sets will also be evaluated.

Sugarcane germplasm 2022-23

Seorahi

Maintenance and evaluation of sugarcane germplasm

Genda Singh Sugarcane Breeding and Research Institute, Seorahi- Kushinagar has been design as the main center for maintenance collection and evaluation of sugarcane germplasm for north central zone of India with the aim of improvement in sugarcane crop. Institute is situated at 27.2 N latitude and 84.2 E longitude in eastern region of Uttar-Pradesh. Germplasm comprising Indian and interspecific hybrids. During 2021-22 a total of 183 accessions including Sachharum species, Indian commercial hybrid and interspecific hybrids were successful maintained in germplasm in pure and disease free condition for their utilization in breeding programme.

Details of the sugarcane germplasm maintained at Seorahi.

Species/ commercial hybrids	Number of accessions
Saccharum spontaneum	03
Indian Commercial Hybrid	175
Forgien commercial hybrid	04
Inter Specific Hybrid (ISH)	01
Total	183

These accession were sown in augmented design in two rows of six meters length with 90 cm distance and evaluated for some quantitative and quality traits. No. of shoots/ha and No. of millable canes/ha in the accessions percent in the germplasm range from 76,850 to 203369 and 11,111to 1,72,222 respectively, whereas, HR brix (%) ranged from 12.7 to 23.5.

Shahjahanpur

Micropropagation of sugarcane varieties

Fresh cultures of elite sugarcane varieties namely CoS 13235, Co 15023 and CoLk 14201 were established for *in vitro* micropropagation during the year 2022-23. For establishment of shoot cultures, healthy tops were collected from 8-10 month old plants of aforesaid varieties growing in trials of Breeding Division. Shoot tip explants measuring about 1.0 cm in length were surface sterilized and aseptically inoculated on agar gelled (8.0 g/l) Murashige and Skoog's (MS) medium supplemented with BAP and Kinetin (0.5 mg/l each) and sucrose (30 g/l) for establishing shoot cultures. Initially, one actively growing shoot was proliferated from each responding explant within 2 weeks of transfer on aforesaid medium. Numerous side-shoots (tillers) developed from the base of each mother shoot to form a shoot clump within next 4-6 weeks. Each shoot clump was isolated from the explants and transferred to MS liquid shoot multiplication medium for establishment. The established shoot cultures were separated in to the smaller groups each containing 2-3 shoots and transferred on to the fresh MS medium of the same composition for further multiplication. Separation and sub-culturing of shoot cultures were repeated fortnightly till sufficient numbers of shoots were produced. The micropropagated shoots were then transferred onto half strength MS liquid rooting medium containing 5.0 mg/l NAA and 50 g/l sucrose for rooting. Sufficient rooting was obtained in most of the shoots within 2 weeks on rooting medium.

The rooted plantlets were taken out of the growth room, washed thoroughly under running tap water and individual plantlets were carefully separated. Finally the plantlets were planted in small polythene bags (size 3x4inch) containing soil mixture (soil, sand, vermi compost , 1:1:1) and kept in glass house for about 30 days for hardening followed by 2 weeks of acclimatization in the shade house. Hardened plantlets were transplanted in 8-9 cm deep furrows drawn in well prepared field at 30 cm in furrows and 90 cm apart. A light irrigation was given to the nursery immediately after transplantation. Recommended agronomic practices were followed for raising the seed nurseries. Approximately 90 % plantlets survived in the field and grew normally. The seed nurseries were monitored by 'seed certification committee' consisting of a Breeder, Pathologist and an Entomologist from time to time. The nursery was found to be pure and free from disease and insect-pests' infestations.

In the year 2022-23, a total 0.91 ha area was planted under tissue culture raised seedlings of varieties CoLk 14201, CoS 13235 and Co15023. Total 640 quintal seed of varieties CoLk 14201 and CoS 13235 was obtained from tissue culture raised seedlings planted in the year 2021-22, from which total 9.10 ha area was planted under breeder seed production programme in the year 2022-23.

Table 1 Observations on different traits

Observations taken	Varieties	
	CoS 13235	**CoLk 14201**
Survival percentage	80	90
Shoot Initiation (%)	80	82
Shoot multiplication rate	2.30	2.72
Rooting (%)	82	85
Survival(%)in the Glass House	83	85
Survival in the Field (%)	92	94
No. of Shoots / Clump	5.07	5.03
NMC/ Clump	4.64	4.55

Shoot multiplication of varieties CoS 13235 and CoLk 14201

Variety CoLk 14201, Plot G2S

Variety CoS 13235, Plot X-3

Variety Co15023, Plot G2N-3

Shahjahanpur

New Released Varieties:

Four elite sugarcane varieties viz.CoS 17231(early), CoS 16233, CoS 15233 and UP 14234(mid late) were released by 'State Varietal Release Committee' in 2022-23, former three for general cultivation in various tracts of UP and later one for the usar conditions. The salient features of these are as under :

CoS 17231(Early) (CoV 89101 X Co S 96260)

An early maturing variety CoS 17231 is characterized by tall, medium thin greenish yellow solid stalks, dark green foliage, erect habit easily detrashing, leaf sheath with purplish ting, very good ratooner, moderately resistant to red rot with low incidence of top borer, stem borer and shoot borer. During the study CoS 17231 recorded 83.01 t/ha average yield which is 5.05 percent higher than Co 0238. Regarding Pol percent in November, January and March it was recorded 11.63,12.87 and 14.04 respectively where as it was 11.69,12.88and 13.73 in Co 0238. CCS t/ha was recorded 11.14 which is 7.95 per cent higher than Co 0238.

CoS 17231

CoS 16233(Mid late) (Co 89003 X Co Se 92423)

A mid late maturing variety CoS 16233 (Sahaj-9), is characterized by tall, medium thick, stalks with wax coating, greenish foliage, erect habit, easily detrashing, good ratooner, During the study in 9 locations of AICRP-NWZ,CoS 16233 recorded 87.65 t/ha average yield which is 5.53 percent higher than CoS 767. Regarding Pol percent in November, January and March it was recorded 12.03,13.08 and 14.07respectively where as it was 12.11,13.20, and 14.22 in Co S 767. CCS t/ha was recorded 11.64 which is 3.74 per cent higher than Co S 767..

CoS 16233 was proposed and accepted as mid-late maturing clone for multi-location testing in North West Zone of the All India Co–ordinated Research Project on Sugarcane during 2020-2021. A mid -late maturing, high yielding, high quality clone with moderately resistant to red- rot disease with low incidence of top borer, stem borer and shoot borer. It was released by the State Varietal Release Committee' for the general cultivation in different tracts of U.P. in the year 2022.

CoS 15233 Mid late (CoH 56G.C.)

A mid late maturing variety CoS 15233 is characterized by tall, medium thick, greenish yellow stalks, yellowish green foliage, erect habit easily detrashing, good ratooner, moderately resistant to red rot with low incidence of top borer, stem borer and shoot borer. During the study CoS 15233 recorded 93.48 t/ha average yield which is

26.86 percent higher than Co S 767. Regarding Pol percent in November, January and March it was recorded 11.31,12.39 and 13.85 respectively where as it was 11.19,12.48, and 13.64 inCo S 767 . CCS t/ha was recorded 12.20 which is 28.69 per cent higher than Co S 767. It ismoderately resistant to red rot with low incidence of top borer, stem borer and shoot borer.

Fig. CoS 15233 Midlate (CoH 56 GC)

UP 14234 (S 536/99 X S 301/87)

A mid late maturing variety UP 14234 is characterized by medium thick, greenish yellow cane with yellowish green top. It recorded 21.74 per cent higher cane yield t/ha than standard CoS 767 under usar conditions at Sadat-Gazipur (Ph 8.5-9.5) . Hence it can be a better alternative sugarcane variety in such areas. It is moderately resistant to red rot with low incidence against top borer, stem borer and shoot borer.

UP 14234 ML (For Stress/Usar at Sadat)
(S.536/99 x S 301/87)

Hybridization

With the objective to improve the cane juice quality,yield and disease resistance hybridization work was performed at Shahjahanpur as well as Coimbatore(Tamil Nadu). A hybridization garden was maintained at Sugarcane Research Institute, Shahjahanpur,U.P. to study the floral biology and to affect the crosses. Out of 47 genotypes planted 40 flowered. The pollen fertility ranged from 9.5 percent (S.235/19) to 74.63 percent (S.301/87). A total of 16 crosses were affected..

Hybridization was also performed at National Hybridization Garden, ICAR- Sugarcane Breeding Institute,Coimbatore as well as Agali. Where 41 Bi-Parental Crosses 02 PC and 26 GCwere affected

Raising of seedlings

A total of 2741.5 g. (2376.5 + 365.0 local) fluff of 88 crosses from different crossing sites viz; Coimbatore, Agali and Shahjahanpur was sown which resulted in 18660 seedlings A total of 16522 (11259 at Shahjahanpur+ 3006 at Muzaffarnagar + 2257 at Gola) seedlings were transplanted for further studies and evolution of elite sugarcane varieties in future.

Details of seedlings

S N	Crosses	Weight of fluff (gm.)	No. of seedlings obtained	No. of seedlings transplanted
A-	**Coimbatore crosses**			
01	Bi-parental(41) Co(33)+Agali (8)	1288.5	12466	11348
02	Poly crosses (02)	14.0	14	12
03	General Crosses (26)	1074.0	6060	5068
	Total (69)	**2376.5**	**18540**	**16428**
-				

B-	**Shahjahanpur crosses** (19)	365.0	120	94
	Grand Total (88)	**2741.5**	**18660**	**16522**

Ratooning of seedlings

In order to select superior clones with good ratoonability along with other desirable attributes, a total of 1273 seedlings (1270 Coimbatore including 03 local seedlings) were transplanted out of which 1087 survived. These seedlings clones were ratooned during February 2022 for further evaluation. Out of these 87 superior clones were selected for the study in C1 generation . CoS 08279 X Co 62198, Co 0238 X CoPant 97222, CoJ 83 X Co775,Co 8353 X BO 130, CoJ 88 PC, CoS 8436 PC , Co1148 GC, CoS08279 GC, Co 8408 GC, CoS 87216 GC, UP 05125 GC gave good selections.

First clonal generation (C1)

At Shahjahanpur from 864 ratooned seedling on the basis of over all good performance a total of 176 clones (143 Coimbatore +33 Agali) were promoted for the study in C_1 generation .Some good crosses viz. CoS 92263 x Co 86011, CoV 89101 x CoPant 97222 andCoV 89101 x CoS 96260 gave more number of genotypes with desirable attributes. On the basis of HR brix and other desirable attributes and overall good performance 68 genotypes were promoted for further evaluation in C2 generation.

Second clonal generation(C2)

In this experiment 232 genotypes selected from C_1 generation were evaluated against four standards viz. Co 0238, CoJ 64, CoS 767 and CoPant 97222 On the basis of quality and other desirable characters a total of 52 genotypes were selected for Preliminary Varietal Trial (PVT)and planted in RBD in two replications comprising of four rows each. For the strengthening of varietal development programme in the Western UP, a total of 30 genotypes were given to Sugarcane Research Station Muzaffarnagar for evaluation and further study.

Preliminary Varietal Trial:

A total of 26 genotypes viz: S.35/18, S. 151/18, S. 86/18, S. 91/18, S. 9/18, S. 185/18, , S. 189/18, S. 44/18, S. 245/18 , S. 89/18, S. 238/18, S. 12/18, S. 124/18, S. 129/18, S. 2/18, S. 14/18, S. 4/18, S. 7/18, S. 246/18, S. 1/18, S. 20/18, S. 22/18, S. 75/18, S. 77/18, S. 18/18, S. 121/18 were tested with four standards viz. Co 0238, CoJ 64, CoS 767 and CoPant 97222 in RBD with two replications. Highest Cane Yield (t/ ha) was recorded in S 1/18 (98.14) followed by S 9/18, (96.06) and S 12/18 (95.36).

In the month of November, the highest sucrose % in juice was recorded in S.91/18 (17.51) followed by S.20/18 (17.39) and Co 0238 (17.33). In the month of January, the highest sucrose % in juice was recorded in S.89/18 (18.24) followed by S.91/18 (18.13) and Co 0238 (18.07). In the month of March, the highest sucrose % in juice was recorded in S.245/18 (20.65) followed by S.77/18 (20.58) and S.151/18 (20.55).

Out of 26 genotypes studied 09 were found moderately resistant to Cf 13 (new race) of red rot. Genotype S.01/18 (Co 09022 x Co 62198) was proposed in the State Varietal Trial for multi location testing at Research Institute/ Stations viz. Shahjahanpur, Seorahi, Muzaffarnagar, Gola & Katya Sadat and Ten sugar factory farms.

State Varietal Trial (I Plant): –

The performance of a uniform set of Seventeen genotypes viz CoS 19231 CoS 19233 (S.12/15), CoS 19234 (S.234/15), CoS 20234 (S.142/15), S.188/15, Seo. 685/15, Seo. 565/16, Seo. 1019/16,Seo. 1581/16, CoLk 18201, CoLk 18202, CoLk 18203, CoLk 18204 along with standards CoJ 64, Co 0238, CoS 767 and CoPant 972222 were studied in RBD with two replication at Shahjahanpur, Seorahi, Muzaffarnagar, Gola & Katya Sadat. At Shahjahanpur the highest cane yield(t/ha) was recorded in CoS19234 (96.06) followed by CoS 19233 (94.91) and CoS 19231 (92.59). The highest Sucrose per cent in juice was recorded in Co 0238 (17.44) followed by S.188/15 (17.12) and CoS 19231 (16.45) in November. In January CoS. 19231 (18.00) followed by Co. 0238 (17.91) and S.188/15 (17.70). In March S.188/15 (20.86) followed by CoS. 19231 (20.49) and CoLk. 18203 (20.37). The highest Pol % in cane was recorded in Co. 0238 (12.93) followed by S. 188/15 (12.72) and CoS. 19231 (12.65) in November. In

January CoS. 19231 (13.27) followed by Co. 0238 (13.26) and S.188/15 (13.19). In March S. 188/15 (14.96) followed by CoS 19231 (14.80) and CoLK 18203 (14.68) the highest CCS t/ha was recorded in CoS 19234 (13.48) followed by CoS 19233 (13.45) and CoS. 19231 (13.31).

StateVarietal Trial (II Plant):–

The performance of a uniform set of eighteen geno types viz CoS 18233(S.1368/13), CoS 18234 (S.2387/12), CoS 18236 (S.855/14), CoS 18238 (S.1017/14), CoS 18241 (S.112/14), CoS 19232 (S.425/14). CoS 19235 (S.471/14) Seo.1067/15, Seo .1860/15, CoSe 15453, CoLk 16201, CoLk 16202, CoLk 16203, CoLk 16204 along with standards CoJ 64, Co 0238, CoS 767 and CoPant 97222 were studied in RBD with two replications at Shahjahanpur, Seorahi, Muzaffarnagar, Gola & Katya Sadat.

At Shahjahanpur the highest cane yield (t/ha) was recorded in CoS 18236 (98.84) followed by Co S18233 (96.30) and CoS 18238 (95.33) .The highest Sucrose per cent in juice was recorded in Co. 0238 (17.36) followed by CoS. 19232 (17.18) and CoLk. 16201 (17.09) in November. In January Co. 0238 (17.82) followed by CoS. 19232 (17.51) and CoLk. 16202 (17.49). In March Co. 0238 (19.96) followed by CoLk. 16202 (19.90) and CoS. 18233 (19.79). The highest pol% in cane was recorded in Co. 0238 (12.68) followed by CoLk. 16201 (12.60) and CoS. 19232 (12.59) in November. In January Co. 0238 (13.05) followed by CoLk. 16202 (13.01) and CoS. 19232 (12.78). In March Seo. 1860/15 (14.59) followed by CoS. 18233 (14.56) and CoS. 18238 (14.49). The highest CCS t/ha was recorded in CoS. 18233 (13.24) followed by CoS. 18236 (12.88) and CoSe. 15453 (12.57).

State Varietal Trial - Ratoon:

The ratoonability of a uniform set of eighteen genotypes viz CoS 18233 (S.1368/13), CoS 18234(S.2387/12), CoS 18236(S.855/14), CoS 18238(S.1017/14), CoS 18241(S.112/14), CoS 19232(S.425/14). CoS 19235(S.471/14) Seo .1067/15, Seo .1860/15, CoSe 15453, CoLk 16201, CoLk 16202, CoLk 16203, CoLk 16204 along with standards CoJ 64, Co 0238, CoS 767 and CoPant 97222 were studied in RBD with two replications at Shahjahanpur, Seorahi, Muzaffarnagar, Gola & Katya Sadat.

At Shahjahanpur on the basis of cane yield(t/ha) CoS 18236(84.25) was highest followed by CoS 18233(82.86), and CoS 18238 (81.01). The highest Sucrose per cent in juice was recorded in CoS 19232 (15.25) followed by CoLk 16201 (14.92) and CoS 19235 (14.71) in October. In November CoS. 19232 (17.49) followed by CoS. 18233 (16.87) and CoLk. 16201 (16.48). In December CoS. 19235 (18.51) followed by CoS. 19232 (18.33) and Co. 0238 (18.11). The highest pol% in cane was recorded in CoJ. 64 (11.25) followed by CoS. 19232 (11.21) and CoS. 19235 (11.17) in October. In November CoS. 18233 (12.51) followed by CoJ 64 (12.15) and CoS. 19232 (11.87). In December CoS 19235 (13.46) followed by CoJ. 64 (13.16) and CoS. 18238 (13.14). The highest CCS t/ha was recorded in CoS. 18233 (10.06) followed by Co. 0238 (10.02) and CoSe. 19235 (09.81).

Muzaffarnagar

1. Seedling:

Under varietal development programme a total of 3006 seedlings of 04 Biparental crosses and 4 GCs were collected from Sugarcane Research Institute, Shahjahanpur and transplanted for further studies and evolution of elite sugarcane varieties in future.

2. Second Clonal generation (C2):

A total of 97 genotypes of different crosses were procured from Sugarcane Research Institute, Shahjahanpur and studied with 03 standards viz. CoJ64, Co0238 and CoS767. On the basis of quality and morphological attributes 12 genotypes were selected for further study in Preliminary Varietal trial (PVT).

3. Standard Varietal Trial 1st Plant:

Seventeen entries including four standards (CoS767, CoPant 97222, Co0238, and CoJ64) were studied in randomized block design with two replications. Six entries viz. Seo. 1581/16, CoS19231, CoS19233, CoS19234, Seo565/16 and CoS20234 in cane yield and three entries viz.CoS19231, Seo1581/16 and CoS19233 in CCS t/ha were found significantly superior over the best standard Co0238(81.92,11.37). In November highest pol % in cane recorded in S.188/15(11.96) followed by CoJ64 (11.88) and Co0238(11.76), while in January CoS19231(13.92) stood first followed by Co0238 (13.88) and CoJ64(13.78), where as in March

Co 0238(14.39) recorded highest pol % in cane followed by CoS19231(14.32) and CoJ64(14.30). In Red rot reaction by plug method 05 entries viz. CoS19231, CoLk18201, CoLk18202, Seo685/15 and Seo565/15 reacted as MR against CF07, CF08 and CF13 races.

4. Standard Varietal Trail 2nd Plant :

Eighteen entries including four standards viz. CoS767, CoPant 97222, Co0238 and CoJ64 were evaluated in randomized block design with two replications. Seven entries *viz.* CoS 18236, CoSe 15453, CoS 18238, CoS 19235, CoS 18233, CoLk 16202 and CoS 19232 recorded significantly higher cane yield and CCS t/ha over the best standard Co 0238 (81.94,10.88). As regards pol % in cane in November CoS 19232 (10.81), CoS 19235 (10.78) and CoS 18233 (10.72) stood first, second and third respectively. In January Co 0238 (12.96) was highest followed by CoS 19235 (12.94) and CoJ 64 (12.90). While in the month of March CoS 19235 (14.04), CoS 18238 (14.01) and Co 0238 (13.92) exhibited 1st, 2nd and 3rd respectively.

5. Standard Varietal trail, Ratoon :

The ratooning ability of preceding SVT 1st plant 18 entries including 4 standards *viz.* CoS767, CoPant 97222, Co 0238 and CoJ 64 were studied in randomized block design with two replications. Two entries CoS 18236 and CoSe 15453 recorded significantly higher cane yield t/ha over the best standard CoPant 97222 (70.83), whereas in CCS t/ha 04 entries CoS 18236, CoSe 15453, CoS 18238 and CoS 19235 were significantly higher over the best check Co 0238 (8.30). In pol % in cane in October Co 0238 (11.52) was highest followed by CoS 18233 (11.44) and CoLk 16201 (11.42). In November the standard variety CoJ 64 (12.58) recorded highest pol % in cane followed by CoS 19235 (12.55) and Co 0238 (12.43), while in December CoS 19235 (13.36) stood first followed by CoLk 16202 (13.21) and CoJ 64 (13.09) respectively.

6. Standard Varietal trail, Multiplication :

Twelve entries of different research Institute/centresviz. CoS 17232, CoS 18232, S.45/17, S.161/17,S.01/18, CoSe 22451, UP 22452, S.155/17, S.168/17, CoLk 19201, CoLk 19202 and CoLk 19204 were multiplied for SVT 2024-25.

SEORAHI

1. HYBRIDIZATION:

To improve cane yield, juice quality and disease resistance, crossing programme was carried out at Sugarcane Breeding institute Coimbatore and Genda Singh Sugarcane Breeding and Research Institute Seorahi (Kushinagar). A hybridization garden was maintained with 35 genotypes/ varieties at G.S. Sugarcane Breeding and Research Institute Seorahi (Kushinagar) to study the pollen fertility. The pollen fertility was recorded which ranged from 12.6 to 74.2 %. A total 26 biparental cross at Coimbatore and 5 biparental cross at Agali (Keral) were affected. At G.S. Sugarcane Breeding and Research Institute Seorahi, 22 biparental crosses were affected.

2. RAISING OF SEEDLING FLUFF RECEIVED FROM COIMBATORE AND PRODUCED LOCALLY:

In the month of November/December 2022 at National Hybridization Garden Coimbatore (Tamilnadue) total 23 biparental, 15 GC, 5 PC, 5 biparental Regional Research Center, Agali (Keral) and at Seorahi Local Hybridization Garden 22 Biparental Crosses were affected, Out of which a 2123.17 gram fluff were received. The total fluff were sown for raising the seedling by "U P method of seedling management".

3. Seedling Ratoon-

A total 6593 seedlings transplanted during 2021-22, after ratooning total 5885 seedlings were survived and studied during 2022-23. On the basis of desirable attributes total 612 seedlings were sown in C1 generation for further study.

4. MULTIPLICATION OF SEEDLING CLONES FOR DISPOSITION OF THEIR REAL CHARACTER IN ORDER TO SELECT THE DESIRABLE TYPES

C1–generation :

During (2022-23) total 612 genotypes were studied along with 4 standards (CoP 9301, CoSe 92423, CoSe 95422 and BO 130) in augmented design to select desirable types. On the basis of desirable attributes 65 genotypes were selected for C2 generation.

C2–generation :

Total 64 genotypes along with 4 standards (CoP 9301, CoSe 92423, CoSe 95422 and BO 130)

were studied during (2022-23) in augmented design to select desirable types. On the basis of desirable attributes 18 genotypes were selected for Preliminary Varietal Trial.

5. TO TEST THE SUITABILITY OF NEW GENOTYPES SELECTED FROM MULTIPLICATION STAGES:

PRELIMINARY VARITAL TRIAL:

In this experiment total 28 genotypes including six standards (CoSe 95422, BO 130, CoLk 94184, CoS 767, CoSe 92423 and CoP 9301) was studied in randomized block design with two replications .On the basis of cane yield t/ha genotype Seo 21/19 (97.92 t/ha) was highest followed by Seo 51/19 (97.00 t/ha) and Seo 255/19 (96.30 t/ha). In the month of November highest sucrose % in juice was recorded in genotype Seo 221/19 (16.55) followed by Seo 255/19 (16.45) and Seo 244/19 (16.13). Where as, in the month of January highest sucrose % in juice was recorded in genotype Seo 218/19 (18.61) followed by CoLk 94184 (18.49) and Seo 244/19 (18.43). Highest sucrose % in juice was recorded in genotype Seo 170/19 (19.55) followed by Seo 127/19 (18.99) and Seo 51/19 (18.93) in the month of March.

6. STATE VARITAL TRIAL (II Plant):

This experiment was carried out with seventeen varieties viz, CoSe 15453, CoSe 19451, CoSe 19452, CoS 18233, CoS 18234, CoS 18241, CoS 19232, CoS 19235, CoLk 16201, CoLk 16202, CoLk 16203, CoLk 16204 along with five standards CoJ 64, Co 0238, CoSe 95422 (Early) CoS 767 and CoPant 972222 (mid-late) were tested in RBD with two replication. On the basis of cane and CCS yield variety CoSe 15453 (102.08, 13.28 t/ha) was highest followed by CoSe 19452 (97.68, 11.77 t/ha) and CoSe 19451 (94.91, 11.45 t/ha). In respect of sucrose % in juice variety CoS 19235 (17.54) was highest followed by CoPant 97222 (17.18) and CoLk 94184 (17.04) in the month of Nov. While, in the month of January highest sucrose % in juice was recorded in the variety CoS 19235 (18.35) followed by CoLk 16201 (18.05) and CoS 18233 (17.99). In the month of March highest sucrose % in juice was found in the variety CoSe 15453 (18.78) followed by standard variety CoLk 94184 (18.77) and CoJ 64 (18.73).

7. STATE VARITAL TRIAL (I Plant) Ratoon :

This experiment was carried out with seventeen varieties viz, CoSe 15453, CoSe 19451, CoSe 19452, CoS 18233, CoS 18234, CoS 18241, CoS 19232, CoS 19235, CoLk 16201, CoLk 16202, CoLk 16203, CoLk 16204 along with five standards CoJ 64, Co 0238, CoSe 95422 (Early) CoS 767 and CoPant 972222 (mid-late) were tested in RBD with two replication. On the basis of cane and CCS yield variety CoSe 15453 (99.54, 12.39) was highest followed by CoSe 19452 (95.37, 10.88 t/ha) and CoSe 19451 (90.74, 10.02 t/ha). In respect of sucrose % in juice variety CoSe 15453 (16.96) recorded highest sucrose % followed by CoLk 94184 (16.80) and CoS 19235 (16.19) in the month of Nov. While, in the month of December highest sucrose % in juice was recorded in the variety CoSe 15453 (18.12) followed by CoS 19235 (18.02) and CoS 18234 (17.93).

8. STATE VARITAL TRIAL (I Plant):

Seventeen varieties, viz CoSe 20451, CoSe 20452, CoSe 20453, CoSe 20454, CoS 19231,CoS 19233, CoS 19234, CoS 20234, S.188/15, CoLk 18201, CoLk 18202, CoLk 18203 along with five standards CoJ 64, Co 0238, CoSe 95422 (Early) CoS 767 and CoPant 972222 (mid-late) were tested in RBD with two replication. On the basis of cane yield variety CoSe 20254 (97.68 t/ha) recorded highest yield followed by CoSe 20453 (95.83 t/ha) and CoSe 20453 (91.43 t/ha). Where as, in respect of CCS t/ha variety CoSe 20454 (12.01 t/ha) recorded highest Commercial cane sugar yield followed by CoSe 20452 (11.79 t/ha) and CoSe 20451 (11.66 t/ha). On the basis of sucrose % in juice highest sucrose % in juice was recorded in the variety S.188/15 (17.49%) followed by CoS 20234 (17.04%) and CoS 19231 (16.90). Whereas, in the month of January highest sucrose % in juice was recorded in the variety CoS 19231 (18.74%) followed by variety S.188/15 (18.50%) and CoS 20234 (18.22%). In the month of March highest sucrose % juice was found in the variety CoSe 20451 (19.07%) followed by CoLk 18201 (18.82%) and CoSe 20452 (18.78%).

Details of Seedling

S. No.	Crosses	Wt. of Fluff (g)	No. of Seedlings
	Coimbatore cross		
1	CoSe 01434 X Co 87268	47.0	92
2	CoSe 01434 X Co 62198	35.0	205
3	CoSe 01434 X Co 89029	30.0	227
4	CoJ 88 X Co 1158	43.0	06
5	CoPant 84212 X CoS 88216	40.0	222
6	CoS 88216 X Co 62198	47.0	39
7	BO 91 X Co 62198	19.0	118
8	CoN 5071 X BO 130	40.0	97
9	Co 62198 X BO 91	34.0	05
10	CoLk 8102 X Co 775	38.0	326
11	CoS 14231 x BO 130	30.0	68
12	CoPant 12221 X Co 62198	35.0	62
13	CoJ 83 X BO 130	37.0	128
14	CoP 15441 X ISH 69	23.5	08
15	Co 0238 X CoS 88216	20.0	86
16	CoV 89101 X CoPant 97222	39.0	2377
17	CoS 8436 X Co 1148	23.0	21
18	CoH 70 X CoS 510	55.0	89
19	CoSe 92423 X Co 1148	29.0	38
20	CoC 8001 X CoPant 97222	24.0	396
21	CoC 8001 X Co 1148	28.0	152
22	CoH 119 X Co 775	60.0	26
23	UP 9530 X Co 11015	36.0	25
24	CoS 8436 X Co 775	17.0	26
25	MS 68/47 X CoSe 92423	47.0	33
26	CoA 7602 X CoS 8436	33.0	37
27	Co 06022 X CoS 510	35.0	19
28	CoSe 92423 X Co 97015	35.0	77
29	CoSe 01434 X Co 62198	31.0	08
30	CoPant 84212 X CoS 88216	23.0	28
31	Co 86032 X Co 97015	30.0	16
32	Co 15023 X ISH 229	28.0	24
	Total	**1091.5**	**5053**
		GC″S	
1	CoS 510	49.0	59
2	CoSe 92423	65.0	39
3	CoS 91269	41.0	58
4	CoS 96260	46.0	105
5	CoSe 01434	22.0	27
6	CoSe 03234	35.0	445
7	CoSe 95436	52.0	32
8	CoS 8436	30.0	05

9	CoPb 16211	40.0	84
10	CoP 15438	33.0	06
11	CoS 8119	52.0	68
12	CoH 70	25.0	85
13	BO 91	37.0	265
14	CoPb 18218	37.0	09
15	CoPb 17214	73.0	126
	Total	**637.0**	**1413**
	PC"S		
1	CoLk 8102	9.0	26
2	Co 0238	9.0	08
3	BO 154	4.0	05
4	CoS 8436	6.0	28
	Total	**28.0**	**67**
	Agali Crosses		
1	ISH 100 X CoPant 97222	4.5	24
2	Co 0238 X ISH 69	5.5	16
3	Co 86032 X ISH 128	18.0	09
4	Co 0241 X Co 8347/8747	36.0	28
	Total	**64.0**	**77**

Seorahi Local

S. No.	Crosses	Wt. of Fluff (g)	No. of Seedlings
1	LG 2919 X Seo 82/95	44	1
2	Seo 365/99 X Seo 1869/09	41	12
3	Seo 301/18 X Seo 5072/08	41	11
4	LG2919 X Seo 5072/08	72	13
5	Seo 365/99 X Seo 382/95	36	-
6	LG 2919 X Seo 525/02	43	18
7	Seo 796/03 X Seo 5072/08	32	12
8	Seo 375/09 X Seo 5072/08	63	13
9	Seo 796/03 X Seo 5072/08	37	-
10	Seo 375/09 X Seo 525/02	62	14
11	Seo 16/07 X Seo 82/95	64	12
12	Seo 796/03 X Seo 82/95	36	12
13	Seo 796/03 X Seo 525/02	36	13
14	Seo 1377/93 X Seo5072/08	57	-
15	Seo 16/07X Seo 5072/08	56	-
16	Seo 1377/93 X Seo 16/07	32	-
17	Seo 525/02 X Seo 82/95	42	-
18	Seo 3336/11 X Seo 382/95	34	-
19	Seo 310/18 X Seo 382/95	32	-
20	LG 2919 X Seo 16/07	53	-
21	Seo 310/18 X Seo1869/09	25	-
22	Seo 3336/11 X Seo 82/95	27	-
23	Seo 525/02 X Seo 1869/09	23	-
24	Seo 301/18 X Seo 82/95	49	-
	Total	**1037.0**	**131**

रोपित सीडलिंग का विवरण

क्र.सं.	पैतृकता	प्राप्त सीड़लिंग	श्रोपित सीड़लिंग	विकसित सीड़लिंग पौध	विकसित सीड़लिंग पेड़ी
1	कोशा. 87216 जी.सी.	275	275	206	194
2	को. 8353 X बी.उ.130	239	239	185	176
3	को.वी. 89101 X को.पन्त 97222	289	289	208	196
4	कोशा. 8371 ग्को.से. 92423	313	313	202	174
5	कोशा. 92263 जी.सी.	244	244	163	150
6	एम.एस. 6847 X को.1148	273	273	135	126
7	कोशा. 8408 जी.सी.	267	267	135	129
8	बी.उ. 91 जी.सी.	357	357	185	179
	योग	**2257**	**2257**	**1419**	**1324**

Summary Table of State Varietal Trial (Plant I) 2022-23

S.N.	Genotypes	Yield (mt/ha)	November		January		March		CCS%	CCS T/ha
			Suc.%	Pol.	Suc.%	Pol.	Suc.%	Pol.		
1	CoS.19231	86.45 II	16.23 III	11.78 III	17.50 III	13.36 III	18.34 III	14.65 III	12.51 III	10.81 I
2	CoS.19234	75.69	14.28	8.21	15.29	10.63	17.77	13.17	12.21	9.24
3	SeO.565/16	88.88 I	14.76	8.45	15.26	10.45	17.48	12.59	12.00	10.66 II
4	SeO.685/16	79.86	15.74	10.70	16.52	11.88	16.51	12.45	10.87	8.68
5	SeO.1019/16	74.99	14.86	8.85	16.70	12.17	17.54	13.34	11.90	8.92
6	SeO.1581/16	76.73	13.20	8.16	14.52	10.12	16.74	12.50	11.20	8.59
7	SeO.188/16	80.55	16.70 I	12.26 I	17.82 I	13.56 I	18.76 I	14.70 I	12.89 I	10.38
8	COJ.64	63.54	16.20	11.78	17.20	13.01	18.17	14.22	12.37	7.85
9	Co. 0238	82.98 III	16.45 II	11.99 II	17.64 II	13.40 II	18.61 II	14.68 II	12.75 II	10.57 III
10	CoS.767	76.38	15.33	40.59	11.21 16.70	8.56 62.25	16.92	13.1		
11	Copant97222	69.44	15.15	10.57	16.53	12.04	16.68	13.06	11.10	7.70

Summary Table of PVT 2022-23

S.N.	Genotypes	Yield (mt/ha)	November		January		March		CCS%	CCST/ha
			Suc.%	Pol.	Suc.%	Pol.	Suc.%	Pol.		
1	S.1523/18	76.11	15.78	11.53	16.46	12.85	17.36	13.66	11.93	9.07
2	S.2496/18	70.55	14.23	10.55	15.97	11.06	16.73	12.97	11.55	8.14
3	S.2437/18	55.27	13.42	9.98	14.22	10.16	15.32	11.83	10.61	5.86
4	S.2599/18	78.88	15.17	10.88	16.45	12.31	17.18	13.96	11.99	9.45
5	S.1931/18	71.24	14.40	9.84	15.16	10.23	16.96	12.34	11.80	8.40
6	S.2216/18	72.83	13.96	9.47	15.61	11.69	16.42	12.05	11.51	8.38
7	S.2032/18	82.40 II	16.80 I	12.74 I	17.40 I	13.65 I	18.68 I	14.80 I	12.90 I	10.62 I
8	S.1833/18	74.72	14.26	10.25	16.21	12.02	17.28	13.02	12.07	9.01
9	S.1536/18	71.94	14.57	10.67	16.08	12.97	17.03	13.51	11.78	8.47
10	S.2186/18	79.60 III	16.24 III	12.30 III	16.80 III	13.42 III	17.60 III	14.31 III	12.08 III	9.61 III
11	S.2443/18	53.88	15.05	10.65	15.98	11.89	16.08	12.40	11.08	5.96
12	S.1703/18	66.38	14.53	10.23	15.66	11.46	16.59	12.73	11.62	7.71
13	S.1648/18	50.41	13.78	9.79	15.87	11.88	16.03	12.75	10.98	5.53
14	S.2250/18	69.16	13.08	8.87	14.92	10.24	16.42	12.34	11.30	7.81
15	S.1700/18	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
16	S.1550/18	52.77	14.97	10.47	15.24	11.60	16.77	12.82	11.68	6.16
17	S.584/18	58.33	14.50	9.28	15.56	11.89	16.54	12.71	11.59	6.76
18	S.1935/18	72.38	15.57	11.63	16.15	12.94	17.47	13.52	12.13	8.77
19	S.2168/18	70.83	15.30	11.50	16.26	12.49	17.35	13.39	11.92	8.44
20	S.2296/18	72.63	14.44	9.34	15.95	11.62	16.56	13.73	11.44	8.30
21	S.1653/18	66.66	14.19	9.23	15.31	10.12	16.79	12.08	11.70	7.79
22	S.1828/18	74.02	13.95	8.47	14.22	10.67	15.88	11.41	10.98	8.12
23	S.1956/18	74.30	14.78	10.73	15.99	11.51	16.70	12.37	11.67	8.67
24	S.1760/18	54.86	15.86	10.03	16.55	12.05	17.40	13.71	12.03	6.59
25	S.1662/18	67.08	15.75	10.81	16.23	11.46	17.26	13.31	11.95	8.01
26	S.55/18	57.36	14.95	9.79	15.87	10.41	16.96	11.89	11.96	6.86
27	S.1153/18	72.63	14.13	10.40	15.15	11.15	16.51	12.68	11.32	8.22
28	S.1372/18	68.05	15.13	11.32	16.57	12.15	17.09	13.50	11.85	8.06

29	S.1459/18	61.80	13.19	9.81	14.00	10.58	15.94	11.47	11.18	6.90
30	S.1295/18	78.47	9.62	6.63	11.34	9.06	15.77	11.09	11.44	8.97
31	S.641/18	57.63	13.98	9.60	14.05	10.62	15.51	12.96	10.83	6.24
32	S.1398/18	75.69	13.49	9.66	14.96	11.30	15.58	12.76	10.90	8.25
33	S.112/18	69.16	13.08	8.18	14.10	10.59	15.40	11.34	11.34	7.84
34	S.102/18	70.83	14.02	10.80	15.19	11.56	16.72	12.49	11.73	8.30
35	S.1309/18	72.91	15.63	11.64	16..36	12.37	117.28	13.60	12.07	8.80
36	S.1774/18	66.66	14.47	11.99	15.94	12.64	16.82	12.90	11.67	7.77
37	S.1718/18	60.41	14.06	9.48	15.20	11.56	16.59	12.76	11.51	6.95
38	S.494/18	59.44	11.06	8.69	12.35	9.57	14.49	11.34	10.01	5.94
39	CoJ-64	61.80	16.15	12.06	17.43	13.20	17.56	14.10	12.22	7.55
40	Co.0238	88.92 I	16.40 II	12.62 II	17.10 II	13.50 II	17.74 II	14.40 II	12.11 II	10.76 II
41	CoS767	74.72	15.66	11.50	16.60	12.63	17.03	13.12	11.84	8.84
42	Copant 97222	68.30	15.59	11.23	16.29	12.58	16.99	13.07	11.78	8.04

Gola

Raising of the Seedling

A total of 2257 seedling of 8 parents obtained from shahjahanpur. From which 1419 seedling developed.

Preliminary Varietal Trial

A total of 42 genotypes of 2018 series, along with four standard viz. CoJ. 64, Co.0238 (early), CoS. 767, CoPant 97222 (mid-late) were studied for the assessment of their yield potential, juice quality and disease resistance under normal fertility level. Out of these, four genotypes viz. S.2599/18, S.2032/18, S.2186/18, S.1935/18, were selected for multiplication trial in 2023-24 for further study. In this trial highest yeild was recorded in Co. 0238(88.92mt/ha) followed by S.2032/18 (82.40mt/ha) and S.2186/18 (79.60 mt/ha). Highest sucrose % in juice was recorded in S. 2032/18 (16.80,17.40,18.68) followed by Co.0238 (16.40, 17.10,17.74) and S.2186/18 (16.24,16.80,17.60) in month of November, January and March respectively. Highest pol in cane was recorded inS. 2032/18(12.74,13.65,14.80) followed by Co.0238 (12.62,13.50,14.40) and S.2186/18(12.30,13.42,14.31) in month of November, January and March respectively. Highest CCS% was recorded in S.2032/18 (12.90) followed by Co.0238 (12.11) and S.2186/18 (12.08). Where, highest CCS t/ha was recorded in Co.0238 (10.76) followed by S.2032/18 (10.62) and S.2186/18 (9.61).

State Varietal Trial (I Plant)

A total of 13 genotypes along with four standards CoJ. 64, Co.0238 (early), CoS. 767, CoPant 97222 (mid-late) were studied in randomized block design with two replication under recommended fertility level,for the assessment of their yield potential, juice quality and disease resistance Highest cane yield (t/ha.) was recorded in Seo 565/16 (88.88) followed by CoS19231 (86.45) and Co 0238 (82.98). on the basis of juice analysis. Highest sucrose % in juice was recorded in S. 188/15 (16.70,17.82,18.76) followed by Co 0238 (16.45, 17.64, 18.61) and CoS 19231 (16.23, 17.50, 18.34) in month of November, January and March respectively. Highest pol in cane was recorded in S. 188/15 (12.26, 13.56, 14.70) followed by Co 0238 (11.99, 13.40,14.68) and CoS 19231 (11.78, 13.36, 14.65) in month of November, January and March respectively. Highest CCS % was recorded in S. 188/15 (12.89) followed by Co 0238 (12.75) and CoS19231 (12.51). Where, highest CCS (t/ha) was recorded in CoS 19231(10.81) followed by Seo 565/16 (10.66) and Co 0238 (10.57).

DNA fingerprinting for identification and protection of elite sugarcane (*Saccharum* spp) varieties, using simple sequence repeat (SSR) markers

The purpose of this study was to provide simple sequence repeat (SSR) based DNA fingerprinting information for sugarcane (Saccharum spp. Hybrids) cultivars that were developed in Shahjahanpur research form. Genomic DNAs from 09 cultivars viz; CoS 16233, CoS 17231, CoS 18233, CoS 18234, CoS 18236, CoS 18238, CoS 19234, CoS 19231 and CoS 19235 were amplified with 06 pairs of polymorphic SSR (UGSM 351, UGSM 358, UGSM 359, UGSM 375, UGSM 432 and UGSM 550) primers using Gene Amp PCR System 9700 (Applied Bio systems make, USA). Markers UGSM 351 and UGSM 550 found highly amplification pattern and could distinguish all the cultivars tested. A total of 122 bands were obtained (Table 1, Fig. 1). The detail of fingerprinting is given in Table 1. This system is informative and useful in protecting new varieties and identifying cultivars because it consists of not only important information of a cultivar but also its specific molecular identify.

Table 1. DNA fingerprinting of elite varieties/genotypes with SSR markers.

Variety/ Genotype	Presence of band (bp) with specific SSR markers	
	UGSM 351	UGSM 550
CoS 16233	1472, 1056, 969, 688, 562, 516, 479, 395, 300	486, 177
CoS 17231	1139, 984, 839, 694, 613, 548, 486, 295	1263, 953, 844, 479, 367, 198, 114
CoS 18233	1474, 1053, 958, 903, 819, 694, 583, 528, 476, 369, 339	1194, 889, 769, 470, 357, 184, 112
CoS 18234	449, 380, 344, 147	758, 561, 452, 334, 279, 224
CoS 18236	1450, 1050, 973, 824, 716, 568, 487, 411, 367, 329	1263, 792, 469, 198
CoS 18238	2217, 1333, 912, 618	2152, 1851, 1250, 941, 721, 603, 419, 358
CoS 19234	1075, 957, 814, 714, 657, 543, 482, 415, 342	1773, 1294, 985, 794, 721, 576
CoS 19231	1460, 1050, 949, 678, 560, 526, 465, 385, 290	630, 550, 491, 182
CoS 19235	635, 580, 503, 459, 386, 354, 152	800, 762, 566, 460, 329, 286, 219

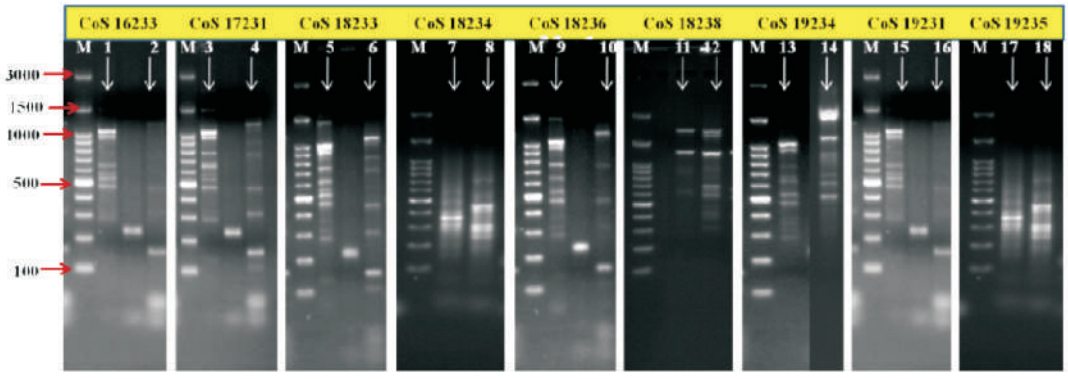


Fig 1. Molecular profiling of elite genotypes of sugarcane with SSR markers for DNA fingerprinting. Lane detail: 1-M100bp, 1, 3, 5, 7, 9, 11, 13, 15 & 17 with UGSM 351 whereas 2, 4, 6, 8, 10, 12, 14, 16 & 18 with UGSM 550.

Molecular identification and antagonistic activity of unknown microbes against red rot pathogen *Colletotrichum falcatum* Went.

A. Molecular identification of new baterial strain

Two endophytic unknown microbes were isolated from red rot infected sugarcane stalk, which were collected from Loni and Maqsoodapur sugar mill area. Endophytic unknown microbes were identified and validated by ICAR-National Bureau of Agriculturally Important Microorganisms, Mau (UP). One endophytic unknown microbe was identified and named as *Stenotrophomonas maltophilia* B2132 and second microbe was identified and named as *Pseudomonas studzeri* B2133 (Table 2 and Fig 2, 3). *Stenotrophomonas maltophilia* B2132 is a gram-negative bacillus bacteria. *S. maltophilia* produces various antibiotics, for example, maltophilin, a macrocyclic lactam antibiotic, which has antifungal activity, but is inactive against gram-positive and gram-negative bacteria. *S. maltophilia* is not only suprees disease but also enhance plant growth through various biochemical activity with plant mechanism. Antagonistic activity of microbes was already tested and validated against *C. falcatum* in last year 2021-22 at UPCSR. The results revealed that the antagonistic activity was varied for both new bacterial strains against *C. falcatum in vitro* condition. It was concluded earlier that the isolates B 2132 was found more virulent than B2133 isolates against *C. falcatum*. Antagonistic activity of thease newly identified bacterial strains were tested against *C. falcatum* in pot condition. This antagonistic results of bacteria was confirmed to inhibit the growth of *C. falcatum* in pot condition. *Stenotrophomonas maltophilia* B2132 was reported at Plant Pathology laboratory, UPCSR, which is the first report in India and second report in the world for red rot management in sugarcane. The red rot management through *Pseudomonas stutzeri* B2133 is the first report in India.

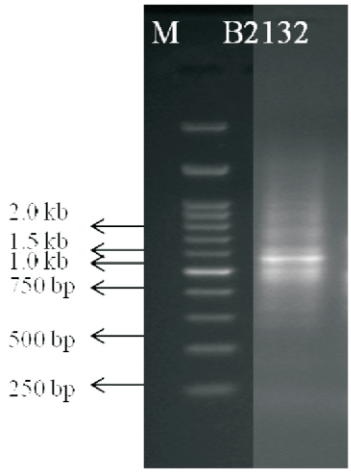


Fig 2: Strain B2132 (UP Council of Sugarcane Research, Shahjahanpur) ERIC fingerprinting. Lane1. M (Left: 250 bp DNA ladder (Genei). Lane 2: Strain B2132, ERIC fingerprinting (Band size: ~ 40, 60, 80, 130, 200, 780, 1730, 4390bp).

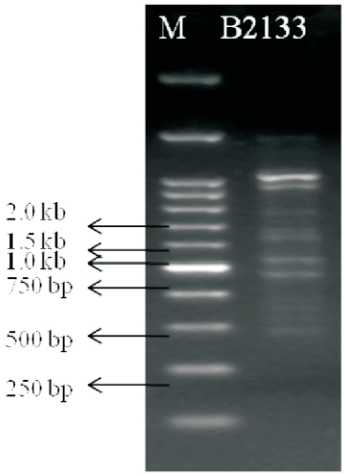


Fig 3: Strain B2133 (UP Council of Sugarcane Research, Shahjahanpur) ERIC fingerprinting. Lane1. M (Left: 250 bp DNA ladder (Genei). Lane 2: Strain B2133, ERIC fingerprinting (Band size: ~ 30, 50, 110, 190, 450, 950, 2110bp).

Table 2. Details of newly identified microbes.

Species name	Nomenclature of unknown microbes	Host plant	Place of host plant
Stenotrophomonas maltophilia	B 2132	Red rot infected stalk of Co 0238	Maqsoodapur sugar mill command area
Pseudomonas stutzeri	B 2133	Red rot infected stalk of Co 0238	Loni sugar mill command area

DNA Sequencing of B2132 and B2133

DNA Sequencing of B2132 and B2133 bacterial strain were performed by16s rDNA/ITS gene sequencing protocol by ICAR-National Bureau of Agriculturally Important Microorganisms, Mau (UP). The registration of these two newly identified strain are under process at Central Insecticides Board and Registration Committee (CIB&RC). The DNA sequencing of *Stenotrophomonas maltophilia* strain B2132 was published on National Center for Biotechnoogy Information with the accession number of OP 457179.1 and title of "*Stenotrophomonas maltophilia* strain B2132 16S ribosomal RNA gene, partial sequence".

B. Antagonistic efficacy of unknown microbe against *C. falcatum* under pot condition

A pot experiment was conducted with the objective "*To find out the efficacy of Stenotrophomonas maltophilia (B2132) against C. falcatum*". The experiment was laid out in a randomized block design with 3 replications. Twenty four eye buds of each treatments in three pots (Eight eye bud in each pot) were planted. The red rot susceptible varieitey of Co 0238 was taken for study. There were eight treatments such as T_1 - *C. falcatum* + *S. maltophilia* B2132 (Soaking of single bud in suspension); T_2 - Bud soaking in *C. falcatum* suspension; T_3 - bud soaking in *S. maltophilia* B2132 suspension; T_4 - *C. falcatum* mixed in soil mixture + bud soaking in *S. maltophilia* B2132 suspension; T_5 - *C. falcatum* mixed in soil mixture + bud soaking in 0.2% Thio Phanate Methyl; T_6 - *C. falcatum* mixed in soil mixture + untreated bud (Drenching of *S. maltophilia* B2132 at 7 DAP); T_7 - *C. falcatum* mixed in soil mixture + untreated bud; T_8 - untreated bud were taken for study.

C. Supression of *C. falcatumin primary incidence*

Infected seed canes and infected soil act as the principal source of primary sources of *C. falcatum* inoculum for the disease recurrence in endemic regions. The grain inoculum of red rot was applied on the setts and in soil under plot to induce red rot disease. Cane setts were also dipped in the suspension of *C. falcatum* for red rot infection. Out of all the treatments, primary infection of *C. falcatum* were appeared 100% in T_1 treatment, where as it was not found in in T_2, T_4, T_5 and T_6 up to 13.7 per cent. Red rot was not found in $T_3$and T_8 treatments. The primary infection of red rot were recorded 100 per cent and 86.30 per cent in T_1 and T_7, respectively (Table 3 & Fig 4, 5). The treatment *C. falcatum* mixed in soil mixture and bud soaking in *S. maltophilia* B2132 suspension (T_4) was found effective to inhibit red rot disease under pot condition and also stimulate plant growth followed by drenching of bacterial culture after planting of eye bud(T_6). Yield contributing traits were computed high in T_3,T_4, T_5 and T_6followed by T_1 and T_7 (Table 4 & Fig 6).

D. Secondary infection of *C. falcatum*

Primary infections could be inhibited by using various tools, whereas secondary infection of red rot initiated by the inocula carried through air, rain splashes and irrigation water play an important role in disease build up in the field. These infections carry the disease from plant to plant and from field to field in favourable conditions (Fig 6 and 7).

The nowel bacterial strain B 2132 inhibits the primary infection of red rot, in contrast the secondry infection was spreaded during rainy season under humid condition. Hence, almost all the treatments were found affected by the secondary infection of red rot, ranging from 22.59 per cent (T_3) to 77.96 per cent (T_7) (Table 3 & Fig 7).

Bacterial treatment (T_4 and T_6) gave a significant result in referance to TPM 0.2 % (T5) to control the primary infecton of red rot. in case of yield contribution bacterial treatment T3, T4 and T6 were also found significant result in germination, cane height and girth (Table 4& Fig 4). Based on the above findings, soaking of sugarcane sett and drenching with *Stenotrophomonas maltophilia* B2132 and *Pseudomonas stutzeri* B2133 could be more beneficial to supress primary infection of red rot.Both bacterial strains could be used as a PGPR (Plant growth promoting rhizobacteria). In comimg future like trichoderma, these both strains could be used as an efficient bio-control agent for red rot management.

Fig4. Primary infection of red rot supressed by the drenching of *S. maltophilia* B2132.

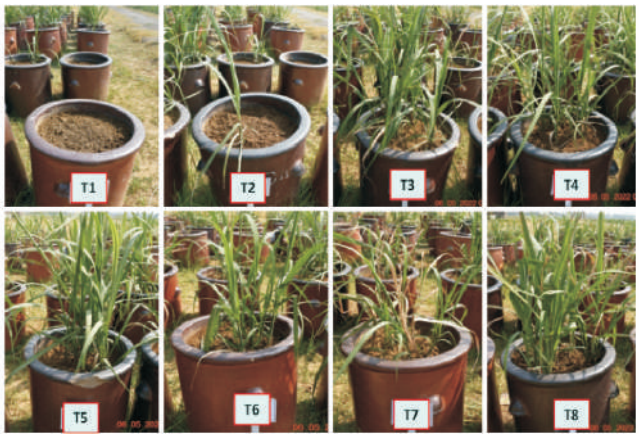


Fig 5. Primary infection of red rot appeared in T2 and T7.

Fig 6. Growth performance of plant with *S. maltophilia* B2132.

Fig 7. Secondary infection of red rot appeared by rain splashes in almost all the treatments.

Table 3. Effect of B2132 treatment on primary and secondry disease incidence

Treatments	Disease incidence	Disease suppression (%)	RR Secondary infection%
T_1	100	0.00	0.00
T_2	6.67	92.28	66.67
T_3	0.00	100	22.59
T_4	13.70	84.10	45.93
T_5	11.67	86.50	41.11
T_6	10.00	88.40	50.56
T_7	86.30	0.00	77.96
T_8	0.00	100	0.00
C.D.	17.68	-	NS
SE (m)	8.24	-	26.14
C.V.	74.57	-	78.39

Table 4. Effect of B2132 treatment on yield contributing parameters.

Treatments	Germination (%)	No of green leaf	Cane height (cm)	Girth (cm)
T_1	8.33	0.00	0.00	0.00
T_2	16.67	7.40	115.93	2.37
T_3	54.17	6.60	99.80	2.07
T_4	50.00	7.00	122.80	2.00
T_5	54.17	7.20	106.67	2.07
T_6	54.17	7.27	103.07	2.01
T_7	66.67	5.20	73.13	1.76
T_8	79.17	6.20	87.47	2.01
C.D.	26.38	25.23	0.23	1.17
SE(m)	2.30	11.76	0.11	0.54
C.V.	31.44	16.26	7.39	11.38

Shahjahanpur

Effect of planting method and spacing on productivity of sugarcane

A field experiment was carried out during autumn at research farm of Shahjahanpur to find out suitable planting method and spacing to facilitate mechanization in randomized block design and replicated thrice. The details of the treatments were given as under:

Treatments:

T_1 –Deep furrow planting at 75cm row spacing

T_2-Deep furrow planting in paired row at 75:125 cm spacing

T_3-.Deep furrow planting in paired row at 75:135 cm spacing

T_4- Deep furrow planting in paired row at 67:134 cm spacing

T_5-.Trench planting in paired row at 150 (30:120) cm spacing

T_6-Conventionl planting at 90 cm row spacing

The soil of the experimental field was low in OC (0.49%), Phosphorous (9.6 kg/ha), and potassium 145.6kg/ha with P^H6.8. Experimental crop (variety CoS13235) was planted on 20.02.2022 and harvested on 10.03.2023

Experimental data (Table 1) showed that significantly higher cane yield (99.20 t/ha) was recorded with deep furrow planting at 75 cm row spacing followed by trench planting in paired row at 150(30:120)cm spacing with cane yield of 98.40t/ha maximum net return (Rs. 155869/ha) was obtained in trench planting trench planting in paired row at 150 (30:120) cm spacing. CCS percent was not affected with various planting methods and spacing.

Bio–efficacy of bio–enriched organic manure (KK Pro) in sugarcane .

This experiment was conducted at research farm of Shahjahanpur to evaluate the effect of of bio–enriched organic manure (KK Pro) on cane yield and juice quality in randomized block design with three replications. Experimental details were given as under:

Treatments

T_1- KK Pro+100% RDF

T_2- KK Pro+75% RDF

T_3- KK Pro+0% RDF

T_4-100% RDF+0% KK Pro

T_5-75%RDF+0% KK Pro

T_6-0% RDF+0% KK Pro

T_7- FYM as per recommendation

The soil of the experimental field was low in OC (0.49%), Phosphorous (9.6 kg/ha), and potassium 145.6kg/ha with P^H6.8. Experimental crop variety CoS13235(early maturing) was planted on 10.10.2021 and harvested on 02.01.2023

Experimental data (Table 2) indicated that significantly higher cane yield (84.30 t/ha) was obtained with 100% RDF +KK Pro @1.25kg/ha followed by 100 RDF+0% KK Pro with cane yield of 80.80t/ha .Maximum net return (Rs 146551/ha) was also found in 100% RDF +KK Pro @1.25kg/ha treatment followed by 100% RDF+0% KK Pro with net income of Rs 1,36,881/ha . CCS percent was not affected with various treatments.

Agronomical evaluation of newly evolved sugarcane genotypes

This experiment was carried out at research farm of Shahjahanpur to find out the fertility levels and plant geometry of promising sugarcane genotypes in factorial RBD with three replications. The treatments were as follows.

Treatments

A- Varieties

V_1- CoS 17231

V_2- CoS 18231

B - Fertility levels

F_1- 100% Recommended NPK

F_2- 100% Recommended NPK + 25% N through organic manure + Biofertilizers (Azotobactor + PSB @ 10 kg/ha each)

C-Plant Geometry

S_1- 67:134 cm in deep furrow paired row planting

S_2- 30:120 cm in trench paired row planting

The soil of experimental field was low in organic carbon (0.36%) and medium in phosphorus (9.8 kg/ha) and potash (117.7 kg/ha) with P^H 7.02. The experimental crop was planted on 20.02.2022 and harvested on 10.03.2023.

Experimental data (Table 3) revealed that significantly higher cane yield (84.68 t/ha) was recorded in genotypes CoS 17231 followed by CoS 18231 (81.60 t/ha). Regarding fertility levels, 100% recommended dose of NPK + 25%N through organic + biofertilizers (Azotobactor + PSB) @10kg/ha each gave significantly higher cane yield (85.65 t/ha) than that of 100% recommended dose of NPK (80.65t/ha). In case of planting methods significantly higher cane yield (86.28 t/ha)was abstained in 67:134 cm in deep furrow paired row plantingas compared to 30:120 cm in trench paired row planting (80.50 t/ha).

Response of various sources of plant nutrients on sugarcane.

This experiment was conducted at research farm of Shahjahanpur to assess the performance of promising sugarcane genotypes of advanced varietal trial (AVT) in randomized block design with three replications. Experimental details were given as under:

Treatments

T_1- 100% recommended dose of NPK though inorganics (Conventional)

T_2- 100% recommended dose of P_2O_5 and K_2O through inorganics + spraying nano urea @5ml/liter of water at 60DAP and 90DAP

T_3- 50% recommended dose of P_2O_5 and K_2O through + Sett treatment with nano DAP@ 5ml/liter of water at 60DAP +spraying nano DAP and nano urea @ 5ml/liter of water at DAP + spraying of nano urea @ 5ml/liter and sagarika @ 5ml/liter of water at 90DAP

T_4- Sett treatment with nano DAP @ 5ml/liter water + spraying nano DAP and nano urea @ 5ml/liter of water at 60DAP+ spraying of nano DAP and nano urea @ 5ml/liter and Sagarika @ 5ml/liter of water at 90DAP

T_5- Sett treatment with nano DAP @ 5ml/liter water + spraying nano DAP and nano urea @ 5ml/liter of water at 60DAP + spraying of nano DAP and nano urea @ 5ml/liter and sagarika @ 5ml/liter of water at 90DAP and 120DAP

T_6- Sett treatment with nano DAP @ 5ml/liter of water + spraying of WSF(19:19:19) @ 1.0kg in 100 liter water and nano urea @ 5ml/liter of water at 60DAP and 90DAP

T_7- Sett treatment with nano DAP @ 5ml/liter of water + spraying of WSF(19:19:19) @ 1.0kg in 100 liter water and nano urea @ 5ml/liter of water at 60DAP, 90DAP and 120DAP

T_8- 100% recommended dose of NPK though inorganics + Sagarika @ 25kg/ha

The soil of the experimental field was low in OC (0.36%), Phosphorous (9.8 kg/ha), and potassium 117.7kg/ha with P^H 7.02.The experimental was laid out on 19.02.2022 and harvested on 12.02.2023

Experimental data (Table 4) revealed that significantly higher cane yield (86.60 t/ha) was recorded with100% recommended dose of NPK through inorganics+ sagarika@ 25kg/ha of water followed by 100% RDF NPK though inorganics with the cane yield of 84.40 t/ha. Maximum net returns Rs 1,45,664/ha was also obtained with 100% recommended dose of NPK through inorganics + sagarika @ 25kg/ha + Sagarika@. CCS percent was not affected significantly with different treatments.

Efficacy of potash derived molasses (PDM) in Sugarcane .

This experiment was conducted at research farm of Shahjahanpur to evaluate the effect of PDM on cane yield and juice quality in sugarcane in randomized block design with three replications. Experimental details were given as under:

Treatments

T_1- Potash derived molasses @ 300kg/ha i.e , 45 kg potash

T_2- Potash derived molasses @ 400kg/ha i.e , 60 kg potash

T_3- Potash derived molasses @ 500kg/ha i.e , 75 kg potash

T_4- Potash derived molasses @ 400kg/ha i.e , 60 kg potash,200 kg at planting time and 200 kg at earthing time

T_5- MOP @ 75 kg/ha i.e, 45 kg potash

T_6- MOP @ 100 kg/ha i.e 60 kg potash

T_7- MOP @ 125 kg/ha i.e 75 kg potash

T_8- Control (No potash)

The soil of the experimental field was low in OC (0.36%), Phosphorous (9.8 kg/ha), and potassium 117.7kg/ha with P^H 7.02. Experimental

sugarcane crop (variety CoS13235) was planted on 18.02.2022 and harvested on 18.03.2023

Experimental data (Table 5) indicated that significantly higher cane yield (98.20 t/ha) was recorded with potash derived molasses (PDM) @ 400kg/ha i.e,60kg potash 200 kg at planting time and 200kg at earthing time followed by PDM @ 500kg/ha i.e , 75g potash as basal with cane yield of 97.20 t/ha. Maximum net return (Rs. 1,94,689/ha) was also found with the PDM @ 400kg/ha i.e 200kg at basal and 200kg at earthing time followed by PDM @ 400kg/ha i.e 60kg potash as basal with net income Rs. 1,88,965/ha. CCS percent was not affected significantly with various PDM treatments.

Table1: Effect of treatments on germination, shoots, millable canes, cane yield, CCS (%) and net income

Treatments	Germination (%)	Shoots (000/ha)	NMC (000/ha)	Cane yield (t/ha)	CCS(%)	Net income (Rs/ha)
T_1 –Deep furrow planting at 75cm row spacing	52.4	177.8	134.3	99.2	13.6	154013
T_2-Deep furrow planting in paired row at 75:125 cm spacing	51.0	156.3	116.0	94.4	13.5	154749
T_3-. Deep furrow planting in paired row at 75:135 cm spacing	51.8	148.7	110.0	92.3	13.3	146071
T_4- Deep furrow planting in paired row at 67:134 cm spacing	52.7	152.0	112.9	90.7	13.1	140343
T_5-. Trench planting in paired row at 150 (30:120) cm spacing	54.2	151.0	111.0	98.4	13.6	155869
T_6-Conventionl planting at 90 cm row spacing	50.9	162.0	114.2	94.3	13.3	154271
SE±	**0.67**	**2.82**	**2.51**	**1.96**	**0.50**	**-**
CD at 5%	**1.42**	**6.02**	**5.36**	**4.18**	**NS**	**-**

Table 2. Effect of treatments on germination, shoots, millable canes, cane yield, CCS (%) and net income

Treatments	Germination (%)	Shoots (000/ha)	NMC (000/ha)	Cane yield (t/ha)	CCS(%)	Net income (Rs/ha)
T_1- KK Pro + 100% RDF	42.1	151.1	124.9	84.3	14.41	146551
T_2- KK Pro+ 75% RDF	43.3	146.4	114.6	79.7	15.07	134604
T_3 – KK Pro + 0% RDF	44.6	98.0	86.1	65.2	15.00	98882
T_4 – 100% RDF + 0% KK Pro	37.4	141.9	112.5	80.8	14.86	136881
T_5 – 75% RDF + 0% KK Pro	38.6	131.7	107.6	76.3	14.53	125292
T_6- 0% RDF + 0% KK Pro (untreated control)	38.8	86.7	85.1	61.4	15.18	87884
T_7- FYM as per recommendation	42.7	142.7	118.9	68.9	14.46	104120
SE±	**5.58**	**4.96**	**3.98**	**2.69**	**0.39**	**-**
CD at 5%	**NS**	**10.8**	**8.68**	**5.87**	**NS**	**-**

Table:3 Effect of treatments on germination, shoots, millable canes, cane yield, CCS (%) and net income

Treatments	Germination (%)	Shoots (000/ha)	NMC (000/ha)	Cane yield (t/ha)	CCS (%)	Net income (Rs/ha)
Varieties						
V_1 - CoS 17231	49.6	163.0	118.0	84.68	13.41	132432
V_2 – CoS 18231	39.0	133.0	102.4	81.60	12.66	122766
SE±	**0.74**	**249.0**	**204.0**	**1.45**	**0.30**	**-**
CD at 5%	**NS**	**534.2**	**437.7**	**3.12**	**NS**	**-**
B – Fertility level						
F_1 - 100% RDF NPK	44.5	142.6	108.0	80.65	12.93	119745
F_2 - 100% RDF NPK+ 25% N through organic manure + Bio-fertilizer (*Azotobacte*r +PSB @ 100 kg/ha each)	44.1	153.3	112.4	85.65	13.15	123261
SE±	**0.74**	**2.49**	**2.04**	**1.45**	**0.30**	**-**
CD at 5%	**1.58**	**5.34**	**4.37**	**3.12**	**NS**	**-**
C – Planting Method						
S_1 -67 :134 cm in deep furrow paired row planting	39.2	151.6	113.2	86.28	13.36	137648
S_2 – 30:120 cm in trench paired row planting	49.5	144.3	107.2	80.50	12.97	105294
SE±	**0.74**	**2.49**	**2.04**	**1.45**	**0.30**	**-**
CD at 5%	**1.58**	**5.34**	**4.37**	**NS**	**0.64**	**-**

Table 4 : Effect of treatments on germination, shoots, millable canes, cane yield, CCS (%) and net income.

Treatments	*Germination (%)*	*Shoots (000/ha)*	*NMC (000/ha)*	*Cane yield (t/ha)*	*CCS (%)*	*Net income (Rs/ha)*
T_1- 100% RDF NPK through inorganic (conventional)	33.2	109.0	89.8	82.4	13.80	139082
T_2- 100% RDF of P2O5 and K2O through inorganics + spraying nano urea @5ml/ lit water at 60 DAP and 90 DAP	35.8	94.4	81.9	71.3	14.13	97848
T_3 – 50% RDF of P2O5 and K2O through inorganics + spraying nano urea @5ml/ lit of water at 60 DAP and 90 DAP	35.7	98.3	84.2	73.1	14.63	105586
T_4 – sett treatment with nano DAP @5ml/lit water + spraying nano DAP and nano urea @5ml/lit of water each 60 DAP + spraying of nano DAP and nano urea @5ml/lit water and sagarika @ 5ml/lit of water at 90 DAP	35.9	97.9	82.1	72.3	14.14	107486
T_5 – sett treatment with nano DAP @5ml/lit water + spraying nano DAP and nano urea @5ml/lit of water at 60 DAP + spraying of nanoDAPandnano urea @ 5ml/lit and sagarika @ 5ml/lit of water @ 90 DAP and 120 DAP	34.1	99.7	84.1	78.2	14.50	126248
T_6- .sett treatment with nano DAP @ 5ml/lit of water + spraying of WSF(19:19:19) @ 1 kg in 100 lit water and nano urea @ 5ml/lit of water @60 DAP and 90 DAP	36.4	96.4	81.5	75.3	14.07	118446

T_7-Sett treatmet with nano DAP @ 5ml/lit of water + spraying of WSF(19:19:19) @ 1 kg in 100 lit of water and nano urea @ 5ml/lit of water @ 60DAP, 90DAP and 120 DAP	32.2	98.2	82.8	76.4	13.94	121530
T_8- 100% recommended dose of NPK though inorganics + sagarika 25 kg	34.3	110.4	91.4	86.6	14.10	145664
SE±	**10.9**	**2.55**	**2.40**	**2.72**	**0.12**	**-**
CD at 5%	**NS**	**5.48**	**5.16**	**5.84**	**NS**	**-**

Table 5 : Effect of treatments on germination, shoots, millable canes, cane yield, CCS (%) and net income

Treatments	Germination (%)	Shoots (000/ha)	NMC (000/ha)	Cane yield (t/ha)	CCS (%)	Net income (Rs/ha)
T_1- Potash derived molasses @300 kg/ha i.e , 45 kg Potash	44.4	131.0	110.0	93.1	14.09	179071
T_2- Potash derived molasses @400kg/ha i.e , 60 kg Potash	52.7	142.4	115.3	96.4	14.16	188965
T_3 - Potash derived molasses @500kg/ha i.e , 75 kg Potash	49.2	143.5	116.6	97.2	14.12	170909
T_4 - Potash derived molasses @400kg/ha i.e , 60 kg Potash , 200 kg at sowing time and 200 kg at earthing time	57.1	145.2	118.0	98.2	14.21	194689
T_5 - MOP @ 75 kg/ha i.e ,45 kg Potash	46.9	130.0	116.1	91.0	14.14	171050
T_6- MOP @ 100 kg/ha i.e ,60 kg Potash	44.9	141.0	110.0	92.1	14.54	173501
T_7- MOP @ 125kg/ha i.e ,75 kg Potash	46.7	141.3	111.0	94.0	14.02	178495
T_8- Control (No Potash)	41.3	124.3	102.5	75.1	14.39	151431
SE±	**4.75**	**4.12**	**5.13**	**5.34**	**0.23**	**-**
CD at 5%	**NS**	**8.83**	**11.01**	**11.45**	**NS**	**-**

Muzaffarnagar

Effect of planting method and spacing on productivity of sugarcane

In order to have the suitable planting method and spacing to mechanization in sugarcane, this experiment was conducted at research farm of sugarcane research station, Muzaffarnagar during 2021-23 in autumn season. The soil of experimental field was sandy loam with reaction neutral (pH 7.5) having low in organic carbon (0.54%), available phosphorus and medium in available potassium. According table 1, six different planting method /spacing were adopted and experiment was laid out in randomized block design with four replications. This experiment was planted with different plot size according treatment along with an early maturing variety CoS 08272. Experiment was planted on 30 September, 2021 and harvested on end of December 2022.

The data (table1) indicated that impact of various planting method was found significantly on yield attributes and cane yield. Highest germination of 70.74% was recorded from treatment T5-trench planting at 30:120 cm followed by deep furrows treatments over conventional planting at 90 cm. significantly highest tillers and number of millable canes (268123 and 126110/ha) were recorded by T1- deep furrow planting at 75 cm followed by T6- conventional planting at 90 cm (263771 and 123089/ha), T5- trench planting at

30:120 cm (242915 and 121093 /ha) and T4- deep planting at 67:134 cm (178015 and 117122than others. Significantly highest cane yield (122.013 t/ha) and ccs yield (13.05 t/ha) were recorded by T1- deep furrow planting at 75 cm followed by T6- conventional planting at 90 cm (116.087,12.54 t/ha), T5- trench planting at 30:120 cm (113.176 and 12.56 t/ha) and T4- deep planting at 67:134 cm (112.95 and 12.41/ha), respectively than rest treatments. Economic point in view, highest net profit Rs 250502/ha was obtained by T1- deep furrow planting at 75 cm followed by conventional planting at 90 cm (Rs 245003/ha) and deep furrow planting at 67:134 cm (Rs 240683/ha) while, benefit : cost ratio was obtained higher in deep planting at 67;134 cm (1.43) over others

Agronomical evaluation of new sugarcane varieties

This experiment was conducted to find out the fertility levels and spacing for newly released sugarcane varieties in spring season. The soil of field was low in organic carbon, available phosphorus and medium in available potassium. Planting spacing was kept in main plot and nutrients management and variety in sub plot. Thus, eight treatments combination in replicated three times in factorial randomized block design. According treatments (Table2) experiment was planted on 27.03.22and harvested on 30.03.23.

The (Table2) data clearly indicated that significantly higher Shoots (178658), number of millable canes (136971), cane yield (88.95ton), ccs yield (11.88ton) and net profit (Rs156042) per hectare were obtainedby sugarcane variety CoS17231overCoSe18231.Trench planted crop at 30:120 cm significantly produced higher shoots (178310), number of millable canes (140926), cane yield(89.273t) and ccs yield (11.14 t) per hectare than deep furrow planting at67:134 cm spacing. While, net profit and B:C ratio was obtained higherin 67:134 cm deep cane planting than 30: 120 cm planting. As regards to fertility levels, significantly higher shoots (174910/ha), number of millable canes (137106/ha),cane yield (87.037), ccs yield (11.55t)and net profit (Rs146786)per hectare wereobtained with treatment F2-100% RDF + 25 kg N/ha through organics + Bio. Fertilizers (Azoto. & PSB) @ 10 kg /ha each as compared to F1-100% of recommended dose of NPK.

Interaction effect: Maximum cane yield of93.148t/ha, ccs yield (12.39t/ha) and net profit

(Rs 158260/ha) was recorded by CoS17231 variety when its planting at 30:120 cm spacing in trenches with 100% RDF + 25 kg N/ha through organics + Bio. Fertilizers (Azoto. & PSB)@ 10 kg /ha each as compared to other treatments combinations (table 2b&2c).

Title: Response of various plantnutrients on sugarcane

The field experiment was conducted to study the effectiveness of various nutrient management practices on yield and quality of sugarcane and soil physical, chemical and biological properties. Eight different treatments were taken in randomized block design with three replications in spring season. Before planting the fertility status of the experimental field was low in organic carbon (0.43%), av. phosphorus and medium in av. potasium. The experimental field was planted on 26.03.22 and harvested on 28-03-23 with CoS132352 variety. Findings showed (Table3) that the significantly highest tillers (179756/ha), number of millable canes (132871/ha), cane yield (98.380t/ha), ccs yield (13.29 t/ha), net profit (Rs 146757/ha) and benefit ratio (1: 0.69) were obtained by treatment T8- 100% recommended dose of NPK through inorganics (Conventional) + Sagarica @ 25 kg/ha followed by treatments T1-100% recommended dose of NPK through inorganics (conventional) 178241,131482, 95.255 t, 12.83t, 137756 and 1: 065 per hectare,T2-100% recommended dose of P2O5 and K2 Othrough inorganics +spraying of nano urea @ 5 ml/liter of water at 60 Dap and 90DAP 176042, 129861, 85.301t, 11.51t, Rs 105750 and 1:0.51 and T3-50% recommended dose of P2O5 and K2Othrough inorganics + Sett treatment with nanoDAP @ ml/ liter of water +spraying of nano DAP and nano urea @ 5 ml/liter of water at 60 DAP + spraying of nano urea @ 5ml/liter of water and sagarica @5ml/liter of watwr at 90 DAP 177315,129398, 83.102t, 11.31t, Rs 105851 and 1: 0.51 tillers, number of millable canes, cane yield, ccs yield, net profit and benefit : cost ratio, respectively than other treatments of nano urea & nano DAP.

Table1: Effect of planting method and plant geometry on yield attributes,cane yield and economics

Treatments	2022-23											
	Ger. (%)	Shoots (/ha)	NMC (/ha)	Cane yield (t/ha)	CCS (%)	CCS yield t/ha	Cost of cultivation (Rs/ha)	Net profit (Rs/ha)	B:C Ratio	Cane wt (g)	Cane length (cm)	Cane girth (cm)
T_1- Deep furrow planting at 75 cm row spacing	55.62	268123	126110	122.013	10.70	13.05	193624	250502	1.29	870	232.4	2.25
T_2- Deep furrow planting in paired row at 75:125 cm spacing	54.79	173072	115103	110.156	10.94	12.06	163128	237839	1.45	895	235.5	2.60
T_3- Deep furrow planting in paired row at 75:135 cm spacing	54.58	172122	114136	109.077	10.96	11.9581	161459	2355	1.45	905	236.0	2.61
T_4- Deep furrow planting in paired row at 67: 134 cm spacing	54.42	178015	117122	112.095	11.00	12.41	167462	240683	1.43	912	241.3	2.56
T_5- Trench planting at 150 cm (30:120cm) cm spacing	70.74	242915	121093	113.176	11.10	12.56	190009	221951	1.16	920	250.2	2.58
T_6- Conventional planting at 90cm spacing	50.62	263771	123089	116.087	10.80	12.54	177553	245003	1.37	882	234.2	2.30
SE±	**0.706**	**1350**	**1171**	**0.846**	**0.013**	**0.100**	-	-	-	-	-	-
CD at 5%	**1.505**	**2877**	**2495**	**1.803**	**0.028**	**0.213**	-	-	-	-	-	-

Table 2a : Effect of treatments on yield attributes, cane yield, sugar yield and economics in sugarcane

Treatments	2022-23											
	Ger. (%)	Shoots (/ha)	NMC (/ha)	Cane yield (t/ha)	CCS (%)	CCS (t/ha)	Height (cm)	Girth (cm)	Wt (g)	Cost of cultivation (Rs/ha)	Net profit (Rs/ha)	B:C ratio
A-Varieties												
V_1- CoS 17231	64.87	178658	136971	88.950	13.37	11.88	216	2.06	743	168265	156042	0.92
V_2- CoSe 18231	61.22	165463	132963	83.486	13.20	11.02	251	2.20	796	170603	133318	0.78
SE±	**0.68**	**581**	**1013**	**1.12**	**0.01**	**0.15**	-	-	-	-	-	-
CD at 5%	**1.46**	**1247**	**2173**	**2.41**	**0.02**	**0.32**	-	-	-	-	-	-
B-Fertility Levels51.30												
F_1- 100% NPK	62.22	169630	132827	85.407	13.30	11.35	231	2.10	764	165837	145078	0.87
F_2- 100% NPK+25kgNthrough organics + Bio-fertilizer	63.88	174910	137106	87.037	13.27	11.55	236	2.19	775	173030	146786	0.83
SE±	**0.68**	**581**	1013	1.12	**0.01**	**0.15**	-	-	-	-	-	-
CD at 5%	**1.46**	**1247**	2173	NS	**0.02**	**NS**	-	-	-	-	-	-
C-Planting Spacing												
S_1- 67:134 cm deep in paired	45.14	165810	129008	83.171	13.31	11.08	231	214	765	158902	144840	0.91
S_2- 30:120 cm in trenches	71.96	178310	140926	89.273	13.35	11.14	236	215	774	180465	141771	0.80
SE±	**0.68**	**581**	**1013**	**1.12**	**0.01**	**0.15**	-	-	-	-	-	-
CD at 5%	**1.46**	**1247**	**2173**	**2.41**	**0.02**	**0.32**	-	-	-	-	-	-

Table 2b: Interaction effect of variety x spacing x fertility level on cane yield, ccs yield and ccs%

Variety	Treat.	Cane Yield t/ha			CCS%			CCS Yield t/ha		
		S1	S2	Mean	S1	S2	Mean	S1	S2	Mean
V_1- CoS17231	F1	85.185	91.204	**88.194**	13.45	13.34	**13.40**	11.425	12.169	**11.796**
	F2	86.296	93.148	**89.722**	13.40	13.30	**13.35**	11.564	12.392	**11.978**
	Mean	**85.740**	**92.176**	**88.958**	13.43	13.32	**13.37**	11.494	12.280	**11.887**
V_2- CoS 18231	F1	79.908	85.370	**82.639**	13.22	13.18	**13.20**	10.566	11.254	**10.910**
	F2	81.296	87.408	**84.352**	13.20	13.20	**13.20**	10.729	11.535	**11.132**
	Mean	**80.602**	**86.389**	**83.495**	**13.21**	**13.19**	**13.20**	10.674	11.394	**11.021**
		83.171	**89.282**		**13.31**	**13.35**		**11.084**	**11.146**	
SE±/ CD for VxF		**1.59/ NS**			**0.01/ NS**			**0.21/ NS**		
SE±/ CD for FxS		**1.59/ NS**			**0.01/ 0.02**			**0.21/ NS**		
SE±/ CD for SxV		**1.59/ NS**			**0.01/ NS**			**0.21/ NS**		
SE±/ CD forVxFxS		**2.24/ NS**			**0.02/NS**			**0.30/ NS**		

Table 2c:-Interaction effect of variety x spacing x fertility level on economics

SN	Treatments	Ger. %	Shoots/ ha	NMC/ha	Cane yield t/ha	CCS%	CCS yield t/ha	Net profit Rs/ha	B:C	Wt. g	Length cm	Girth cm
T_1	100% recommended dose of NPK through inorganics (conv.)	44.58	178241	131482	95.255	13.47	12.83	137756	0.65	1.036	242	2.60
T_2	100% recommended dose of P2O5 and K2Othrough inorganics +spraying of nano urea @ 5ml/liter of water at 60 Dap and 90DAP	44.22	176042	129861	85.301	13.49	11.51	105750	0.51	1.015	240	2.58
T_3	50% recommended dose of P2O5 and K2Othrough inorganics + Sett treatment with nano DAP @ ml/ liter of water at 60 DAP +spraying of nano DAP and nano urea @ 5 ml/liter ofwater at 60 DAP + spraying of nano urea @ 5ml/liter of water and sagarica @5ml/liter of water at 90 DAP	43.80	177315	129398	83.102	13.61	11.31	105851	0.51	1.008	238	2.55

T_4	Sett treatment with nano DAP 5ml/ liter of water + spraying of nano DAP and nano urea @5ml/liter and sagarica @5ml/liter of water at 90 DAP	43.12	160301	114236	70.255	13.75	9.66	61475	0.31	0.900	225	2.35
T_5	Sett treatment with nano DAP 5ml/ liter of water + spraying of nano DAP and nano urea @5 ml/liter at 60 DAP and + spraying of nano DAP and nano urea @ 5 ml/liter and sagarica @5ml/liter of water at 90 DAP and 120 DAP	42.50	170139	124190	75.116	13.70	10.29	71586	0.35	0.970	230	2.47
T_6	Sett treatment with nano DAP @5ml/ liter of water + Spraying of WSF (19:19:19) @ 1.0 kg in 100 liter of water and nano urea @ 5ml/liter at 60 DAP and 90 DAP	42.96	174074	128125	78.588	13.67	10.74	88580	0.44	0.981	235	2.48
T_7	Sett treatment with nano DAP 5ml/ liter of water + Spraying of WSF (19:19:19) @ 1.0 kg in 100 liter of water and nano urea @ 5ml/liter at 60 DAP,90 DAP and 120 DAP	42.81	174769	128472	80.324	13.65	10.96	93635	0.47	0.990	235	2.50
T_8	100% recommended dose of NPK through inorganics + Sagarica @ 25 kg/ha	44.84	179746	132871	98.380	13.51	13.29	146757	0.69	1.050	245	2.65
	SE±	0.72	1807	1964	1.83	0.018	0.24	-	-	-	-	-
	CD	1.55	3877	4214	3.93	0.040	0.50	-	-	-	-	-

Table3: Response of various plantnutrients on sugarcane

Variety	Treat.	Cost of cultivation Rs/ha			Net profit Rs/ha					
		S1	**S2**	**Mean**	**S1**	**S2**	**Mean**	**S1**	**S2**	**Mean**
V_1- CoS17231	F1	153398	175500	164449	156673	156482	156577	1.02	0.89	0.95
	F2	158382	180798	169580	157754	158260	158007	0.96	0.84	0.90
	Mean	**155880**	**178149**	**168265**	**157213**	**157371**	**156042**	0.99	0.86	**0.92**
V_2- CoS 18231	F1	156887	177563	167222	133178	133178	133577	0.85	0.75	0.80
	F2	159961	183002	171231	135955	135161	135558	0.82	0.71	0.76
Mean	**Mean**	**158171**	**180282**	**170603**	**134966**	**134170**	**133318**	0.83	0.73	**0.78**
		158902	**180465**		**1448401**	**141771**		**0.91**	**0.80**	
				47						

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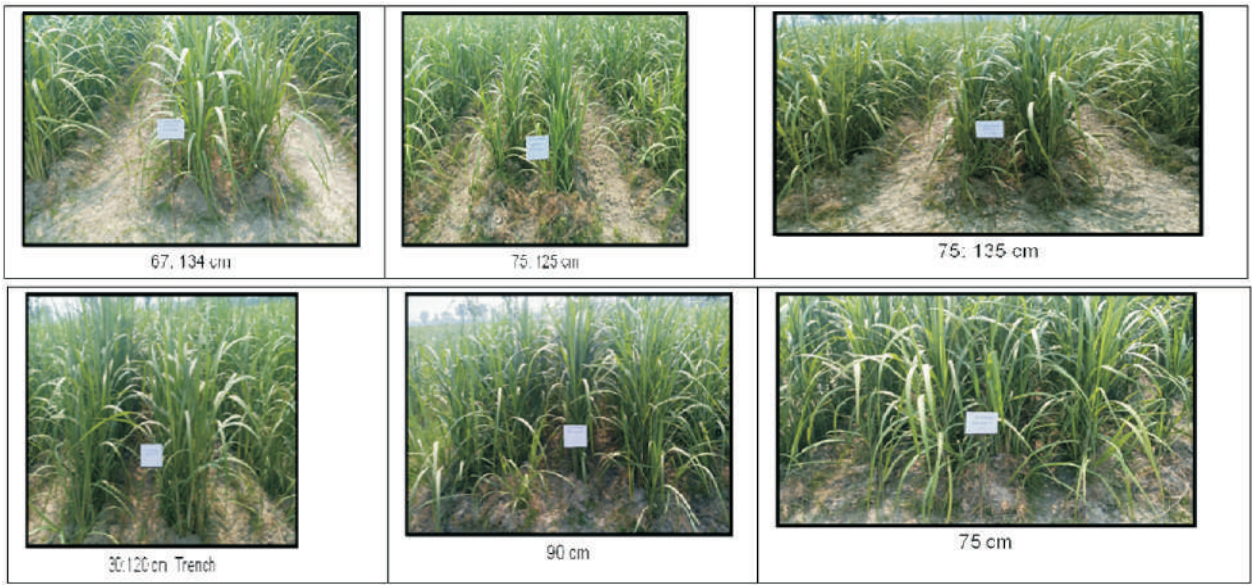
Title-Effect of planting method and spacing on productivity of sugarcane

The soil of the experimental plot was medium in organic carbon, low in available phosphorus and potash with pH 8.11. An experiment was conducted in autumn season to find out suitable planting method and spacing to facilitate mechanization in randomized block design with four replications layout. Germination per cent was not affected significantly by different planting methods. Deep furrow planting at 75 cm row spacing method produced significantly higher shoot population (179.89 thousand ha^{-1}) over remaining planting methods treatments except deep furrow planting at 75:125, 75:135 and 67:134 cm plant geometry. Number of millable canes was recorded significantly higher number in trench planting in paired row at (30:120) 150 cm (12073 thousand ha^{-1}) against deep furrow planting at 75:135, 67:134 cm row spacing plant geometry and conventional planting at 90 cm row spacing plant geometry. Effect of different planting methods on cane yield was noted significantly more in trench planting in paired row at 150 (30:120) cm (115.78 t ha^{-1}) as compared remaining all the planting methods treatments. CCS per cent was not affected significantly by different treatments but maximum value (12.45) obtained in trench planting in paired row at 150 (30:120) cm (Table-01).

Table -01: Effect of plant geometry on cane productivity

Treatments	Germination (%)	Shoot (000/ha)	NMC (000/ha)	Cane Yield (t/ha)	CCS (%)
T_1-Deep furrow planting at 75 cm row spacing	50.98	179.89	115.83	90.86	11.35
T_2-Deep furrow planting at 75:125 cm row spacing	53.65	133.59	104.45	84.47	11.94
T_3-Deep furrow planting at 75:135 cm row spacing	54.23	127.38	101.93	81.85	12.12
T_4-Deep furrow planting at 67:134 cm row spacing	54.43	132.54	111.78	97.79	12.34
T_5-Trench Planting in paired row at 150 (30:120) cm	56.64	164.26	120.73	115.78	12.45
T_6-Conventional planting at 90 cm row spacing	48.39	178.03	94.88	74.34	11.42
SEm±	1.94	4.15	4.35	5.77	0.52
CD(P=0.05)	NS	12.72	13.25	17.55	NS



Agronomical evaluation of new evolved sugarcane genotypes

The soil of the experimental site was medium in organic carbon, low in available phosphorus and potash with pH 8.11. An experiment was conducted in spring season to find out the fertility levels and planting method for promising sugarcane genotypes. Genotype CoS 17231 recorded significantly higher germination (53.81 per cent) against CoSe 17451. Shoot population and NMC were recorded significantly higher in CoS 17231 (154.49 and 116.65 thousand ha^{-1}) as compared with remaining genotype. Genotype CoSe 17451 produced significantly higher cane yield (82.07 t ha^{-1}). Application of recommended dose of NPK+25 per cent N through organic manure + biofertilizers produced significantly higher shoot population (149.56 thousand ha^{-1}), NMC (114.34 thousand ha^{-1}) and cane yield (83.59 t ha^{-1}) over recommended dose of NPK practice. Effect of plant geometry on NMC was significantly higher in 30:150 cm trench method (123.49 thousand ha^{-1}). CCS per cent was not affected significantly by different genotypes, fertility levels and plant geometry treatments but CoS 17231 genotype produced higher CCS per cent (12.18) against CoSe 17451 genotype.

Table-02: Agronomical evaluation of new sugarcane genotypes

Treatments	Germination (%)	Shoot (000/ha)	NMC (000/ha)	Yield (t/ha)	CCS (%)
Genotypes					
CoS 17231	53.81	154.49	116.65	77.33	12.18
CoSe 17451	48.91	136.24	101.29	82.07	12.09
SEm±	**1.45**	**1.61**	**2.56**	**1.33**	**0.11**
CD (P=0.05)	**4.38**	**4.90**	**7.77**	**4.02**	**NS**
Fertility levels					
100 % RDF	53.08	140.86	103.70	75.80	12.21
100 % RDF+25 % O. M.	49.65	149.56	114.34	83.59	12.0
SEm±	**1.45**	**1.61**	**2.56**	**1.33**	**0.11**
CD (P=0.05)	**NS**	**4.90**	**7.77**	**4.02**	**NS**
Plant geometry					
67:134 cm	52.52	132.11	94.45	75.36	11.98
30:150 cm	50.20	158.32	123.49	84.04	12.30
SEm±	**1.45**	**1.61**	**2.56**	**1.33**	**0.11**
CD (P=0.05)	**NS**	**4.90**	**7.77**	**4.02**	**NS**

Response of various sources of plant nutrients on sugarcane

The soil of the experimental plot was medium in organic carbon, low in available phosphorus and potash with pH 7.86. An experiment was conducted in randomized block design with three replications to find out the effect of Nano DAP, Nano urea, and Sagarika on growth, yield and quality of sugarcane in spring season. This experiment was consisted in eight treatments i.e. T_1- 100 per cent recommended dose of NPK through inorganic (Conventional), T_2- 100 per cent recommended dose of P_2O_5 and K_2O through inorganic+spraying nano urea@5ml/litre of water at 60 DAP and 90 DAP, T_3-50 per cent recommended dose of P_2O_5 and K_2O through inorganic +sett treatment with nano DAP @ 5ml/litre water+spraying nano DAP and nano urea@ 5ml/litre water at 60 DAP+spraying of nano urea@5 ml/liter water and Sakariga@5 ml/liter of water at 90 DAP, T_4- Sett treatment with nano DAP @ 5ml/litre water +Spraying Nano DAP and Nano urea @5 ml/liter of water at 60 DAP + Spraying of Nano DAP and Nano urea @ 5ml/liter and Sagarika@5 ml/liter of water at 90DAP , T_5- Sett treatment with nano DAP @ 5ml/litre water +Spraying Nano DAP and Nano urea @5 ml/liter of water at 60 DAP + Spraying of Nano DAP and

Nano urea @ 5ml/liter and Sagarika@5 ml/liter of water at 90DAP and 120 DAP,T_6- Sett treatment with nano DAP@5 ml/liter of water +spraying of WSF (19:19:19) @ 1.0kg in 100 liter water and nano urea @ 5 ml/liter of water at 60 and 90 DAP, T_7- Sett treatment with nano DAP@5 ml/liter of water +spraying of WSF (19:19:19) @ 1.0kg in 100 liter water and nano urea @ 5 ml/liter of water at 60, 90 and 120DAP and T_8- Conventional + Sagarika@ 25 kg/ha. Germination and commercial cane sugar per cent were not affected significantly by various sources of plant nutrients treatments. Conventional + sagarika@ 25 kg/ha practice produced significantly higher shoot population (159.73 thousand ha^{-1}) and NMC (124.81 thousand ha^{-1}) over other remaining treatments except T1. Conventional + sagarika@ 25 kg/ha treatment produced significantly higher cane yield (84.90 t ha^{-1}) but statically at par performance with T1, T2 and T3 treatments

Table -03: Response of various sources of plant nutrients on sugarcane productivity

Treatments	Germination (%)	Shoot (000/ha)	NMC (000/ha)	Cane Yield (t/ha)	CCS (%)
T_1	51.85	155.36	115.28	81.66	12.58
T_2	49.11	141.57	103.18	76.79	12.77
T_3	43.93	140.28	103.28	73.87	12.40
T_4	45.12	133.34	107.35	61.09	12.42
T_5	49.05	136.61	109.53	66.88	12.84
T_6	48.39	137.51	104.47	65.68	12.66
T_7	47.50	139.69	111.21	65.53	12.70
T_8	50.71	159.73	124.81	84.90	12.70
SEm±	**1.88**	**4.61**	**3.61**	**3.64**	**0.17**
CD (P=0.05)	**NS**	**14.13**	**11.09**	**11.15**	**NS**

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Soil survey, testing, fertility mapping and fertilizers recommendation

Under the regular feature programme during the year 2022-23, the work was undertaken on the soil survey, testing, fertility mapping and fertilizer recommendation in Gobind Sugar Mill Aira (Lakhimpur-kheri) zone. There were one thousand seven hundred thirty one representative furrow depth soil samples collected in the zone. Samples were processed and analyzed for major and micro-nutrients. Analytical result showed that most of the soils were deficient in Nitrogen, Phosphorous and medium in potash. Consider the critical value for Zn, Fe, Mn and Cu as 0.8, 4.5, 3.5 and 0.7 ppm respectively about 59.21%, 26.11%, 40.15% and 27.15% soil samples were found deficient. On the basis of results, prepare the fertilizer recommendation in every circle of sugar mill zone for maintained sugarcane standard.

Major Nutrients-

* Nitrogen	@180-200 kg/ha
*Phosphorous	@ 60-80 kg/ha through single super phosphate
*Potash	@40-60 kg/ha

Micro-Nutrients-

*Zinc Sulphate	@25 kg/ha
*Ferrous Sulphate	@10 kg/ha
*Manganese Sulphate	@10 kg/ha
*Copper Sulphate	@5 kg/ha

The fertilizer recommendation and fertility map were given to pearson concerned.

Fertility Map of Gobind Sugar Mill Aira (Lakhimpur-Kheri)

Fertility status and fertilizer recommendations of the farm of UPCSR, Shahjahanpur

A total 46 soil samples were collected from U.P. Council of Sugarcane Research, Shahjahanpur before planting at spring and autumn seasons. Soil samples were processed and analyzed. Results showed that the pH ranged from 6.80 to 7.56 with a mean value of 6.99, EC (dsm^{-1}) ranged from 0.109 to 0.220 with a mean value of 0.156, Organic carbon (gm/kg) ranged from 3.0 to 5.85 with a mean value 4.03, available phosphorus (kg/ha) ranged from 7.3 to 12.6 with a mean value of 9.39 and available potash (kg/ha) ranged from 97.44 to 187.60 with a mean value of 130.74.Most of the soil samples were deficient in Copper, Zinc and Manganese as per rating of critical limit in respect of micro-nutrients. Available sulphur (ppm) ranged from 7.3 to 16.8 with a mean value of 9.58 ppm. It indicates that most of the soil samples were poor in nitrogen, phosphorous and sulphur whereas potash was medium and zinc, copper and manganese were near to critical limit. Fertilizer recommendations were prepared as per results for respective crop and given to farm superintendent.

Free soil testing

Under free soil testing programme, about 1165 soil samples were received from different cane growers and analyzed. The fertilizer recommendations were given to concern.

Studies on different mode of nitrogen utilization efficiency in sugarcane.

Field experiment was conducted during the year 2022-23 in spring planting season at the farm of U.P. Council of Sugarcane Research, Shahjahanpur in RBD with three replications. The experimental soil had pH 7.0, EC 0.186 (dsm^{-1}), organic carbon 5.30gm/kg, available Phosphorus 7.90 kg/ha, available potash 121.87 kg/ha, Zinc 0.441 ppm, Iron 10.62 ppm, Manganese 0.915 ppm,Copper 0.621 ppm and Sulphur 13.8 ppm,. The treatments comprised:-

T1- Basal+2top dressing (90+120 DAP)
T2- 3Top dressing (30,60&90 DAP)
T3- 2Top dressing (60&120DAP) + F1
T4- 2Top dressing (60&90DAP) F4+F5
T5- 1Top dressing (120DAP) +F2+F3.

T-6 1Top dressing (90DAP) +F2+F4+F5.
T-7 Basal Azotobacter +1Top dressing (90DAP) +F1+F2.
T-8 Azotobacter +F1+F2&Top dressing (90DAP) +F5

Note- F1,F2,F3,F4 and F5 urea foliar spray @1% at the time of 45,60,90,120 and 150 DAP.

Recommended dose of Phosphorous and potash were applied in all the plots.

Results revealed that application of nitrogen as two top dressing at the time of 60 and 120 days along with single foliar application at the time of 45 days after planting gave highest cane yield (95.37t/ha) in the comparison to recommended dose of nitrogen (86.42t/ha). Data Significantly proved with compared to control. These treatment saved 57kg nitrogen/ha in the comparison to flate recommendation. As regarded the sucrose percent in juice the application of T3 as two Top dressing (60&120DAP) and F1 as foliar spray (45DAP) also increased @2.31% and 2.01% at the 10th and 12th months of crop age. but data did not reach to significance level.

Table-1

Treatments	Sucrose %		Yield(Mt/ha)
	10 months crop age	12 months crop age	
T1	18.54	18.85	86.42
T2	18.30	18.84	91.05
T3	18.97	19.23	95.37
T4	18.37	18.96	84.88
T5	18.08	19.15	79.32
T6	17.97	18.29	83.33
T7	17.72	18.70	81.48
T8	18.32	18.47	79.10
CD	NS	NS	6.87

Muzaffarnagar

Soil Testing :

Total numbers of 1296 soil sample were received from different sugar Mill zones and Analysis of 643 soil sample the nutrient index percentage the organic carbon(1.56) Low in nitrogen, phosphorus(1.59) and medium in Potash(1.74) was found. The pH range between 6.60-8.02 was found in the soil sample and E.C. range between 0.10-0.24 mmhos/ cm2 found in that soil sample. After soil analysis the fertilizer recommendation were mode and send the concerned cane growers of different sugar mill zones.

Effect of sources of Nitrogen (PMT 2022-23) :

Study are under progress to find out the effect of continuous application of organic manure and inorganic fertilizers on yield and quality of sugar cane since 1949-50 at Muzaffarnagar in an monoculture rotation of sugar. Seven treatment were followed (i) Control No Manure (ii)FYM (iii) GN Cake (iv)Urea (v) F.Y.M. +Urea (vi) G.N. Cake + Urea (vii)F.Y.M. +G. N. Cake + Urea used at before planting time with four replication in R.B.D. Results revealed that increasing level of different treatment. The germination, tillers, N.M.C. yield and sucrose percentage of up to level of FYM+GN cake +Urea. The Maximum tillers/ha.(164813), number of millable cane/ha.(129294), yield t/ha (85.85) and sucrose percentage (16.92) and (17.05) at 10th and 12th Month crop age was found in significantly treatment FYM+GN cake +Urea. The minimum number of tillers/ha (140226), number of millable cane/ha (105777), yield MT/ha (69.17) and sucrose percentage (16.20) & (16.27) at 10th and 12th Month crop age in the treatment of control i.e.(No manure).

Table-1 : Nutrition requirements of Sugarcane (Source of Nitrogen)
PMT (2022-23)

Sl. No.	Treatment 135 kg N/ha	Germination %	Tiller/ ha	NMC/ ha	Yield MT/ha	Suc.% Oct.	Suc. % Dec.
1	Control(No manure)	41.37	140226	105777	69.17	16.20	16.27
2	FYM @135 kg N/ha	42.83	145804	122846	79.90	16.57	16.69
3	G.N.Cake@135 kg N/ha	42.44	147767	123448	82.15	16.64	16.73
4	Urea @ 135 kg N/ha	41.81	150110	122555	81.25	16.69	16.80
5	FYM+Urea@67.5kg N/ha	45.46	155777	124943	82.19	16.76	16.85
6	G.N. cake +Urea @ 67.5 kg N/ha	43.850	158900	12588	83.03	16.83	16.92
7	FYM+ GN cake +Urea @ 45 kg N/ha	45.83	164813	129294	85.85	16.92	17.05
	C.D.	0.48	9997.6	2090.7	4.11	0.067	0.071

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On the basis of soil testing the effect of fertilizer on yield and quality of sugarcane.

The objective of this experiment to detect out the impacts of soil test fertilizer recommendation on yield and quality of sugarcane.

The experiment has done in randomized block design with four replications, there are six treatments as liked below;

T1: Conventional fertilizer recommendation(FR) only-180 kg N/ha.

T2: Conventional fertilizer recommendation as major nutrients-180N, 80P, 40K (kg/ha).

T3: 80% recommensation dose of NPK- 144N, 60P, 48K (kg/ha).

T4: Soil test FR as chemical fertilizer for major nutrients-200N, 80P, 60K (kg/ha).

T5: Soil test FR as chemical fertilizer for major and minor nutrients- 190N,70P, 50K, 25Zn, 40S (kg/ha)l

T6: Soil test FR as nutrient management-(1/3N-through organic +10 kg biofertilizer) 127N, 80P, 60K, 10kg PSB +10kg azotobactor each /ha +63.39 Qtls PMC or 126.6 Qtls FYM.

Table No.1

Treatments	Ger%	Tillers/ha	NMC/ha	Sucrose %	Purity Co.	Yield MT/ha
T1- Con.FR-180kg N/ha	40.24	159721	105632	17.95	87.60	70.68
T2- CFR as MN 180N, 80P, 40K kg/ha	41.63	163193	108178	17.87	87.68	66.13
T3-80%RDF 144N, 60P, 48K kg/ha	39.41	156789	103549	17.06	87.31	73.92
T4-STFR MN 200N, 80P, 60K kg/ha	46.34	167360 **III**	110802 **III**	17.47	87.66	75.85 **III**
T5- STFR as ch fr maj & min N 190N, 70P, 50K, 25Zn, 40S kg/ha	42.34	173841 **I**	117669 **I**	17.25	87.11	82.72 **I**
T6-STFR INM 1/3N th org+ 10kg BF, 127N, 80P, 60K+10PSB+Azb each/ha + 63.39Q PMC or 126.6Q FYM	43.98	170369 **II**	113502 **II**	17.17	87.13	78.24 **II**
C.D.	5.12	2079.4	2450.8	1.174	1.202	8117.61

Observations to be recorded:

1- Initial satatus of soil.

2- Fertilizer dose according to status.

3- Germination%, shoots, NMC, Yield and juice quality.

4-Soil status after harvest.

Soil Analysis

Soil analysis of sugarcane Farm and farmers During 2022-23 -201 total soil sample collected from G.S.S.B.R.I Seorahi farm and analysed for N,P,K,E.C and pH.401 soil samples from farmers which we have received from D.C.M. Fertilizers Chemical, Padrauna, Luxmiganj, Captanganj, Khadda, Ramkola (K), Ramkola (P), Kathkuiyan and Seorahi we analysed soil for N,P,K,E.C and pH. Result of soil sample sent to concerns.The Eastern Sugar Mills Sunsri, Jogvani, Areria (Bihar) 16 samples and 5 samples from Seorahi farmers are analysed for major and minor elements for N,P,K,E.C , pH, Zn, Fe and Mn.

Juice Analysis

During 2022-23 there were total number of 1338 juice smples and 196 bagasse pol analysed. Juice data sent to concerning discipline for there record and per usual.

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1. Juice analysis programme

The cane juice samples obtained from experimental plots of Breeding as well as other disciplines of the institute for quality parameter are analyzed for quality parameters viz., brix, sucrose content, and purity coefficient, pol percentage in cane and fiber percentage cane. Analysis of juice sample is carried out from the plants growing in C2 generation until the release of the variety under different programs in breeding division. Juice analysis for quality parameter were carried out from experimental plots of different disciplines at cane harvesting stage for assessment of any variation in quality due to different treatments/ experiments as per research program. Under this program, total 4432 samples of cane juice was analyzed for Brix, sucrose and purity coefficient, 779 samples of cane was analyzed for pol % in cane and 779 samples of cane was estimated for fiber% in cane (Table 8.1). The results were made available to the concerned departments for their perusal.

Table 7.1: Juice samples analyzed during the year 2022-23

Samples analyzed during the year 2022-23				
Name of the Section	**Brix, Pol% & Purity**	**Pol % in cane**	**Fiber % cane**	**Total**
Breeding	1640	707	707	3054
Physiology	244	-	-	244
Sugar Chemistry	132	72	72	276
Entomology	127	-	-	127
Agronomy	492	-	-	492
Soil Chemistry	48	-	-	48
Pathology	131	-	-	131
Bio- Chemistry	60	-	-	60
Total	**2874**	**779**	**779**	**4432**

Screening of elite sugarcane varieties for sustainable sugar recovery

To select elite sugarcane clones having high sucrose content for commercial cultivation six early maturing and six mid-late maturing varieties were assessed. All six early varieties viz; Co 15023, Co 0118, CoS 17231, CoS16233, Co 0238, CoS 13235, and mid late maturing varieties viz; CoS 767 , CoS 09232, CoS 8279, CoS 17234 , CoS 10239, CoS 14233, were harvested from October (early crushing) to March (late crushing) and evaluated for quality parameters sucrose percent, pol percent cane and fibre percent cane. All six early varieties showed promising results in terms of percent sucrose, percent fibre and pol % in cane as compared to the mid-late varieties. Percent juice sucrose of early maturing varieties ranged between 14.59% (Co 0238) to 15.86% (Co 15023) during October, and gradually increased until March and ranged between 19.62 % (CoS 16233) to 20.93% (Co 0238). Percent juice sucrose of mid-late maturing varieties ranged between 13.29% (CoS 767) to14.34% (CoS 09232) in October, and increased to 18.58% (CoS 17234) to 19.55% (CoS 09232) in March. The overall superiority of the early maturing varieties continued throughout the harvesting period. Values for Pol percent cane showed a similar trend. Percent fibre of the early varieties ranged

between12.42 (CoS 13235) to 13.10 (CoS 16233) percent in October and 14.62 (CoS 13235) to 14.97 (CoS 16233) percent in March. However, in mid-late maturing varieties, the percent fibre was 13.58 (CoS 09232) to 14.0 (CoS 10239) percent in October, and increased to 15.19(CoS 08279) to 15.31 (CoS 17234) percent in March. These results show that proper balance of the area under early and mid-late maturing varieties and their scientific harvesting schedule will improve sugar recovery (Table 8.2).

Table 7.2: Varietal evaluation for sustainable sugar recovery 2022-23

S.N.	Varieties	Months					
		Oct	Nov	Dec	Jan	Feb	Mar
Sucrose % in juice							
Early maturing							
1	Co 15023	15.86	17.66	18.67	19.42	20.45	20.54
2	Co 118	15.22	16.97	18.15	18.96	19.89	20.06
3	CoS 17231	15.55	15.92	17.93	18.39	19.85	19.99
4	CoS 16233	14.74	16.43	18.34	18.89	19.55	19.62
5	Co 0238	14.59	17.29	17.83	18.84	19.94	20.93
6	CoS 13235	14.82	17.05	17.85	18.72	19.80	19.92
Mid-late maturing							
7	CoS 767	13.29	15.28	15.67	17.25	18.21	19.38
8	CoS 09232	14.34	15.80	17.12	17.73	19.21	19.55
9	CoS 08279	14.29	15.88	16.55	17.69	18.65	19.50
10	CoS 17234	12.82	15.68	16.88	17.34	18.39	18.58
11	CoS 10239	14.04	15.59	15.88	16.96	18.14	18.61
12	CoS 14233	14.13	15.54	17.27	17.64	18.52	18.75
Pol % in Cane							
Early Maturing							
1	Co 15023	11.89	13.0	13.49	14.02	14.30	15.0
2	Co 118	11.44	12.57	13.20	13.77	14.60	14.86
3	CoS 17231	11.67	11.90	13.08	13.34	14.47	14.62
4	CoS 16233	11.20	12.19	13.32	13.70	14.18	14.50
5	Co 0238	11.10	12.77	12.98	13.63	14.56	14.82
6	CoS 13235	11.32	12.60	13.02	13.51	14.49	14.89
Mid-late maturing							
7	CoS 767	10.24	11.43	11.74	12.70	13.37	14.01
8	CoS 09232	10.95	11.80	12.60	13.05	13.81	14.24
9	CoS 08279	10.91	11.85	12.23	13.0	13.17	14.16
10	CoS 17234	9.88	11.71	12.43	12.77	13.19	13.69
11	CoS 10239	10.76	11.60	11.97	12.56	13.04	13.50
12	CoS 14233	10.86	11.52	12.69	12.91	13.37	13.63
Fiber % in cane							
Early maturing							
1	Co 15023	12.34	13.46	14.20	14.40	14.76	14.80
2	Co 118	12.58	13.92	14.24	14.42	14.82	14.89
3	CoS 17231	13.0	14.0	14.36	14.52	14.90	14.92
4	CoS 16233	13.10	14.17	14.30	14.57	14.96	14.97
5	Co 0238	12.50	13.78	14.22	14.39	14.66	14.68
6	CoS 13235	12.42	13.64	14.16	14.37	14.60	14.62

Mid-late maturing							
7	CoS 767	13.67	14.36	14.50	14.86	15.24	15.26
8	CoS 09232	13.58	14.29	14.42	14.82	15.20	15.21
9	CoS 08279	13.91	14.32	14.46	14.85	15.17	15.19
10	CoS 17234	13.61	14.28	14.56	14.80	15.22	15.31
11	CoS 10239	14.0	14.39	14.61	14.90	15.23	15.29
12	CoS 14233	13.94	14.34	14.55	14.89	15.15	15.27

3. Impact of planting season on quality attributes of plant and ratoon sugarcane

The study evaluated the impact of planting time on two early (Co 0238 and UP 05125) and two mid-late varieties (CoS 08279 and CoS 09232). Varieties were planted in September (autumn), February (spring) and May (Late spring) in RBD with three replications under normal cane package and practices. The crops were harvested in February, and growth and qualitative analysis were carried out. The study shows that the planting time significantly affected the yield and quality of the cane. The highest yield of 95.92 t/ha (Co 0238) was observed in autumn planted cane, followed by spring 85.40 t/ha and late 78.39 t/ha planted cane. However, CCS% was also found to be highest in autumn-planted cane, followed by spring and late (Table 8.3a, 8.3b and 8.3c). Thus, the study so far on plant cane revealed a notable impact of planting time on the yield and the quality attributes of sugarcane due to the climatic factors, restricted time of growth phase and soil moisture availability. The late-planted sugarcane crop also becomes more susceptible to different pests and diseases.

Table 7.3 (a) Impact of planting season on growth attributes of plant sugarcane (Feb, 2023)

Planting Time	Varieties	Germination %	No. Of tillers /ha	NMC /ha	Cane Girth (cm)	Cane Height (cm)	Cane Weight (kg)	Yield (t/ha)
Autumn	Co 0238	60.42	122427	95095	2.80	230	1.40	115.88
	UP 05125	51.56	107266	88700	2.48	195	1.22	106.24
	CoS 08276	57.81	109844	90351	2.56	210	1.25	102.72
	CoS 09232	64.89	115826	91382	2.49	215	1.28	103.96
Spring	Co 0238	58.33	124077	88597	2.68	222	1.35	95.77
	UP 05125	51.45	107988	84472	2.50	184	1.10	80.95
	CoS 08276	54.79	112216	85399	2.67	205	1.16	93.39
	CoS 09232	60.52	119126	86225	2.65	200	1.05	93.90
Late Spring	Co 0238	54.06	117683	82615	2.54	210	1.26	88.31
	UP 05125	48.75	104275	79418	2.31	170	1.02	74.01
	CoS 08276	47.92	108297	80862	2.46	196	1.10	72.76
	CoS 09232	57.19	115516	81996	2.41	178	1.06	74.94

Table 7.4 (b) Impact of planting season on quality attributes of plant sugarcane (Dec, 2022)

Planting Time	Varieties	Brix%	Sucrose %	Purity %	Reducing sugar (mg/ml)	CCS%
Autumn	Co 0238	20.71	17.99	86.87	2.42	12.34
	UP 05125	20.58	17.78	86.39	2.30	12.16
	CoS 08276	20.62	17.70	85.84	3.10	12.07
	CoS 09232	20.25	17.39	85.88	2.18	11.86
Spring	Co 0238	20.65	17.85	86.44	2.12	12.21
	UP 05125	20.56	17.69	86.04	2.53	12.08
	CoS 08276	20.49	17.58	85.80	3.15	11.98
	CoS 09232	20.11	17.11	85.08	3.33	11.61
Late Spring	Co 0238	20.58	17.72	86.10	2.26	12.10
	UP 05125	20.44	17.57	85.96	2.65	11.99
	CoS 08276	20.35	17.43	85.65	2.25	11.88
	CoS 09232	20.01	17.01	85.01	2.21	11.54

Table 7.5 (c) Impact of planting season on quality attributes of plant sugarcane (Feb,2023)

Planting Time	Varieties	Brix%	Sucrose %	Purity %	Reducing sugar (mg/ml)	CCS%
Autumn	Co 0238	22.05	19.99	90.66	2.31	13.99
	UP 05125	21.58	19.43	90.04	2.15	13.56
	CoS 08276	21.45	19.15	89.28	3.45	13.31
	CoS 09232	21.32	19.02	89.21	3.36	13.21
Spring	Co 0238	21.91	19.74	90.10	2.31	13.78
	UP 05125	21.46	19.33	90.07	3.00	13.49
	CoS 08276	21.41	19.08	89.12	2.90	13.25
	CoS 09232	21.30	18.96	89.01	2.11	13.16
Late Spring	Co 0238	21.89	19.71	90.04	2.11	13.75
	UP 05125	21.42	19.28	90.01	2.57	13.45
	CoS 08276	21.36	19.03	89.09	3.61	13.21
	CoS 09232	21.24	18.91	89.03	3.24	13.12

4. Assessment of post harvest quality deterioration in promising sugarcane varieties under sub-tropical condition

This experiment evaluated the quality decline, mainly the sucrose and weight loss of cane cultivars, after harvest to ensure the most suitable varieties for a more extended crushing period for the sugar industry. The post-harvest deterioration of CoS 13231, Co 118, CoS 12232, and CoSe 11453 was assessed till 240 hours of harvest. The canes were kept in bundles under two different conditions (i) open field (T1) and (ii) covered with a thick layer of sugarcane trash (T2). The study shows a significant decline in the weight of the canes. The losses ranged between 4.45 to 10.35 per cent during low (Jan) and 8.09 to 16.80 percent during high (April) temperatures. The maximum loss was found to be in the uncovered (T1) CoS 13231 (10.35) percent) during low and in T1, CoSe 11453 during high (16.80 per cent) temperatures, it was found to be minimum in the variety Co 0118 during low (4.45 percent) and high (8.09%) temperatures (Table 8.4 a and c). The sucrose losses ranged from 0.90 to 1.92 units during low and 2.33 to 4.33 units during high temperatures. The sucrose losses were high in CoS 13231 and CoS 12232 but low in trash-covered Co 0118 (Table 8.4 b and d). This study would help prepare a post-harvest quality deterioration profile of the promising elite varieties, which would further assist us in calendaring the harvest schedule of the varieties accordingly for the benefit of farmers and the sustainability of sugar factories from early to late crushing periods.

Table 7.6 (a) Loss in Moisture percent at different time hours of cane harvest during low temperature (Jan,2022)

Hour after Harvest	Varieties							
	CoS 12232		CoS 13231		Co 118		CoSe 11453	
	T1	T2	T1	T2	T1	T2	T1	T2
48	0.51	0.33	0.81	0.40	0.43	0.24	0.14	0.13
96	2.16	1.79	3.41	0.96	1.81	1.09	0.62	0.44
144	3.54	1.45	3.77	2.03	2.23	1.36	2.14	1.11
192	6.97	3.01	7.72	2.58	5.78	2.04	3.13	1.49
240	10.12	4.76	10.35	5.52	9.41	4.45	9.67	4.69

Table 7.7 (b) Sucrose loss at different time hours of cane harvest during low temperature (Jan,2022)

Hour after Harvest	Varieties							
	CoS 12232		CoS 13231		Co 118		CoSe 11453	
	T1	T2	T1	T2	T1	T2	T1	T2
0	18.03	18.03	18.12	18.12	19.73	19.73	19.81	19.81
48	18.0	18.01	17.76	17.82	19.20	19.57	19.11	19.31
96	17.77	17.98	17.51	17.67	18.94	19.24	18.92	19.01
144	17.48	17.75	17.36	17.55	18.60	19.11	18.74	18.84
192	16.84	17.20	16.75	16.87	18.42	18.92	18.23	18.60
240	16.36	16.49	16.20	16.56	18.13	18.83	18.11	18.41
Loss in Units	1.67	1.54	1.92	1.56	1.60	0.90	1.70	1.40

Table 7.8 (c) Loss in Moisture percent at different time hours of cane harvest during low temperature (April,2022)

Hour after Harvest	Varieties							
	CoS 12232		CoS 13231		Co 118		CoSe 11453	
	T1	T2	T1	T2	T1	T2	T1	T2
48	3.66	2.43	3.82	3.48	2.12	1.98	3.75	3.24
96	7.50	6.40	8.97	7.04	4.50	3.67	7.82	6.58
144	10.84	7.63	10.28	9.58	8.06	6.38	9.42	8.41
192	11.62	8.39	12.72	11.24	9.82	7.40	11.74	10.01
240	15.40	9.82	14.04	13.39	13.48	8.09	16.80	10.94

Table 7.9 (d) Sucrose loss at different time hours of cane harvest during low temperature (April,2022)

Hour after Harvest	Varieties							
	CoS 12232		CoS 13231		Co 118		CoSe 11453	
	T1	T2	T1	T2	T1	T2	T1	T2
0	20.75	20.75	20.62	20.62	20.57	20.57	20.54	20.54
48	19.91	20.01	19.66	19.94	19.80	20.0	19.49	19.78
96	18.42	19.50	18.42	19.64	19.13	19.74	18.24	19.21
144	17.99	19.01	17.78	19.10	18.51	19.0	17.85	18.69
192	17.52	18.61	17.59	18.69	17.99	18.77	17.0	18.04
240	17.0	18.07	17.03	18.11	17.51	18.24	16.21	17.62
Loss in Units	3.75	2.68	3.59	2.51	3.06	2.33	4.33	2.92

5. Utilization of sugarcane and sugar industry wastes for sustainable sugarcane production

A pilot study in a farmer's field was conducted with sugarcane cultivar Co 0118 (early maturing) to explore the impact of recycled sugar-mill waste and inorganic fertilizer application on sugarcane's growth, yield, and quality attributes. The experiment comprised 10 treatments, including two inorganic fertilizer options (T1 and T2), two integrated treatments (T3 and T4), and six organics (sugar-industry by-products and wastes) options (T5-T10). The highest germination rate (57%) was when the cane received sugar-industry by-products (T6) [press mud cake (PMC) applied at 20 t/ha + biofertilizers, *Azotobacter* and PSB (phosphorus-solubilising bacteria) at 10 kg/ha each + irrigation through treated sugar-industry wastewater]. The highest number of tillers (140,000/ha at 120 DAP), number of millable canes (102,000/ha), cane yield (99.2 t/ha) and sugar yield (11.7 t/ha) were also observed with treatment T6. However, these results were similar to those obtained from treatment T4 [PMC applied at 10 t/ha + 50% NPK through inorganic + biofertilizers, *Azotobacter* and PSB applied at 10 kg/ha each + irrigation through treated sugar-industry wastewater]. The quality parameters, viz. brix and pol%, were improved with PMC, fly ash and biofertilizers. Soil organic carbon showed positive responses to the application of organic by-products. The results showed that the application of sugarcane-industry derivatives may lead to their

proper disposal and reduce the recommended level of inorganic chemical fertilizers. It will also enable improved sustainability and soil health (Table 8.5 & 8.6) (Fig 8.1 & 8.2).

Table 7.10. Effect of different treatments on yield attributes (mean of two crops, 2020-22)

Treatment	Germination (%)	Tillers (tillers/ha)	Millable stalks (stalks/ha)	Cane length (cm)	Cane girth (cm)	Stalk weight (kg)	Cane yield (t/ha)
T1	52.4	132,781	91,133	255	2.48	1.21	95.4
T2	51.2	123,151	92,780	249	2.45	1.20	93.6
T3	54.2	134,077	97,595	245	2.50	1.12	98.2
T4	53.0	142,596	97,780	260	2.40	1.15	98.6
T5	56.0	135,374	97,040	240	2.50	1.14	96.2
T6	56.7	139,633	102,225	243	2.36	1.18	99.2
T7	53.4	118,336	84,817	244	2.47	1.17	89.3
T8	53.8	133,707	94,262	263	2.56	1.14	91.66
T9	51.6	107,225	82,410	225	2.48	1.18	87.98
T10	50.9	109,447	89,076	232	2.50	1.20	90.48
SE±	1.76	1798	1314	1.3	0.01	0.01	1.4
CD	3.7	3777	2762	3	0.02	0.02	3.0

Table 7.11 Effect of different treatments on quality attributes (mean of two crops, 2020-22)

Treatment	Brix^0	Sucrose %	Purity %	Reducing sugars (mg/ml)	CCS %
T1	19.52	16.90	86.58	2.30	11.57
T2	19.40	16.76	86.39	2.39	11.46
T3	19.25	16.60	86.23	6.17	11.34
T4	18.99	16.33	85.99	5.22	11.14
T5	18.90	16.24	85.92	3.50	11.08
T6	19.86	17.22	86.71	4.16	11.80
T7	18.50	16.60	85.41	4.08	11.56
T8	19.54	16.93	86.64	3.00	11.60
T9	19.05	16.39	86.06	4.00	11.19
T10	19.11	16.45	86.08	5.42	11.23
CV	1.10	3.31	0.73	3.95	0.61
SE	0.17	0.45	0.52	0.13	0.06
CD	0.36	0.95	NS	0.27	0.12

Figure 7.1. Preparation of different treatments and planting of the experiment.

Figure 7.2. Irrigation with sugar-industry treated wastewater

5. Impact of ortho silicic acid (OSA) on quantitative and qualitative attributes of early and mid late sugarcane varieties

A field study was conducted on two early, viz; CoS 13231, CoLk 15204, and two mid late viz., CoS 12232 and CoPb 15213 sugarcane varieties, to explore the impact of application of stabilized OSA (Silxol, 0.8%) on growth, yield and juice quality attributes. The data on growth, yield and quality indicate significant variations among the treatments. Significantly the high rate of germination%, number of millable canes, yield (t/ha), sucrose % and CCS (t/ha) was found with both the doses of OSA ie., T2 and T3 over T1 (control). However, the increase was better in treatment T2 (4 ml/ha) over T3 (8 ml/ha) (Table 1 & 2). The cane yield was increased to the tune of 7.28 (CoPb 15213) to 11.35% (CoS 12232) in T2 over the

T1. The sucrose% was found to increase by 0.66 (CoS 13231) to 5.02 (CoLk 15204) in T2 canes over T1. Also, one of the most important traits ie., CCS t/ha was found to increase in all the varieties and the increase ranged between 9.32 (CoS 13231) to 14.08% (CoS 12232) in T2, however the increase in T3 was slightly low as compared to T2 and ranged between 5.85 (CoS 13231) to 12.25% (CoLk 15204). The increase in all the qualitative and quantitative traits with T3 dose was found to be at par or low when compared to T2. This impact of T1, T2 and T3 doses may be due to the hormetic impact of nonessential metal ions, as they can boost growth based on a method of compensatory adaptation, where they act as cause for cell expansion and proliferation (Poschenrieder et al, 2013). Data shows that application of 4 ml/l ortho silicic acid (silixol, 0.8%) helps in improving cane yield and juice quality of sugarcane up to a significant level (Table 8.7 & 8.8).

Table 7.12 : Effect of Ortho Silicic Acid (Silixol) on growth and yield attributes of different varieties of sugarcane under different treatments

S.N.	Varieties	Treatments	Germination (%)	Tillers (000)/ha	NMC (000)/ha	Cane yield (t/ha)
1	CoS 13231	T1	37.73	148.23	96.48	75.25
		T2	43.29	166.21	100.14	82.11
		T3	42.03	164.27	98.66	77.94
		% increase (T2 over T1)	12.84	10.82	3.65	8.35
		% increase (T3 over T1)	10.23	9.76	2.21	3.45
2	CoLk 15204	T1	38.91	145.22	98.33	79.65
		T2	42.71	156.42	101.21	86.03
		T3	40.08	154.32	99.85	82.88
		% increase (T2 over T1)	8.90	7.16	2.85	7.42
		% increase (T3 over T1)	2.92	5.90	1.52	3.90
3	CoS 12232	T1	38.83	153.32	98.61	79.87
		T2	44.25	166.24	101.24	90.10
		T3	42.52	164.34	99.87	85.89
		% increase (T2 over T1)	12.25	7.77	2.60	11.35
		% increase (T3 over T1)	8.68	6.71	1.26	7.01
4	CoPb 15213	T1	36.17	145.32	99.21	83.34
		T2	41.25	158.33	100.99	89.88
		T3	40.30	156.25	99.32	85.42
		% increase (T2 over T1)	12.32	8.22	1.76	7.28
		% increase (T3 over T1)	10.25	7.00	0.11	2.44

Table 7.13 Effect of Ortho Silicic Acid (Silixol) on juice quality, yield attributes and sugar yield of different varieties of sugarcane under different treatments

S. No	Varieties	Treatments	Brix (%)	Sucrose (%)	Purity (%)	Stalk height (cm)	Stalk diameter (cm)	Single cane weight (kg)	CCS (%)	CCS (t/ha)
1	CoS 13231	T1	20.63	18.03	87.40	224.00	1.82	0.78	12.41	9.34
		T2	20.60	18.15	88.12	242.55	2.02	0.82	12.54	10.30
		T3	21.02	18.47	87.83	236.00	2.00	0.79	12.73	9.92
		% increase (T2 over T1)	-0.15	0.66	0.82	7.65	9.90	4.88	1.04	9.32
		% increase (T3 over T1)	1.86	2.38	0.49	5.08	9.00	1.27	2.51	5.85
2	CoLk 15204	T1	18.26	15.33	83.97	203.00	1.98	0.81	10.34	8.24
		T2	18.98	16.14	85.05	215.22	2.22	0.85	10.96	9.43
		T3	19.36	16.61	85.83	208.00	2.12	0.83	11.33	9.39
		% increase (T2 over T1)	3.79	5.02	1.27	5.68	10.81	4.71	5.66	12.62
		% increase (T3 over T1)	5.68	7.71	2.17	2.40	6.60	2.41	8.74	12.25
3	CoS 12232	T1	19.06	16.21	85.03	200.00	2.04	0.81	11.00	8.79
		T2	19.48	16.69	85.70	214.19	2.24	0.89	11.35	10.23
		T3	19.83	17.06	86.05	207.00	2.16	0.86	11.65	10.01
		% increase (T2 over T1)	2.16	2.88	0.78	6.62	8.93	8.99	3.08	14.08
		% increase (T3 over T1)	3.88	4.98	1.19	3.38	5.56	5.81	5.58	12.19
4	CoPb 15213	T1	17.99	15.11	83.94	180.00	1.86	0.84	10.19	8.49
		T2	18.30	15.43	84.31	205.33	2.12	0.89	10.43	9.37
		T3	18.62	15.78	84.75	190.00	2.04	0.86	10.69	9.13
		% increase (T2 over T1)	1.69	2.07	0.44	12.34	12.26	5.62	2.30	9.39
		% increase (T3 over T1)	3.38	4.25	0.96	5.26	8.82	2.33	4.68	7.01

7. Testing of sugar recovery in different sugar mills, 2022-23

Under this programme six sugar mills viz; (1). Avadh sugar energy Ltd. Unit-Hargaon, (Sitapur) (2). U.P. State Sugar Corporation Ltd., Unit- Pipraich, (Gorakhpur), (3). Yadu Sugar Ltd, Bisauli, (Badaun), (4). Dwarikesh Sugar Ind. Ltd, Dwarikesh Dham, (Faridpur), (5). The Kisan Sahkari Chini Mills Ltd, Tilhar, (Shahjahanpur) and (6). Kisan Sahkari Chini Mills Ltd, Sampurna Nagar, (Kheri) of Uttar Pradesh were evaluated for their sugar recovery. The programme was aimed at quality assessment of major varieties under cultivation from farmer field. The cut to crush losses in terms of Pol% in cane in the field, in fiberized cane and losses during processing, were evaluated. Sugar losses were also estimated in bagasse, molasses and press mud cake separately at different time interval and total losses were calculated. All the analytical work was performed in the quality control laboratory of the concerned mill with the help of laboratory chemists. After analysis, necessary suggestions were given to the sugar mills for improving the varietal composition and also for reducing cut to crush losses and processing losses so that the overall sugar recovery could be increased (Table 8.9).

Table 7.14 Testing of Sugar Recovery and Losses in Different Sugar Mills (2022-2023)

S. No	Name of Factory	Date of Testing	Fresh Cane (Pol % in cane)	Yard Cane (Pol % in cane)	Fibrized Cane (Pol % in cane)	Manufacturing Losses %				
						Total Loss A/C to Scientific Analysis	Recovery Analyzed by Scientist	Loss Shown by Sugar Mills	Recovery Shown by Sugar mills	Difference in Recovery
1	Avadh Sugar & Energy Ltd., Unit-Hargaon, (Sitapur)	20.12.2022	13.55	13.251	13.02	3.36	9.66	2.61	9.55	0.11
2	U.P. State Sugar Corporation Ltd., Unit-Pipraich, (Gorakhpur)	24, 25, 26.12.2022	12.72	12.17	11.91	2.30	9.61	2.05	7.75	1.86
3	Yadu Sugar Ltd, Bisauli, (Badaun)	27.12.2022	14.29	13.99	13.81	2.35	11.81	2.35	11.60	0.21
4	Dwarikesh Sugar Ind. Ltd, Dwarikesh Dham, (Faridpur)	08.02.2023	13.77	13.52	13.29	2.76	10.53	2.58	10.44	0.09
5	The Kisan Sahkari Chini Mills Ltd, Tilhar, (Shahjahanpur)	06.03.2023	13.97	13.60	13.27	2.46	11.27	2.13	10.75	0.52
6	Kisan Sahkari Chini Mills Ltd, Sampurna Nagar, (Kheri)	23.03.2023	13.06	12.80	12.58	2.25	10.58	2.06	10.00	0.58

SHAHJAHANPUR

Varietal Screening for Jaggery Production

Since the juice is the primary factor determining the quality of jaggery, factors affecting the juice quality also affect the jaggery quality. Studies have shown that regardless of the method of boiling and clarifying, the chemical nature of the juice is what most strongly influences the quality of the jaggery. To determine which sugarcane varieties are best for producing high-quality jaggery, a study was conducted at Shahjahanpur using the types Co 0238, Co 98014, CoLk 94184, CoS 13231, CoS 08272, CoSe 08452, CoS 09232, CoS 12232, CoSe 11453, and CoS 767. CoS 09232 (10.25) and variety Co 0238 (11.37) produced the highest jaggery output (t/ha). The variety Co 0238 (82.58) had the greatest Pol% jaggery, followed by CoS 767 (79.82), CoS 09232 (79.43), and CoS 08272 (79.16) in terms of qualitative parameters. The invert sugar % was lowest in CoS 09232 (2.38) Co 0238 (2.48), however, colour of jaggery was also minimum in these varieties and they were found to be better for commercial production of jaggery (Table 6.1).

The moisture%, and ash% was found to be minimum in CoS 767. However, the iron content was observed maximum in CoS 09232 (Table 6.2).

Table 8.1: Comparative performance of different varieties of sugarcane for yield and quality of jaggery

S.N	Varieties	Cane Yield t/ha	Gur Yield t/ha	Gur % in Cane	Pol % in Gur	Invert Sugar	Colour Reading
1	Co 0238	91.85	11.37	12.38	82.58	2.48	132
2	Co 98014	85.11	9.13	10.73	78.11	2.67	149
3	CoLk 94184	82.17	8.78	10.69	78.45	2.57	167
4	CoS 13231	85.73	9.24	10.78	77.64	2.72	197
5	CoS 08272	86.27	9.51	11.02	79.16	2.61	167
6	CoS 09232	87.01	10.25	11.78	79.43	2.38	126
7	CoSe 08452	86.90	9.05	10.48	78.08	2.65	153
8	CoS 12232	86.25	8.94	10.36	78.10	2.70	157
9	CoSe 11453	85.69	8.14	9.50	77.49	2.77	172
10	CoS 767	87.26	9.43	10.81	79.82	2.46	128

Table 8.2 Varietal effect on gur quality parameters

S. No	Varieties	Moisture%	Ash%	Zn mg/100g	Fe mg/100g	Mn mg/100g	Cu mg/100g
1	Co 0238	4.36	2.12	2.70	9.79	1.42	1.63
2	Co 98014	4.34	1.80	1.82	9.23	1.61	1.38
3	CoLk 94184	5.32	2.82	1.28	7.43	1.77	1.48
4	CoS 13231	6.56	1.72	1.65	7.42	1.43	1.35
5	CoS 08272	4.68	2.12	1.72	9.86	1.41	1.39
6	CoS 09232	4.42	2.58	1.40	10.85	1.63	1.29
7	CoSe 08452	4.65	2.28	1.23	7.53	1.42	1.28
8	CoS 12232	5.32	1.88	1.23	7.89	1.71	1.21
9	CoSe 11453	5.52	2.65	2.15	10.25	1.49	1.27
10	CoS 767	3.51	1.46	1.08	10.87	1.37	1.21

Muzaffernagar

Varietal screening for gur/jaggery production

The field experiment was conducted to identify the sugarcane varieties suitable for gur production under different climate condition. This experiment was conducted with 9 sugarcane variety viz; CoS 767,Co 0238, CoS 13231, CoS 13235, CoSe 13452, CoS 15233, CoS16233, CoSe 16451 and CoS 17236 in randomized block design with three replications in spring season. The crop was planted on 26-3-22 and harvested on 30-03-23. All varieties were raised with all recommended practices and jaggery/ gur sample manufactured on 16-17Feb,2023. In this experiment, highest cane yield was obtained from Co 0238 (81.481t/ha) followed by CoS 13235 (81.171t/ha), CoS 15233 (73.457 t/ha), CoS15233 (72.068 t/ha) and CoS17236 (66.821t/ha). As regards to gur % in cane, the sugarcane variety Co 0238 produced higher (11.83) followed by CoS13235 (11.77), CoS 15233 (10.62), CoS 16233 (10.40). In respect of gur yield ton per hectare, highest was obtained in Co 0238(9.64) followed by CoS 13235 (9.55),CoS 15233 (7.80), CoS 17236 (16233) over standard Cos 767 (6.13).

Table 8.3 : Effect of different sugarcane variety on jaggery/ gur yield

2022-23						
S.N.	**Varieties**	**Cane Yield (t/ha)**	**CCS (%)**	**Gur % in cane**	**Gur % in juice**	**Gur yield (t/ha)**
1	CoS767	60.339	12.40	10.17	16.47	6.13
2	Co0238	81.481	13.15	11.83	18.13	9.64
3	CoS13231	66.358	12.19	9.50	20.15	6.30
4	CoS13235	81.171	13.11	11.77	18.15	9.55
5	CoSe13452	70.216	12.95	9.83	16.86	6.90
6	CoS 15233	73.457	12.98	10.62	17.12	7.80
7	CoS 16233	72.068	13.02	10.40	17.43	7.50
8	CoSe 16451	62.654	12.95	9.63	18.16	6.03
9	CoS 17236	66.821	12.51	10.00	16.39	6.68
	SE±	2.79	-	-	-	-
	CDat 5%	5.93	-		-	-

Shahjahanpur

Distribution of macro and micro nutrients in leaf, sheath and whole plant in promising sugarcane varieties

To study the utilization of major and micro nutrients and relationship between nutrients and physico-biochemical parameters with yield and quality of sugarcane,16 promising sugarcane varieties *viz.* Co 0238, Co 0118, CoS 08272, UP 05125, CoS 12231, CoS 13235, CoLk 14201, CoS 09232, UP 05011, CoS 08279, CoS 10239, CoS 08276, CoS 16232, CoS 16233, CoSe 13452 and CoS 14231 were taken. After harvesting of cane, plant samples were processed and samples were analyzed for the comparative analysis of macro-nutrients (N, P and K) and micro-nutrients (Zn, Fe, Mn and Cu) as well as Nitrate reductase activities (NRA) in leaf, leaf sheath and whole cane by standard predefined procedures.

In case of macronutrients studies the analytical results showed that, highest average 'N' content was observed 1.30% in Co 0238 followed by Co 0118 and CoS 08272 while lowest value (1.08%) was observed in CoS 10239. The Phosphorus content was more in whole plant in comparison to leaf and sheath and highest content was recorded 0.32% in Co 0238 followed by Co 0118 and CoS 08272 while lowest 0.21% in CoS 08279. Maximum Potassium (K) content was observed in CoLk 14201 (3.74%) fallowed by Co 0238 and CoS 08272 whereas minimum in CoS 16232 (2.61%) (Table 1). This was also found that N and K contents were decreased from leaf to whole cane in all the varieties. Statistical analysis on correlation coefficient values indicated that N, P and K were positively correlated with the sucrose percent and yield.

Regarding micronutrients studies the analytical results showed that, Zinc content was increased from leaf to whole plant. Zinc content was varied from 2.7 to 38.5 ppm in all the parts of sugarcane. However, average content was found maximum (21.1 mg/kg) in CoS 16233 followed by Co 0238 (20.0 ppm) while minimum in CoSe 13452 (11.3 ppm). The average plant content of Iron (Fe) was found maximum in CoS 08272 (460.0 mg/kg) followed by Co 0238 (442.1 mg/kg) whereas minimum in Co 05011 (204.1 ppm). The average plant content of Copper (Cu) was detected maximum in CoS 0238 (15.17 ppm) while in leaf it was maximum in CoS 16233 (20.1 ppm) whereas minimum in CoS 08272 (9.1 ppm). The Manganese content in all part was varied from 11.3 mg/kg to 50.9 mg kg-1. However, the highest 'Mn' value (average plant content) was observed in CoS 16233 (32.93 ppm) and lowest in CoS 10239 variety (19.93 ppm).

The nitrate reductase enzyme activities (NRA) were also determined in leaf samples of these promising sugarcane varieties. The maximum NRA activity was recorded in variety CoS 08272 (2.68 µm/gm/hr) followed by CoS 13231 and CoLk 14201 varieties while it was lowest in CoS 16232 (1.49 µm/gm/hr). After statistical analysis, the correlation coefficient values revealed that nitrate reductase enzyme activity was positively correlated with sucrose content and yield in all the varieties studied (Table 2).

It was concluded that over all higher major and micronutrient values were observed in Co 0238, CoS 08272,Co 0118 and CoLk 14201 varieties in comparison to other varieties may be one of the factor for higher yield and early maturing variety. Higher Zn, Mn and Cu contents were observed in high yielding and early varieties i.e. Co 0238, Co 0118, CoS 08272, CoLk 14201 and CoS 16233 while lower in CoS 08276, CoS 08279, CoS 10239, CoS16232, UP 05011 and CoSe 13452 variety, therefore the inclusion of these nutrients is may be required as fertilizer recommendation for higher sugar and cane yield (Table 2). The correlation analysis of micronutrients revealed that they were positively correlated with the sucrose percent but negatively with the cane yield except in case of iron. The results suggested that the amendment of higher doses of zinc, manganese and copper in soil may increase the cane yield as well as sucrose content.

Table 1: Distribution of N, P, K and NR activity in various parts of sugarcane varieties

Varieties	'N' content (%)				'P' content (%)				'K' content (%)				NRA (nm/g/hr)
	Leaf	Leaf sheath	Whole plant	Average plant content	Leaf	Leaf sheath	Whole plant	Average plant content	Leaf	Leaf sheath	Whole plant	Average plant content	Leaf
Co 0238	1.25	1.36	1.30	1.30	0.33	0.27	0.36	0.32	1.29	1.62	0.78	1.23	2.68
Co 0118	1.31	1.34	1.19	1.28	0.31	0.29	0.34	0.31	0.88	1.50	0.63	1.01	2.04
CoS 08272	1.22	1.36	1.20	1.26	0.30	0.28	0.35	0.31	1.27	1.73	0.74	1.25	2.58
UP 05125	1.16	1.27	1.15	1.19	0.28	0.24	0.29	0.27	0.97	1.50	0.62	1.03	1.65
CoS 13231	1.21	1.29	1.24	1.25	0.22	0.19	0.26	0.22	1.10	1.55	0.40	1.02	1.96
CoLk 14201	1.25	1.31	1.22	1.26	0.29	0.23	0.34	0.29	1.33	1.70	0.75	1.26	2.41
CoS 13235	1.19	1.24	1.11	1.18	0.30	0.23	0.32	0.28	1.23	1.57	0.60	1.13	1.77
CoS 09232	1.16	1.28	1.17	1.20	0.27	0.20	0.27	0.21	1.29	1.65	0.75	1.23	2.39
Co 05011	1.23	1.31	1.09	1.21	0.29	0.27	0.30	0.29	1.05	1.70	0.73	1.16	2.07
CoS 08279	1.15	1.23	1.11	1.16	0.21	0.18	0.24	0.25	1.07	1.18	0.53	0.93	1.39
CoS 10239	1.05	1.16	1.02	1.08	0.22	0.20	0.28	0.23	1.06	1.70	0.28	1.01	1.94
CoS 08276	1.10	1.31	1.08	1.16	0.28	0.30	0.28	0.29	1.22	1.72	0.47	1.13	1.99
CoS 16232	1.18	1.22	1.17	1.19	0.30	0.28	0.29	0.29	0.81	1.38	0.42	0.87	1.49
CoS 16233	1.24	1.27	1.21	1.24	0.32	0.29	0.31	0.31	1.30	1.55	0.47	1.10	2.23
CoSe 13452	1.21	1.23	1.16	1.20	0.28	0.29	0.29	0.29	1.17	1.53	0.62	1.11	1.67
CoS 14231	1.15	1.27	1.12	1.18	0.29	0.32	0.30	0.31	0.83	1.52	0.48	0.94	2.67
Mean	**1.19**	**1.28**	**1.16**	**1.21**	**0.28**	**0.25**	**0.30**	**0.28**	**1.12**	**1.57**	**0.58**	**1.09**	**2.06**

Table 2: Distribution of micro nutrients in various parts of sugarcane varieties

Varieties	'Zn' content (mg/kg)				'Fe' content (mg/kg)				'Cu' content (mg/kg)				'Mn' content (mg/kg)			
	Leaf	Leaf sheath	Whole plant	Average plant content	Leaf	Leaf sheath	Whole plant	Average plant content	Leaf	Leaf sheath	Whole plant	Average plant content	Leaf	Leaf sheath	Whole plant	Average plant content
Co 0238	7.3	18.3	34.5	20.03	292.4	418.4	615.5	442.1	13.9	21.2	5.6	13.57	31.4	36.5	27.5	31.80
Co 0118	4.4	15.9	19.3	13.20	210.0	398.9	588.0	399.0	11.3	15.3	1.3	9.30	35.1	41.0	11.3	29.13
CoS 08272	6.8	22.3	18.5	15.87	218.5	345.0	816.6	460.0	9.1	14.4	1.6	8.37	22.1	33.4	16.7	24.07
UP 05125	3.7	15.9	21.4	13.67	192.6	384.9	410.5	329.3	8.3	13.5	0.3	7.31	29.4	48.2	11.3	29.63
CoS 13231	11.9	14.1	17.5	14.50	180.4	378.9	295.0	284.8	11.4	13.4	3.5	9.43	27.3	46.8	16.7	30.27
CoLk 14201	7.3	15.2	26.5	16.33	367.7	572.5	345.5	428.6	10.1	13.8	1.2	8.37	29.9	46.8	20.0	32.23
CoS 13235	5.8	9.6	18.2	11.20	310.2	352.9	165.4	276.2	8.7	12.3	3.5	8.17	28.4	30.8	16.4	25.20
CoS 09232	7.7	18.3	31.5	19.17	134.0	264.9	256.0	218.3	9.9	14.4	5.2	9.83	32.3	46.8	15.7	31.60
Co 05011	9.4	15.9	26.8	17.37	188.7	250.0	172.6	204.1	9.7	13.4	2.4	8.50	25.8	21.8	10.7	19.43
CoS 08279	10.2	14.5	16.2	13.63	319.2	250.9	115.4	228.5	9.3	13.8	1.8	8.30	23.9	43.7	14.6	27.40
CoS 10239	5.5	8.8	21.5	11.93	322.4	664.5	117.8	368.2	9.3	14.4	3.5	9.07	13.8	32.5	13.5	19.93
CoS 08276	6.7	9.9	19.4	12.00	218.5	725.0	215.5	386.3	11.4	14.4	2.4	9.40	22.1	41.9	15.7	26.57
CoS 16232	6.9	11.6	18.9	12.47	177.6	675.5	396.7	416.6	17.7	13.2	1.3	10.73	28.3	34.3	14.6	25.73
CoS 16233	8.6	16.2	38.5	21.10	258.0	304.9	282.5	281.8	20.3	12.4	4.6	12.43	34.4	49.9	13.5	32.60
CoSe 13452	8.5	9.5	16.8	11.60	350.6	274.9	215.5	280.3	17.1	13.4	2.4	10.97	27.7	48.2	14.6	30.17
CoS 14231	6.5	15.3	37.4	19.73	240.3	370.8	585.0	398.7	15.0	12.2	3.2	10.13	39.0	45.5	18.6	34.37
Mean	**7.33**	**14.46**	**23.9**	**15.24**	**248.8**	**414.6**	**349.6**	**337.7**	**12.03**	**14.09**	**2.73**	**9.62**	**28.2**	**40.5**	**15.7**	**28.13**

Effect of micronutrients application on sugarcane

Objectives:

1. To find out the effect of micronutrients on qualitative and quantitative parameters of sugarcane.
2. To study the effect of Zn, Mn and Cu on enzymes activity associated with growth and sucrose accumulation of sugarcane.

To find out the effect of micronutrients namely Zn, Cu and Mn on qualitative and quantitative parameters of sugarcane a field experiment was done in spring planting season 2021-22. Four promising sugarcane varieties *viz.* CoS 13231, CoS 13235, CoS 08272 and UP 05125 were taken for this analysis. $ZnSO_4$, $CuSO_4$ and $MnSO_4$ were taken as fertilizer for the application of micronutrient. Four treatment combination *viz.* T_1 (Control)- NPK+Zn, T_2- (NPK+Zn+Cu), T_3- (NPK+Zn+Mn) and T_4- (NPK+Zn+Cu+Mn) along with three replicate made for this analysis. The effect of Zn, Cu and Mn on enzymes activity associated with growth and sucrose accumulation of sugarcane i.e. Sucrose Phosphate Synthase, Sucrose Phosphate Synthase, Acid Invertase, Neutral Invertase and Nitrate Reductase activities were analyzed by standard predefined procedures using Spectrophotometer. The effect of these micronutrients on qualitative parameters *viz.* germination per cent, NMC, HR brix, Sucrose per cent and yield were also recorded.

Results:

In case of micronutrients studies the analytical results showed that, in the month of September at grand growth phase Sucrose Phosphate Synthase (SPS) activity in leaf was increased up to 10.7% by application of Zn and Cu along with RDF (Table 1). The same trends were observed in case of Sucrose Synthase (SuSy) activity in all varieties which were increased up to 10.6% by application of Zn and Cu along with RDF (Table 1) while Acid Invertase and Neutral Invertase activity did not showed any significant changes (Table 2). Nitrate Reductase (NR) activity increased up to 11.6%, 8.1%, 10.5% and 9.8% in CoS 08272, UP 05125, CoS 13231 and CoS 13235 respectively by application of Zn and Cu (Table 3).

Germination per cent was significantly increased up to 9.4%, 7.5%, 6.45% and 10.06% in CoS 08272, UP 05125, CoS 13231 and CoS 13235 respectively by application of Zn, Mn and Cu along with RDF. The higher HR Brix and Sucrose % in juice were recorded in UP 05125, CoS 13231 and CoS 13235 by application of Zn and Cu along with RDF while it was maximum in CoS 08272 by application of Zn and Mn (Table 4). These results showed that by the application of $ZnSO_4$, $CuSO_4$ and $MnSO_4$ as micronutrient fertilizers along with the recommended dose of N,P,K the qualitative and quantitative traits of sugarcane could be enhanced. Though for the confirmation and refined conclusion this experiment will continue for the next two year more.

Table 1: Effect of Zn, Cu and Mn on Sucrose Phosphate Synthase and Sucrose Synthase activity associated with sucrose accumulation

	SPS Activity in Leaf (µmole min^{-1} mg^{-1} protein)				Sucrose Synthase (SS) Activity (µmole min^{-1} mg^{-1} protein)			
Variety	**CoS 08272**	**UP 05125**	**CoS 13231**	**CoS 13235**	**CoS 08272**	**UP 05125**	**CoS 13231**	**CoS 13235**
T1 (Control)	0.0285	0.0273	0.0283	0.0279	0.0378	0.0367	0.0354	0.0369
T2	0.0295	0.0279	0.0298	0.0288	0.0385	0.0377	0.0387	0.0385
T3	0.0298	0.0282	0.0300	0.0297	0.041	0.0389	0.0391	0.0389
T4	0.0304	0.0286	0.0306	0.0307	0.0414	0.0403	0.0393	0.0405
Activity Increased	6.60%	4.76%	8.13%	10.03%	9.52%	9.80%	11.01%	9.75%

Table 2: Effect of Zn, Cu and Mn on Acid Invertase and Neutral Invertase activity associated with growth.

	Acid Invertase Activity in Leaf (units per mg protein)				Neutral Invertase activity (units per mg protein)			
Variety	**CoS 08272**	**UP 05125**	**CoS 13231**	**CoS 13235**	**CoS 08272**	**UP 05125**	**CoS 13231**	**CoS 13235**
T1 (Control)	0.0387	0.0427	0.0382	0.0439	0.0663	0.0786	0.0687	0.0767
T2	0.0392	0.043	0.0395	0.0437	0.0659	0.0779	0.0682	0.0755
T3	0.0401	0.0414	0.0422	0.044	0.0661	0.0784	0.068	0.076
T4	0.0398	0.0429	0.0424	0.0433	0.066	0.0781	0.0683	0.0756

Table 3: Effect of Zn, Cu and Mn on Nitrate Reductase activity associated with growth.

Nitrate Reductase Activity (NRA) in Leaf ($nmolegm^{-1}\ hr^{-1}$)				
Treatment	**CoS 08272**	**UP 05125**	**CoS 13231**	**CoS 13235**
T1 (Control) NPK+Zn	2.67	2.46	2.47	2.55
T2(NPK+Zn+Cu)	2.79	2.72	2.72	2.80
T3 (NPK+Zn+Mn)	3.04	2.47	2.69	2.69
T4 (NPK+Zn+Cu+Mn)	2.98	2.58	2.68	2.72
Activity Increased	11.6%	8.1%	10.5%	9.8%

Table 4: Effect of Micronutrients on Physiological behavior of different sugarcane varieties

Varieties	Treatment	Germination (%)	NMC (000/ha)	HR Brix* (Dec 2022)	Sucrose %* (Dec 2022)	Yield (Ton/ha)
CoS 08272	**T1 (Control)**	46.62	106.33	20.21	18.21	90.20
	T2	48.71	108.46	20.26	18.24	92.00
	T3	49.80	108.75	20.83	18.92	93.67
	T4	48.09	108.06	20.18	18.30	92.25
UP 05125	**T1 (Control)**	55.87	103.63	19.93	18.47	79.40
	T2	56.54	106.43	19.92	18.23	81.57
	T3	58.01	105.95	19.51	17.76	82.20
	T4	61.63	106.72	20.78	18.85	82.80
CoS 13231	**T1 (Control)**	57.12	103.34	20.68	19.03	78.03
	T2	59.21	104.59	20.94	19.66	78.98
	T3	59.78	104.11	21.04	19.62	78.62
	T4	62.16	104.88	20.73	19.29	80.20

CoS 13235	**T1 (Control)**	57.69	97.42	20.93	19.73	89.55
	T2	60.44	97.05	21.33	20.03	90.67
	T3	60.92	97.27	21.47	20.03	91.98
	T4	62.49	98.05	21.61	20.01	92.67

Table 5 : Micronutrient content in different sugarcane varieties at harvesting

Varieties		Zn (mg/kg)	Mn (mg/kg)	Cu (mg/kg)	Fe (mg/kg)
CoS 08272	T1 (Control)	7.8	19.8	9.7	298.5
	T2	8.1	20.1	10.5	313.6
	T3	8.7	22.2	11.4	402.4
	T4	8.5	20.6	11.5	398.5
	% Increased	11.5%	12.1%	18.5%	34.8%
UP 05125	T1 (Control)	3.9	23.4	8.5	232.6
	T2	4.2	24.6	9.4	276.8
	T3	4.5	26.5	10.1	315.4
	T4	4.6	27.4	9.6	318.5
	% Increased	17.9%	17.1%	18.8%	36.9%
CoS 13231	T1 (Control)	9.9	24.3	11.4	180.4
	T2	10.2	25.4	11.6	191.5
	T3	10.8	25.8	12.5	204.6
	T4	10.9	26.3	12.8	207.5
	% Increased	10.1%	8.2%	12.3%	15.0%
CoS 13235	T1 (Control)	6.4	24.1	8.7	310.2
	T2	6.8	25.4	9.6	324.0
	T3	7.6	27.2	10.5	338.5
	T4	7.7	28.4	10.3	342.7
	% Increased	20.3%	17.8%	20.6%	10.5%

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Evaluation of promising sugarcane varieties under soil moisture stress

Promising sugarcane varieties namely CoSe 01434, CoLk 94184, CoS 16233, CoLk 14201, CoS 17231, CoS 18232, CoS 18231,CoS16231, CoS 08279 &CoS14233 were evaluated for drought tolerance under water stress condition at the research farm of U.P. Council of Sugarcane Research, Shahjahanpur. Two moisture levels were maintained during pre-monsoon period. Under normal soil moisture condition, five pre-monsoon irrigations were given while under deficient moisture only two pre-monsoon irrigations were applied.

The results indicated that varieties CoS16233, CoS 18231,CoS14233 and CoLk14201 maintained higher Germination Shoot population and number of millable canes were significantly higher in varieties CoS17231, CoLk 14201 and CoS 18231 which were statistically at par with the standards (CoSe 01434 and CoS 08279), however maximum yield under water stress condition was observed in varieties CoLk 14201&CoS 16233 and CoS 17231 along with minimum yield reduction percent which indicated their water stress tolerance character. Sucrose percent in juice was not affected significantly due to moisture stress. Varieties, CoS 17231.CoLk 94184 and CoLk 14201 gave higher sucrose percent in juice.

Treatmental irrigation for deficient moisture

Varieties under salt and normal soil condition

Evaluation of varieties under saline soil condition

An experiment was conducted in glazed pots with ten promising sugarcane varieties viz., CoS 08279, CoS10239, CoS16233, CoS17231, CoS 18231, CoS14233,CoLk 14201, Co 15023, CoS 17234 and CoS 18232. Salinity level 8 EC was maintained artificially by mixing calcium chloride, sodium chloride and sodium sulphate in appropriate amounts. The performance of varieties growing in normal and saline soils were compared. Varieties CoS 16233, CoLk 14201, CoS 17231 and CoS 18231gave higher tillers/clump, millable canes/ clump and cane yield than other varieties growing under saline soil condition. Varieties Co 15023, CoS 17231 and CoLk 14201 gave higher Sucrose percent in Juice. Conclusively, varieties CoLk 14201, CoS 17231 and CoS 16233 were found relatively more tolerant to salinity.

Effect of moisture stress on growth parameters of sugarcane

In autumn planting season 2020-22, an experiment was conducted using four verities i.e. CoS 08272, CoS 13231, CoS 08279 and CoS 09232 with two moisture levels normal and deficient soil moisture. Moisture levels where maintained during pre-monsoon period. Under normal soil moisture condition five pre-monsoon irrigation where given while under deficientmoistures only

two pre-monsoon irrigations where applied. The results indicated that all the verities were highly affected due to deficient moisture. Leaf area, SLA, SLW and leaf area index was higher in the verity CoS 08279 than others under deficient moisture. Shoot population, NMC and cane yield was also higher in CoS 08279. Leaf area index was positively co-relation with yield. CoS 08272 and CoS 13231 gave higher sucrose percent in juice.

Impect of sugarcane sett treatment with microbial consortia formulation of performance and yield in sugarcane.

An experiment was conducted during spring planting seasion (2022-23) using verity Up 05125 with 12 treatments i.e. T1 prerak liquid consortia with 100% NPK dose T2 prerak liquid consortia with 25% reduction in NPK dose. T3 prerak liquid consortia with 25% reduction in NPK dose. T4 prerak liquid consortia with 25% reduction dose in NPK. T5 Pusa, sanmporna lequid with 100% NPK dose. T6 Resid H.C powder, T7 blue N Powder. T8 oorjit granules FVC with 100% dose of NPK. T9 oorjit granules FVC with 75% dose of NPK. T10 Navozim Xtrudegramules T11 Ecomax grannuals. T12 untreated control. Result indicated that higher germination was found in (T4)prerak liquid consortia with 75% reduction dose of NPK followed by (T7) blue N Powder. (T8)oorjit granules FVC with 100% dose od NPK and (T6)Resid H.C powder Tillers NMC and cane yield was found in the treatment (T4)prerak liquid consortia with 75% reduction dose of NPK, (T7) blue N Powder and (T8)oorjit granules FVC with 100% dose od NPK sucrose percent in Juice was not affected.

Evaluation of promising sugarcane varieties under water logging condition.

In this experiment to find out the suitable varieties for water logging condition with 12 sugarcane varieties viz, CoS 17231, CoS 16233, CoS 14233, CoS 08279, CoS 96436, CoS 13231, UP 05125, UP 9530, CoSe 11453, CoLk 14201, CoS 10239 and SL146/10 were taken for study. Water logging conditions was maintained naturally at Gola research farm for approximately 55-60 days in rainy season. Varieties UP 05125, CoS 14233, CoS10239 and CoLk14201 maintained higher germination. Varieties UP 05125, CoS 14233, CoS 10239 and CoLK 14201 CoS 08279, UP 9530, CoSe 96436 and CoS 13231 showed higher shoot population, shoot height, number of millable canes and yield under water logging condition. Leaf area of LTM was higher in CoS 08279, CoS 10239, CoLk 14201, CoS 96436, SL 146/10 and CoSe 11453.

Seorahi

Evaluation of sugarcane genotypes for water logging tolerance

An experiment was conducted during 2022-23 with 08 sugarcane varieties *viz.,* CoS 13231, UP 05125, CoLk 94184, Co 98014, CoS 08279, CoSe 15453, UP 9530 and CoSe 96436 with three replications in RBD. All varieties were found affected due to water logging condition of 32.0 cm to 78.0 cm depth from 05-06-2022 to 14-09-2022. Maximum leaf area was found in variety in Co 98014 (402.67 cm^2), whereas highest germination was found in variety CoS 08279 (55.20%). Maximum number of tillers (183387/ha) and highest NMC (102127/ha) were also recorded in variety CoS 08279, whereas maximum growth rate was recorded in variety Co 98014 (2.12 cm/day) followed by CoS 08279 (1.89 cm/day). Highest sucrose percent (17.11%) was obtained in CoS 13231 followed by CoLk 94184 (17.06%). Maximum plant height was recorded in variety Co 98014 (322.0 cm) followed by CoS 08279 (317.0 cm). Highest yield (81.53 t/ha) was found in CoS 08279 followed by UP 05125 (76.69 t/ha) and CoSe 15453 (75.46 t/ha).

11- SOIL MICROBIOLOGY

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Soil Microbiology is involved in producing a quality Bio-products viz: Azotobacter, PSB, Organo decomposer, *Beauveria bassiana & Metarrhizium anisopliae* and Ankush, for improving organic status of soil and management of soil borne fungal diseases, termite, white grub of sugarcane. All these products are made and available to the farmers and Sugar mills according to their demand (Table-1).

1. Production of Bio-fertilizers, Bio-agents (Ankush) and Organo decomposer.

* To maintain the sustainability of soil fertility and its health along with saving of inorganic fertilizer, a carrier based (powdered) bio-fertilizer i.e. Azotobactor and Phosphorus solubilising bacteria (PSB) were produced and supplied to the farmers, sugar mills in the amount of 7100 and 9596 kg respectively.
* For quick initial decomposition of organic waste materials in a short duration a powdered based cellulolytic culture inoculant named "Organo-decomposer" was produced an quantity of 3721 kg and supplied to the farmers and sugar mills.
* To manage soil borne fungal disease like root-rot, pine-apple and wilt disease of sugarcane through a bio-agent "Ankush" was produced an amount of 41560 kg and supplied to the farmers and sugar mills. It is an eco-friendly device of disease management and also useful in preventing primary infection of red-rot through soil, present in previous crop debris.
* For the management of Termite and white grub a carrier based bio pesticide *Beauveria bassiana & Metarrhizium anisopliae* was produced an amount of 2714 kg and supplied to the farmers and sugar mills.
* 1187 kg of all bio products supplied free of cost to the research institute/centres of UPCSR, Shahjahanpur.

Table: 1 Supply of Bio-products (2022-23)

SN	Name of the Bio fertilizers / Bio agents	Total production/supply in Kg.	Total income (Rs.)
1	Ankush	41560	38, 26, 488.00 (Rs. Thirty eight lakhs twenty six thousands four hundred eighty eight) only
2	Azotobactor	7100	
3	PSB	9596	
4	Organo decomposer	3721	
5	*Beauveria bassiana & Metarrhizium anisopliae*	2714	
	Total	**64,691 or 646.91 Qtls.**	

1. Establishment of liquid bio-fertilizer unit (Manual Production)

Different cultures will be procure from authorized institution for registration point of view and production will start after establishment of laboratory, completion of registration process and other formalities.

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Varietal behaviour towards insect pests

Under state varietal trials (SVT I),ten genotypes such as CoLk 18201, CoLk 18203, CoLk 18204, CoS 19234, CoS 19333, S. 188/15, S. 565/16, Seo 1019/16, Seo 158/16 and Seo 685/15 along with three standards Co 0238, Co 05011 and CoJ 64 were evaluated against early shoot borer (*Chiloinfuscatellus* Snellen), root borer (*Polyocha depressella* Swinhoe), top borer (*Scirpophaga excerptalis* Walker) and stalk borer (*Chiloauricilius* Dudgeon) of sugarcane. The infestation of early shoot borer (ESB) was recorded on 30th, 60th, 90th and 120th days after planting in a separate trial laid out this year for screening of genotypes. Total number of shoots and shoots with dead hearts for early shoot borers were counted in the entire plot and the percent incidence was calculated. The cumulative incidence of ESB ranged from 3.27 per cent in S. 188/15 to 10.10 per cent in S. 565/16. All the tested genotypes were evaluated less susceptible against early shoot borer on the basis of cumulative infestation per cent (Table 1). The infestation of root borer was recorded 2.41 per cent in CoLk 18201 to 10.70 per cent in Seo 158/16. All the tested genotypes were evaluated less susceptible against root borers on the basis of cumulative infestation per cent(Table 1). The cumulative incidence of top borers was recorded less susceptible to moderate susceptible. However, it ranged from 7.63 per cent in S. 565/16 (LS) to 18.46 per cent in CoLk 18201 (MS) at harvesting stage (Table 1). All the genotypes exhibited less to highly susceptible reaction against stalk borer. The infestation index of stalk borer ranged from 0.1 per cent in Seo 1019/16 (LS) to 9.3 per cent in CoS 19333 (HS) (Table 1).

Under state varietal trials (SVT II), fourteen genotypes such as CoLk 16201, CoLk 16202, CoLk 16203, CoLk 16204, CoS 18233, CoS 18234, CoS 18236, CoS 18238, CoS 19232, CoS 19235, CoSe 15453, S. 112/14, Seo 1067/15 and Seo 1860/15 along with four standards Co 0238, Co Pant 97222, CoJ 64 and CoS 767 were evaluated against early shoot borer, root borer, top borer and stalk borer of sugarcane at Shahjahanpur location. The infestation of ESB was recorded on 30th, 60th, 90th and 120th days after planting. ESB was infested from 2.31 per cent in Seo 1067/15 to 7.33 per cent in CoLk 16203. All the tested genotypes were evaluated less susceptible against early shoot borer on the basis of cumulative infestation per cent (Table 2). The infestation of root borer was recorded from 0.39 per cent in CoLk 16204 to 5.08 per cent in Seo 1860/15. All the tested genotypes were evaluated less susceptible against root borers on the basis of cumulative infestation per cent (Table 2). The infestation of top borer was recorded less susceptible to moderate susceptible at harvesting stage. However, it ranged from 6.25 per cent in CoLk 16201 (LS) to 16.50 per cent in CoS 19232 (MS) (Table 2). All the genotypes exhibited less to highly susceptible reaction against stalk borer. The infestation index of stalk borer ranged from 0.44 per cent in CoS 19235 (LS) to 2.14 per cent in CoLk 16204 (MS) (Table 2).

Table 1.Evaluation of zonal varieties/genotypes against early shoot borer (ESB), top borer, root borer and stalk borer of sugarcane at Shahjahanpur in SVT I Plant (2022-23).

	Varieties	ESB		Root Borer		Top borer		Stalk borer	
		Cumu. incidence %	Grade	Incidence %	Grade	At harvest %	Grade	infestation index	Grade
	CoLk 18201	7.02		2.41		18.46		0.5	LS
	CoLk 18203	6.53	LS	4.97	LS	13.51	MS	1.4	LS
	CoLk 18204	8.85	LS	10.13	LS	8.79	LS	1.5	LS

	CoS 19234	3.33	LS	2.52	LS	14.13	MS	2.1	MS
	CoS 19333	7.14	LS	10.42	LS	6.40	LS	9.3	HS
	S. 188/15	3.27	LS	4.03	LS	14.29	MS	4.8	
	S. 565/16	10.10	LS	2.99	LS	7.63	LS	1.7	
	Seo 1019/16	5.17	LS	6.00	LS	13.24	MS	0.1	
	Seo 158/16	5.07	LS	10.70	LS	8.82	LS	2.8	
	Seo 685/15	5.81	LS	7.26	LS	10.81	MS	0.2	
	Co 0238	5.06	LS	5.71	LS	7.18	LS	4.3	
	Co 05011	4.76	LS	0.00	LS	6.32	LS	1.6	
	CoJ 64	5.50	LS	10.67	LS	2.19	LS	0.0	

Table 4.Evaluation of zonal varieties/genotypes against early shoot borer (ESB), top borer, root borer and stalk borer of sugarcane at Shahjahanpur in SVT II Plant (2022-23).

Sl. No.	Varieties	ESB		Root Borer		Top borer		Stalk borer	
		Cumu. incidence%	Grade	Incidence %	Grade	At harvest %	Grade	infestation index	
1	CoLk 16201	4.14	LS	2.93	LS	6.25	LS	1.70	
2	CoLk 16202	4.10	LS	3.19	LS	7.31	LS	0.96	
3	CoLk 16203	7.33	LS	2.18	LS	8.30	LS	0.87	
4	CoLk 16204	5.48	LS	0.39	LS	8.17	LS	2.14	
5	CoS 18233	2.99	LS	2.01	LS	8.06	LS	1.13	
6	CoS 18234	5.69	LS	1.67	LS	7.23	LS	0.80	
7	CoS 18236	3.08	LS	3.33	LS	7.52	LS	2.09	
8	CoS 18238	2.81	LS	2.30	LS	7.97	LS	1.46	
9	CoS 19232	6.42	LS	0.90	LS	16.50	MS	0.52	
10	CoS 19235	4.57	LS	3.24	LS	8.10	LS	0.44	

11	CoSe 15453	3.48	LS	2.30	LS	7.38	LS	0.58	
12	S. 112/14	5.44	LS	3.10	LS	11.17	MS	0.96	
13	Seo 1067/15	2.31	LS	4.03	LS	7.01	LS	1.45	
14	Seo 1860/15	3.85	LS	5.08	LS	9.78	LS	1.09	
15	Co 0238	5.49	LS	2.08	LS	7.39	LS	7.15	
16	Co Pant 97222	3.85	LS	2.86	LS	8.43	LS	1.25	
17	CoJ 64	9.27	LS	4.10	LS	9.06	LS	0.97	
18	CoS 767	1.85	LS	2.93	LS	6.25	LS	1.15	

Survey and surveillance of sugarcane insect pest

Extensive survey and surveillance work was conducted during pre-monsoon and post-monsoon in twenty five sugar factories of different districts viz; Shahjahanpur (Rosa, Powayan, Tilhar, Maksudapur, Nigohi), Hardoi (Loni, Hariyawan, Rupapur), Pilibhit (Brakheda, Pooranpur), Sitapur (Hargaon, Jawaharpur, Biswan), Lakhimpur Kheri (Ajbapur, Kumbhi, Gola, Aira, Khambharkhera, Gularia, Palia, Sampurna Nagar), Rampur (Karimganj), Hapur (Simbhaoli) and Bareilly (Faridpur, Navabganj) of UP to know the condition of major insect pests of the area. During survey the infestation of early shoot borer was noticed ranged from 3% (Pilibhit district) to 8% (Shahjahanpur, Hardoi districts) on Co 0238 and other varieties. The infestation of top borer was recorded ranged from 6% (Hargaon, Jawaharpur, Biswan sugar mill area) to 50% (Simbhaoli sugar mill area) on Co 0238 and other varieties. The infestation of root borer was recorded ranged from 4.5% (Brakheda, Pooranpur sugar mill area) to 8% (Rosa, Powayan, Tilhar, Maksudapur, Nigohi sugar mill area) on Co 0238 and other varieties. The infestation of Stalk borer was recorded ranged from 5.5% (Rosa, Powayan, Tilhar, Maksudapur, Nigohi, Brakheda, Pooranpur sugar mill area) to 8.5% (Hargaon, Jawaharpur, Biswan). The infestation of Internode borer also found with ranged from 1.5% (Ajbapur, Kumbhi, Gola, Aira, Khambharkhera, Gularia, Palia, Sampurna Nagar sugar mill) to 3% (Rosa, Powayan, Tilhar, Maksudapur, Nigohi sugar mill area). The infestation of Termite was recorded ranged from 3.5% (Brakheda, Pooranpur sugar mill area) to 10% (Ajbapur, Kumbhi, Gola, Aira, Khambharkhera, Gularia, Palia, Sampurna Nagar) on Co 0238 and other varieties**.** The infestation of Thrips was recorded ranged from 13% (Brakheda, Pooranpur sugar mill area) to 25% (Ajbapur, Kumbhi, Gola, Aira, Khambharkhera, Gularia, Palia, Sampurna Nagar sugar mill area) on Co 0238, CoLk 14201 and several vaarieties. The defoliator, grass hopper were recorded in stray in all factory zones while army worm was found in stray in almost all factory zones. Gurdaspur borer was recorded in stray in Lakhimpur Kheri district. Pyrilla infestation was found in stray at Shahjahanpur, Hardoi and Lakhimpur Kheri disctricts's area. The infestation of mites also recorded up to 46% in almost all the sugar mill area (Table 3).

Fig 1. Root borer affected crop (A), root borer larvae (B) and thrips affected crop (C).

Table 3.Survey and surveillance of sugarcane insect pests in central UP during 2022-23

Sl. No.	Varieties	Location	Name of pest	Incidence%/population		
				Min.	Max.	Avg.
1	Co 0238, Co 0118, CoLk 94184, Co 98014, Co 15023, CoLk 14201, CoS 13235	Rosa, Powayan, Tilhar, Maksudapur, Nigohi sugar mills and SRI Shahjahanpur (Shahjahanpur district)	Early shoot borer	1	15	8
			Top borer	2	40	21
			Root borer	1	15	8
			Stalk borer	1	10	5.5
			Internode borer	1	5	3
			Army worm	0	3	1.5
			Thrips	5	25	15
			Mite	2	90	46
			Pyrilla	16	36	26
			Mealybug	0	3	1.5
			Grass hopper	0.5	20	10.25
			Termite	2	6	4
			Rat	0	3	1.5
2	Co 0238, CoS 13235, Co 15023, CoLk 14201	Brakheda sugar mill area (Pilibhit district)	Early shoot borer	2	4	3
			Top borer	2	22	12
			Root borer	3	6	4.5
			Stalk Borer	1	10	5.5
			Army worm	0	2	1
			Thrips	10	16	13
			Mite	0	2	1
			Grass hopper	0.5	5	2.75
			Termite	2	5	3.5

3	Co 0238, Co 0118, CoS 13235, Co 15023	Loni, Hariyawan, Rupapur Sugar mill area (Hardoi district)	Early shoot borer	1	15	8
			Top borer	1	40	20.5
			Root borer	0	14	7
			Stalk Borer	1	11	6
			Internode Borer	0	5	2.5
			Thrips	2	25	13.5
			Mite	0	12	6
			Pyrilla	9	36	22.5
			Grass hopper	0	23	11.5
			Termite	2	10	6
4	Co 0238, CoPk 05191, Co 0118, Co 15023	Hargaon, Jawaharpur, Biswan Sugar mill area (Sitapur district)	Early shoot borer	2	10	6
			Top borer	2	10	6
			Root borer	2	6	4
			Stalk Borer	2	15	8.5
			Army worm	0.5	2	1.25
			Mite	0	5	2.5
			Grass hopper	5	15	10
			Termite	2	4	3
5	Co 0238, Co 15023, Co 0118, CoLk 14201, CoS 13235, CoPk 05191, CoJ 85, Co 98014, CoS 08279	Ajbapur, Kumbhi, Gola, Aira, Khambharkhera, Gularia, Palia sugar mill area (LakhimpurKheri district)	Early shoot borer	2	10	6
			Top borer	1	70	35.5
			Root borer	2	10	6
			Stalk borer	1	16	8.5
			Internode Borer	0	3	1.5
			Gurdaspur Borer	0	2	1
			Army worm	0	3	1.5
			Thrips	10	40	25
			Mite	2	12	7
			Pyrilla	5	35	25
			Grass hopper	2	20	11
			Termite	0	20	10
6	Co 0238, Co 15023, Co 0118, CoLk 14201, CoS 13235	Faridpur, Nababganj sugar mill area (Bariely District)	Early shoot borer	2	10	6
			Top borer	1	20	10.5
			Root borer	2	10	6
			Thrips	4	35	19.5
			Mite	2	12	7
			Grass hopper	4	20	12
			Termite	0	6	3
7	Co 0238	Karimganj sugar mill area (Rampur district)	Early shoot borer	3	5	4
			Top borer	2	15	8.5
			Root borer	4	5	4.5
			Mite	2	12	7
			Grass hopper	0	5	2.5
	Co 0238	Simbhaoli Sugar Mill (Hapur)	Top borer	10	90	50

Impact of eco-friendly products on biotic stress

A field experiment was conducted with the objective "To study the efficacy of various effective and sustainable alternatives for the management of insect pests and diseases in sugarcane" during autumn season. The experiment was laid out in a split plot design with 3 replications during autumn and spring season. Two varieites namely Co 0238 and Co 0118 were taken for study. The experiment consisted of five treatments *viz.*, T_1 -Nutrient application through natural resourses (Ghanjeevamrut, jeevamrut etc) and insect pests, disease control through natural (Neemashtra); T_2-Nutrient application through natural resources (Ghanjeevamrut, jeevamrut etc) and insect pests, diseases control through bio products; T_3-Nutrient application through inorganic chemical resources insect pests and diseases control through natural (Neemashtra); T_4-Nutrient application through natural resources (Ghanjeevamrut, jeevamrut etc) and insect pests, diseases control through chemicals (Carbendazime, Imidacloprid etc.); T_5-Nutrient application through chemical resources and insect pests, disease control through chemicals. Sugarcane sett were treated with natural product i.e. Beejamrut wherever required in treatments.

In autumn season, germination percent was recorded higher in T_1 (50.17) in Co 0238 and T_2 (52.26%) in Co 0118 than chemical treatment (T_3 and T_5). Highest shoot population, number of millable cane and cane yield were recorded in chemical treated plots such as T_3 and T_5 (Table 4). Minimum and very low insects pest was recorded in autumn planted crop (Table 5).Likewise autumn crop in spring season also reflected almost same results in all the quantitative characters. Germination was found better with Ghanjeevamrut, jeevamrut etc (T_1 andT_2) wherever sugarcane sett were treated with beejamrut. The other traits like shoot; population, NMC and cane yield were found higher in chemical treated plots of T_3 and T_5. Severe infestation of insect pest was recorded in T_1, T_2 and T_4 treatment wherever natural product were applied. The quantitative traits were not fluctuated in any treatments of natural as well as chemical (Table6, 7 and Fig 2, 3).

Table 4.Effect of natural product on germination shoot population, NMC and yield of Co 0238 (A) and Co 0118 (B) during autumn season.

Treat./ Variety	Germination %		Shoot Population (000/ha)		NMC (000/ha)		Yield (T/ha)	
	A	B	A	B	A	B	A	B
T_1	50.17	45.14	116804	89860	78262	68679	36.32	33.54
T_2	48.15	52.26	113748	97151	89859	76179	32.36	32.08
T_3	44.16	50.41	156595	105554	104512	90345	88.54	71.39
T_4	45.37	49.94	106387	90207	73193	73818	39.03	27.92
T_5	43.69	45.02	134512	102846	101734	89304	85.76	75.48
Mean	**46.31**	**48.55**	**125609**	**97123**	**85304**	**79665**	**56.40**	**48.08**

Table 5.Infestation of borer against different treatments with varieties Co 0238 (A) and Co 0118 (B) during autumn season.

Treat/ Vari.	Early shoot borer (%)		Top borer %		Stalk borer (Infest. index)		Root borer (%)		Sugar in juice (%)	
	A	B	A	B	A	B	A	B	A	B
T_1	.42	1.20	.29	3.91	6.06	.93	.33	0.00	.33	9.01
T_2	1.23	1.74	5.06	.02	.70	.58	4.67	8.67	9.40	0.54
T_3	0.38	1.13	1.07	.09	.94	1.20	.00	6.00	9.29	8.73
T_4	.00	2.51	3.52	.85	.02	.91	6.00	.00	9.37	1.18
T_5	0.57	0.67	.41	.67	1.59	1.05	2.00	6.00	9.62	0.85
Mean	**1.42**	**1.20**	**5.29**	**3.91**	**4.06**	**.53**	**4.00**	**7.73**	**9.20**	**0.06**

Table 6.Effect of natural product on germination shoot population, NMC and yield of Co 0238 (A) and Co 0118 (B) during spring season.

Treat./ Variety	Germination %		Shoot Population (Per ha)		NMC (per ha)		Yield (T/ha)	
	A	B	A	B	A	B	A	B
T_1	48.32	49.31	111734	99304	83263	60485	54.79	36.25
T_2	41.49	47.57	105207	101526	80346	61666	46.67	41.46
T_3	32.93	31.31	114582	101943	85276	72499	77.71	71.04
T_4	41.90	45.72	100485	97290	72638	60763	51.46	38.75
T_5	35.47	34.26	117637	107498	70763	83957	76.04	70.83
Mean	**40.02**	**41.63**	**109929**	**101512**	**78457**	**67874**	**61.33**	**51.67**

Table 7.Infestation of borer against different treatments with varieties Co 0238 (A) and Co 0118 (B) during spring season.

Treat/ Vari.	Early shoot borer (%)		Top borer% (At harvest)		Stalk borer(Infest. index)		Root borer (%)		Sugar in juice (%)	
	A	B	A	B	A	B	A	B	A	B
T_1	0.88	13.46	4.02	.96	5.16	.09	40.00	3.33	9.7	.79
T_2	.91	15.76	3.39	.59	.79	.54	1.67	1.67	20.1	0.76
T_3	.69	4.6	.31	.61	.49	0.95	.33	8.33	0.0	0.63
T_4	9.54	13.23	3.82	.31	3.81	.62	.00	3.33	0.0	.86
T_5	3.55	5.95	1.99	3.89	2.52	.33	.33	.33	0.0	0.14
Mean	**7.31**	**10.60**	**3.11**	**.27**	**3.35**	**.11**	**67**	**.00**	**.96**	**0.43**

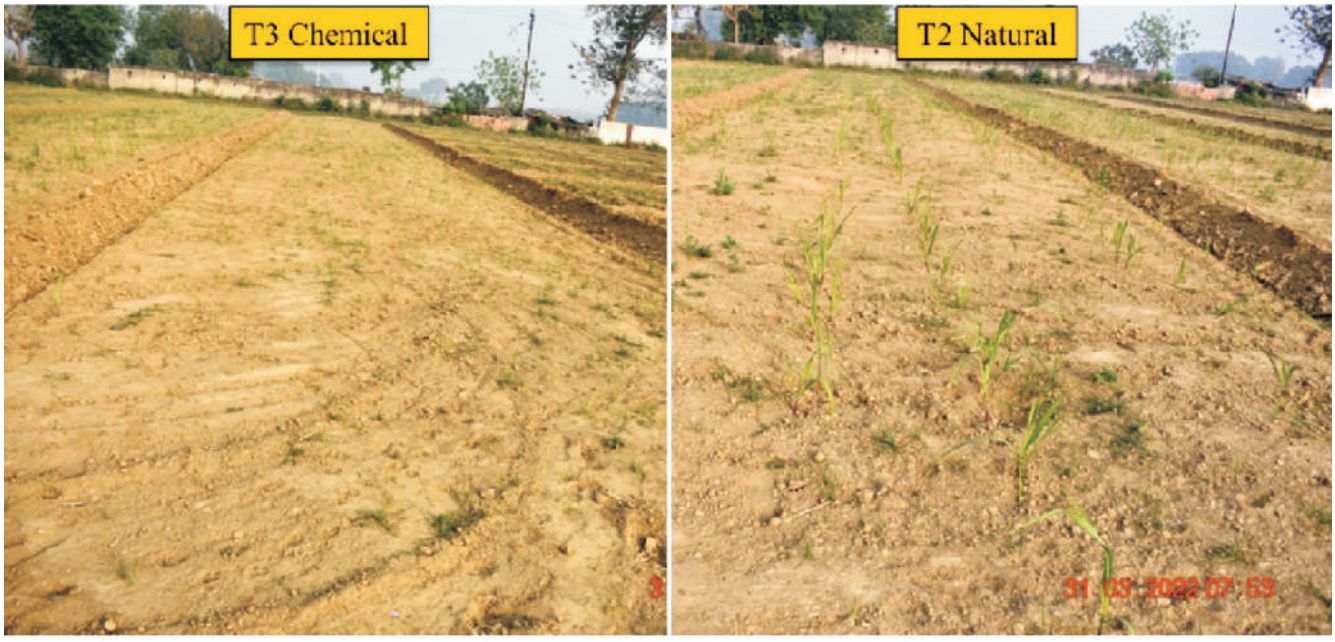

Fig 2.Effect of chemical (T_3- Poor) and natural products (T_2- Good) on germination in spring season.

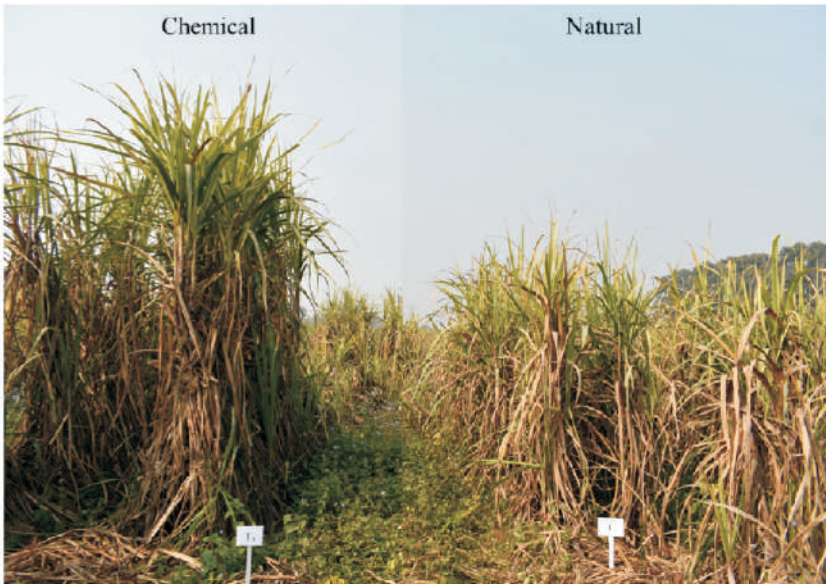

Fig 3.Performance of crop with chemical (T_3) and natural products (T_2) in autumn season.

Production of Trichocard

Trichogramma spp. is an important egg parasitoid of lepidopterous pests with effective to control the sugarcane stem, top, ESB, root, Gurdaspur, and plassy borers. *Trichogramma-chilonis* are being used to control stem, ESB, root, Gurdaspur and plassey borers. The infestation of top borer controls by *Trichogramma japonicum* as biocontrol technique. Trichocards of both the species are being produced and supplied to cane growers and sugar mills. The total of 9526 trichocards has been produced and Rs. 476300.00 revenue has been generated at Shahjahanpur Institute (Fig 3).

Evaluation of sugarcane bagasse as a rearing media for *Corcyra cephalonica* production

The present investigation was therefore formulated with sugarcane bagasse, the aim of manipulation in rearing media to find out the alternative of media to improve the mass production of *Corcyra cephalonica*, good quality eggs, number of eggs, size and weight of corcyra larva with economical products. The experiment was conducted *in vitro* conditions with three replications under controlled temperatures of 25°C± 2°C and relative humidity of 65–70%. The experiment consisted of seven treatments *viz*., T_1 - Sugarcane bagasse + Rice bran (50% Each); T_2- Sugarcane bagasse + Maize (50% Each); T_3- Sugarcane bagasse + Sorghum (50% Each); T_4- Sugarcane bagasse + Wheat; T_5- Sugarcane bagasse; T_6- Maize; T_7- Wheat. One hundred grams milled groundnut was placed in each wooden boxes of rearing media for the freshly hatched *C. cephalonica* larvae. The boxes were closed with muslin cloth and covered with wooden cover involved three batches of the seven treatments replicated three times, and 10 boxes used in each treatment. *C. cephalonica* larvae were kept for 35 days to collect data on the number of larvae, length of larvae, weight of larvae and number of eggs laid by *Corcyra* moth.

The effects of different rearing media are based on pooled data of 10 boxes for each replication. The mean weight of 10 *C. cephalonica* larvae on different rearing media in pooled data of the trials affirmed that T6 recorded the highest larval weight (23.94 mg) followed by T_2(23.56 mg), T_7(17.77 mg), T_4(13.94 mg), T_3(13.17 mg) and T_1(11.75 mg). The lowest larval weight was obtained 2.911 mg in T5 (Sugarcane bagasse) alone. The maximum moth emergence were found in T_3(266.83), T_7(166.67) and T_6 (164.42). The maximum total larvae were noticed in T_7 (376), T_3 (325.67) and T_6 (240.33). The maximum fecundity eggs laying was recorded from Corcyra females emerged from T_3 (3254 eggs), T_4 (2142 egg) and T_7 (1625 eggs). The maximum larval length of *Corcyra* was recorded in T_3 (1.14 cm), T_6 (1.11 cm) and T_4 (1.09 cm), respectively (Table 8, 9 and Fig 4, 5). From the above

results, it was indicated that rearing media sorghum along with sugarcane bagasse and sugarcane bagasse combination with wheat found best rearing media for the emergence of *C. cephalonica* moths and all the larval features. Sugarcane bagasse alone was not found better for the emergence *C.cephalonica* moths.

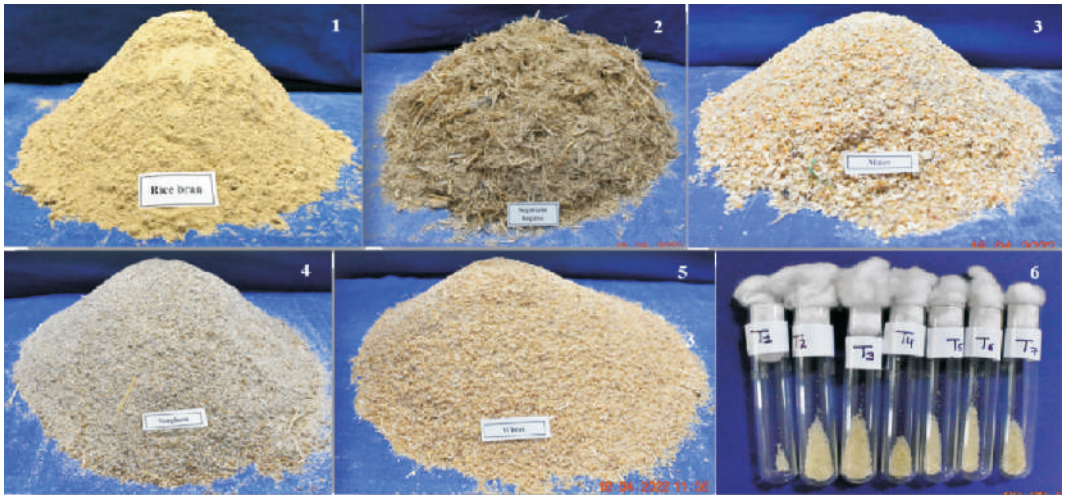

Fig 4.Different rearing media (1-5) and egg laid by *Corcyra cephalonicamoth* (6)

Fig 5.Length of male (0.8 cm) and female moth (1.4 cm).

Table 8.Performance of *C. cephalonica* on different rearing media (Based on pooled data of three replications).

Treat.	Mean number of Corcyra larva	Length of Larva (cm)	Mean weight of 10 larva (g)	Weight of each larvae (mg)	Number of Egg
T_1	47.67	0.96	0.56	11.75	270
T_2	135.00	1.06	3.18	23.56	1560
T_3	325.67	1.14	4.29	13.17	3254
T_4	207.33	1.09	2.89	13.94	2142
T_5	130.67	0.86	0.38	2.91	648
T_6	240.33	1.11	9.00	23.94	1452
T_7	376.00	0.98	6.68	17.77	1625
SE (m)	60.19	0.11	-		-
CD	131.16	NS	-		-

Table9.Number of Corcyra moth in different cycle of collectionafter 35 days on seven rearing media.

Treatment	I st Collection cycle	II nd Collection cycle	III rd Collection cycle	IV th Collection cycle	Mean Number
T_1	28.33	14.33	5.67	14.67	15.75
T_2	83.67	89.00	67.33	65.00	76.25
T_3	248.00	179.33	276.33	363.67	266.83
T_4	140.33	170.00	197.67	149.67	164.42
T_5	83.33	25.33	13.00	1.67	30.83
T_6	152.00	130.67	189.67	139.67	153.00
T_7	142.00	170.00	142.00	212.67	166.67
SE (m)	45.64	32.65	35.04	31.87	-
CD	101.63	71.15	76.35	69.44	-

Bio-efficacy of Voliam Flexi 300 SC (Syngenta's Product)

This experiment was framed during 2022-23 seasons at Plant Pathology block. The sugarcane variety Co 118 was planted to evaluate the bio-efficacy of Voliam Flexi 300 SC (Chlorantraniliprole 8% w/w + Thiamethoxam 17.5% w/w) against sugarcane insect pests. There were seven treatments such as T_1- Untreated check; T_2-Voliam Flexi 300 SC @ 400ml/ha; T_3- Voliam Flexi 300 SC @ 500ml/ha; T_4- Voliam Flexi 300 SC @ 600ml/ha; T_5-Voliam Flexi 300 SC @ 1200ml/ha; T_6-Virtako 1.5G @10 Kg/ha and T_7 -Chlorantraniliprole 18.5 SC @375ml/ha were characterized in to randomized block design with four replications. The trial was performed as per protocol of 2022-23 as soil drenching with 1000 litre water at 35 to 45 days. Almost all the doses of Voliam Flexi 300 SC found good against the borers. The treatment T_3Voliam Flexi 300 SC @ 500ml/ha was recorded economically well to all the borers such as ESB, top borer and root borer. The quantitative attributes of plant were also better than untreated control (Table 10).

Table 10.The mean data for quantitative characters and infestations of borers against different treatments.

l. No	Treat ment	Germin -ation %	Shoot Population (000/ha)	NMC (000/ha)	Yield (T/ha)	SB (Cu minc .)	Top borer (At harvest)	Root Borer (%)
1	T_1	53.70	106	74	55.83	9.52	5.95	47.50
2	T_2	65.16	120	84	64.37	4.54	3.24	48.75
3	T_3	63.25	122	85	71.46	3.28	2.61	35.00
4	T_4	67.19	127	88	73.96	.84	2.28	37.50
5	T_5	70.02	126	86	71.66	1.72	1.77	38.75
6	T_6	66.84	122	78	64.37	2.42	2.65	51.25
7	T_7	57.23	112	67	72.29	2.46	2.71	21.25

Muzaffarnagar

Varietal screening for resistance to major insect pests of sugarcane.

Spring planted varieties: CoS 19231, CoS 19233,CoS 19234, CoS 20234, CoLk 18201, CoLk 18202, CoLk 18203, CoLk 18204, Seo 685/15, Seo 565/16, Seo 1019/16 ,S-188/15 and rest of 4 varieties were standard CoS 767, Co 0238, CoPant 97222 and CoJ 64.

Conclusion:- During hot weather the incidence of shoot borer is minimum 1.89 percent (variety, CoLk 18202) and maximum 11.7% in Seo 565/16 (variety, CoS 19233) The incidence of top borer 2nd brood at hot weather 0.8 percent (variety, CoS 19231) and

maximum 3.12 percent (variety, CoS 19233).The incidence of top borer 3rd brood 0.16 percent (variety, CoS 20234) to 2.42 percent (genotype S-188/15).

At the time of harvest, the incidence of top borer was minimum 4.0% (variety, CoS 19234 and maximum 26.0 percent in standard CoJ 64. The incidence of root borer at the time of harvest is minimum 4.0 % (varieties CoS 19231 and genotype Seo 1019/16) and and maximum 16.0 percent (standard Co 0238).The incidence of stalk borer on cane basis ranged from 16.0 percent (CoLk 18201) to 70.0 percent (variety, CoS 20234) and stalk borer on inter node basis ranged from 1.9 percent (variety CoS 19231) to 5.08 percent (variety, CoS 20234) as well as infestation index ranged from 0.21 (variety CoLk 18201) and maximum 3.60 percent (variety CoS 20234).

Survey and surveillance of sugarcane insect pests 2022-23.

Conclusion: Survey and surveillance of sugarcane insect pests at hot weather/pre monsoon in 15 sugar factories zones as well as Src, Mzn Viz; Simbhawali sugar Ltd.(Hapur), BHL unit Bhaisana (Muzaffarnagar) , SDEC Malakpur (Meerut) ,IPL Unit , Rohanakalan (Muzaffarnagar), Naglamal sugar complex (Meerut),The kissan sahkari chini mill, Sarsawan (Shahranpur), The kissan sahkari chini mill, Nazibabad (Biznore), Dhampur sugar mill unit,Mansoorpur(Muzaffarnagar), Triveni Eng. & industries Ltd, Sabitgarh,(Bulandsahar), Do- aab sugar mill (Shamli), BHL unit Bilai (Biznore), BHL unit Kinoni (Meerut), Bio Organics Ltd. Asmauli (Sambhal), Deewan sugar ltd., Agwanpur, (Muradabad). As well as Src, Mzn. Surveying programme was also in all above chini mill and sugarcane research center (MZN) also were surveyed by scientist of Src Muzaffarnagar to identify major insect pest. During hot weather the infestation of shoot borer was low susceptible ranged from 0.76 % (BHL unit Kinoni (Meerut) to 7.85% (BHL unit Bhaisana (Muzaffrnagar) The incidence of top borer ranged between 1.22% (Triveni Eng. & industries Ltd, Sabitgarh, (Bulandsahar) to 57.83% (Simbhawali sugar Ltd.) Hapur. The percent incidence of root borer was observed in two sugar factories i.e 0.23% in Naglamal sugar complex (Meerut),to 3.55% SDEC Malakpur (Meerut). The intensity of Black bug were recorded minimum 0.5 insect/ clump SDEC Malakpur (Meerut) maximum 5.5 bug/clump in BHL unit Bilai (Biznore). The percent incidence of stalk borer in hot weather observed only in 3 sugar factories i.e. 0.32 % in Naglamal sugar complex (Meerut), to 7.10% The kissan sahkari chini mill, Sarsawan (Shahranpur), The intensity of mealy bug were recorded minimum 0.63 insect/ plant to 1.60 insect/ plant Dhampur sugar mill unit, Mansoorpur (Muzaffarnagar). Fall army worm/ clump were recorded 3 sugar factories 0.119 worm/ clump Dhampur sugar mill unit, Mansoorpur (Muzaffarnagar) to 0.32 worm/ clump in Naglamal sugar complex (Meerut) . Pyrilla was also recorded in negligible form. Intensity of hispa and thrips was also found in sporadic form in Sugarcane Reasearch center Muzaffarnagar.

At the time of post monsoon the 11 sugar factories surveyed by Src, Mzn scientists in all surveyed zone percent incidence of top borer was recorded minimum 4.25 % in kissan sahkari chini mill, nazibabad (Biznore) to maximum 26.06% Dhampur sugar mill unit, Mansoorpur (Muzaffarnagar), at this time root borer were also found in negligible form 0.41% in Dhampur sugar mill unit, Mansoorpur (Muzaffarnagar) to 1.45 in Mandi dhanaura (Amroha) sugar factories zone. The percent incidence of stalk borer on cane basis recorded maximum 8.34% in BHL unit, Gangnauli (Shahranpur) sugar factory zone area followed by minimum 1.10% in in Mandi dhanaura (Amroha) sugarfactory zone area. Mealy bug is also recorded at this time in all surveyed factory zone i.e. 1.7 insect/plant in Naglamal sugar complex (Meerut) to 12.56 insect/plant in Dhampur sugar mill unit, Mansoorpur (Muzaffarnagar) factory zone area as well as Pyrilla is also recorded in all syurveyed sugar factories zone i. e. minimum 1.67 insect/leaf. The kissan sahkari chini mill, nazibabad (Biznore) to maximum 30.31 insect/ leaf in BHL Unit Gangnauli, (Shahranpur) white flies 202.3 inset/ leaf (heavy intensity incidence) also visible in upper do aab sugar mill (Shamli) and minimum 3.24 insect/leaf in Dhampur sugar mill unit, Mansoorpur (Muzaffarnagar) factory. Sporadic and low infestation of white grub was also recorded in 2-3 sugar factories.

Stalk bore management .(Filler experiment,spring 2022-23

Conclusion: In this expermiments our objective is to evaluate the efficacy of some insecticides against against stalk borer**.** In this experiment, design is RBD & planted Co 15023 with recommended dose of fertilization, plan 6 treatment and one is control. In this experiment minimum germination percent (32.50%) in T_7 -Control (Untreated) and maximum (38.25%) in T_5 (Spraying of *Beauveria bassiana* @ 5.0 k.g./ha in the 2nd week of August and September) .Tiller /ha (165556) is also maximum in T_5 (Spraying of *Beauveria bassiana* @ 5.0 k.g./ha in the 2nd week of August and September), amd minimum in (152778) in treatmemt T_7 (Control). Stalk borer observed four time in all time stalk borer percent incidence ic minimum in stalk borer 1st time observe before use of 1st dose insecticide . at this time minimum incidence of stlak borer in T_5 (Spraying of *Beauveria bassiana* @ 5.0 k.g./ha in the 2nd week of August and September) over the treatment treatmemt T_7 (Control).so conclusion is Spraying of *Beauveria bassiana* @ 5.0 k.g./ha in the 2nd week of August and September found better followed by treatment T_2 (spraying of profenophof 40%+cyper 4% @ 1000 ml/ha in the 2nd of August and September.) over the treatment T_7 (control or untreated).

But the result was not very clear and satisfactory, so the experiment was terminated.

Production of bio-pesticide and Trichocard.

This is a 1st year and in this experiment production of *Merarhizium anisopilie* and *Beauveria bassiana* in commercial scale ("sayukat utpad ") इस प्रायोगिक परीक्षण का यह प्रथम वर्ष है। इस परीक्षण में जैव पेस्टीसाईडस तथा ट्राईकोकार्डस का वृहद स्तर पर उत्पादन कार्य प्रारम्भ कर गन्ना शोध केन्द्र पर स्थापित बसन्तकालीन तथा शरदकालीन गन्ना नर्सरी में प्रयोग किया गया। वृहद स्तर पर जैव पेस्टीसाईडस 5.69 कुन्तल, व 316 ट्राईकोकार्डस का उत्पादन कर 1.74 कुन्तल जैव पेस्टीसाईडस तथा 61 ट्राईकोकार्डस विक्रय कर परिषदीय कोष मे 32282.00 रू मात्र राजस्व जमा कराये गये।

Production of Bio fertilizer, Bio-agent (Ankush) and Organo-decomposer

नामक इस प्रायोगिक परीक्षण का यह प्रथम वर्ष है। इस परीक्षण में जैव उर्वरक, जैव एजेन्ट तथा आर्गेनोडीकम्पोजर 79.34 कुन्तल, का उत्पादन कर 72.02 कुन्तल जैव उर्वरक, जैव एजेन्ट तथा आर्गेनोडीकम्पोजर का विक्रय कर प्राप्त धनराशि परिषदीय कोश में जमा कराये गये।

Tabel 1 : SVT Spring (2022-2023)

S.N.	Varieties	Shoot borer % incidence			
		45 DAP	60 DAP	90DAP	120DAP
1.	CoS 19231	1.87	0.53	0.48	1.79
2.	CoS 19233	6.97	1.75	1.16	4.33
3.	CoS 19234	3.05	0.41	0.34	1.71
4.	CoS 20234	4.55	0.81	0.16	0.82
5.	CoLk 18201	2.60	0.50	0.45	2.34
6	CoLk 18202	2.53	0.33	0.56	0.69
7	CoLk 18203	5.11	0.77	0.52	8.71
8	CoLk 18204	2.96	1.59	1.69	1.31
9	Seo 685/15	4.48	2.50	1.11	1.86
10	Seo 565/16	5.20	1.70	0.96	4.79
11.	Seo 1019/15	4.29	1.53	0.89	1.75
12.	Seo 158/16	3.69	0.69	0.32	2.22
13.	S- 188/15	4.93	3.24	0.81	4.32
14	CoS 767	4.60	0.92	0.36	2.08
15	Co J 64	7.00	2.33	0.71	1.20
16	Co 0238	2.92	0.33	0.22	5.09
17	CoPant 97222	2.79	1.16	1.02	5.38
	C.V.	48.9235	98.777	87.6294	80.6197
	S.E.	2.0044	1.228	0.6255	2.3939
	C.D.	Nil	Nil	Nil	Nil

SVT Spring (2022-2023)

S.N	Varieties	At the time of hot weather				At the time of harvest				At the time of harvest			
		Shoot borer Cumulative.	Bored plat/ha	Top borer2nd brood	Topborer 3rd brood	Root borer	Top borer	Stalk borer canebasis	Stalk borer internode	Infestation index	Stalk borer	Stalk borer	
				% incidence		% incidence							
1.	CoS 19231	3.80	5555	0.81	0.96	4.0	14.0	26.0	1.90	0.49	8.33	7.46	0.82
2.	CoS 19233	9.95	11419	3.12	1.16	10.0	6.0	50.0	3.46	1.73	5.62	11.10	0.92
3.	CoS 19234	4.32	8642	1.00	0.38	8.0	4.0	30.0	2.16	0.65	6.32	7.8	0.94
4.	CoS 20234	4.32	9877	1.31	0.16	6.0	8.0	70.0	5.08	3.60	6.05	7.3	0.93
5.	CoLk 18201	4.20	3395	02.53	0.45	6.0	14.0	16.0	1.29	0.21	5.49	8.60	1.17
6	CoLk 18202	1.89	2469	1.97	0.00	10.0	10.0	22.0	1.24	0.27			
7	CoLk 18203	9.79	20370	2.85	1.98	10.0	18.0	18.0	1.74	0.98	8.27	14.32	1.28
8	CoLk 18204	5.52	4938	2.14	1.36	6.0	20.0	20.0	2.63	0.84	5.60	70	0.91
9	Seo 685/15	6.34	7716	2.16	1.49	8.0	6.0	20.0	1.71	0.342	7.33	11.68	1.26
10	Seo 565/16	11.7	12962	1.01	1.50	6.0	10.0	42.0	2.96	1.24	5.41	9.26	1.20
11.	Seo 1019/16	5.69	4938	2.54	0.42	4.0	20.0	18.0	1.67	0.30	5.93	11.31	1.17
12.	Seo 158/16	5.40	9259	1.21	1.36	6.0	10.0	50.0	3.36	1.68	6.80	19.20	2.12
13.	S- 188/15	7.90	9559	2.86	2.42	14.0	22.0	36.0	2.72	0.98	7.03	7.00	1.42
14	CoS 767	6.42	11727	1.09	0.73	6.0	10.0	32.0	2.63	0.84			
15	Co J 64	7.31	10943	2.10	1.22	14.0	26.0	22.0	1.57	0.34			
16	Co 0238	7.13	10185	2.27	1.34	16.0	18.0	26.0	2.0	0.52			
17	CoPant 97222	7.65	8025	2.49	0.0	10.0	14.0	32.0	2.68	0.86			
	C.V.	-	-	79.4527	143.71	61.99	19.287	52.2382	43.079		**27.02**	**59.84**	**38.53**
	S.E.	-	-	0.86497	1.3530	2.858	2.473	16.2860	1.0023		**1.56**	**5.58**	**0.40**
	C.D.	-	-	Nil	Nil	Nil	Nil	Nil	Nil		**NIL**	**NIL**	**NIL**

Survey and Surveillance of Sugarcne Insect Pest in Western U.P. 2021-22 (Pre monsoon)

S. N.	Varieties	Location	Name of Pest	% Incidence/Population		
				Max.	Min.	Avg.
1.	Co 0238,	Simbhawali sugars Ltd.(Hapur)	Top borer (% Incidence)	62.30	53.3	57.83
2.	Co 0238	BHLUnit Bhaisana Muzaffarnagar	Top borer (% Incidence) Shoot borer(% incidence) Black bug/clump (intensity)	43.33 10.0 4.5	34.20 5.75 1.50	38.76 7.85 3.0
3	Co 0238, CoJ 85	SDEC,Malakpur Meerut	Top borer (% Incidence) Shoot borer(% incidence) Root borer (% Incidence) Stalk borer (% Incidence Black bug/clump (intensity) Army worm/Plant (intensity)*	43.23 1.92 4.38 4.23 0.61 0.76	34.23 1.15 2.69 2.34 0.38 0.023	38.73 1.533.55 3.27 0.50 0.15
4	Co 0238,	IPL Unit rohana kalan,Mzn	Top borer (% Incidence) Shoot borer(% incidence) Black bug/clump (intensity)	35.62 2.25 1.375	28.13 0.875 0.51	31.88 1.56 0.93
5.	Co 0238	Naglamal sugar complex, Meerut	Top borer (% Incidence) Shoot borer(% incidence) Root borer (% Incidence) Stalk borer (% Incidence Black bug/clump (intensity) Army worm/Plant (intensity)* Fall army worm /clump	13.18 6.27 0.34 0.45 3.82 1.73 0.45	9.45 3.45 0.091 0.18 2.90 0.64 0.18	113.32 4.80 0.23 0.32 3.37 1.20 0.32
6.	Co 0238,CoS 08272	The kissan cop. Chini mill, Sarsawan,Shahran pur	Top borer (% Incidence) Shoot borer(% incidence) Stalk borer (% Incidence Root borer(% Incidence) Black bug/clump (intensity) Army worm/clump (intensity Mealy bug (intensity)	20.44 8.89 8.0 0.55 4.22 1.0 1.82	16.11 6.11 6.11 0.22 2.78 0.67 1.36	18.28 7.5 7.0 .39 3.5 0.84 1.60
7.	Co 0238,13235, Co 14201	The kissan cop. Chini mill, Nazibabaad,,Bzn	Top borer (% Incidence) Shoot borer(% incidence) Black bug/clump (intensity) Army worm/clump (intensity Fall army worm /clump Mealy bug/plant (intensity)	9.1 7.4 1.73 0.27 0.27 1.82	5.82 4.55 0.55 0.91 0.91 0.91	7.46 5.96 1.14 0.183 0.18 1.37
8	Co 0238	Mandi dhanaura sugar mill, Amroha	Top borer (% Incidence) Shoot borer(% incidence) Army worm/clump (intensity	6.0 1.55 0.45	3.91 0.55 0.185	4.96 1.5 0.32
9	Co 0238	DCM Unit, Mansoor pur(Mzn)	Top borer (% Incidence) Shoot borer(% incidence) Black bug/clump (intensity) Army worm/clump (intensity Fall army worm /clump Mealy bug/plant (intensity)	13.62 7.20 1.40 0.42 0.143 1.96	5.29 2.81 0.95 0.24 0.0951 .26	9.46 5.01 1.05 0.48 0.119 1.61
10	Co 0238	Triveni eng.&industries ltd.Sabitgarh (Buland sahar)	Top borer (% Incidence) Shoot borer(% incidence) Black bug/clump (intensity) Army worm/clump (intensity	1.42 4.14 1.14 0.79	1.00 1.00 0.43 0.36	1.22 2.57 0.79 0.59

			Mealy bug/plant (intensity)	1.36	0.43	0.89
11	Co 0238	Upper do-aab chini mill,(Shamali)	Top borer (% Incidence) Shoot borer(% incidence) Black bug/clump (intensity) Army worm/clump (intensity Mealy bug/plant (intensity)	9.5 6.0 4.25 1.67 2.5	5.92 2.0 1.43 0.5 0.75	7.11 4.0 2.85 1.1 1.62
12	Co 0238	BHLUnit Bilai (Biznore)	Top borer (% Incidence) Shoot borer(% incidence) Black bug/clump (intensity) Army worm/clump (intensity Mealy bug/plant (intensity	2.9 4.0 8.9 1.55 1.67	0.89 1.11 2.22 0.55 0.55	1.89 2.56 5.56 1.05 1.11
13	Co 0238	BHLUnit Kinoni(Meerut)	Top borer (% Incidence) Shoot borer(% incidence) Army worm/clump (intensity Mealy bug/plant (intensity	2.58 0.92 5.83 0.5	1.00 0.58 4.67 0.17	1.79 0.76 5.25 0.325
14	Co 0238	Dhampur sugars Ltd,Asmuli (Sambhal)	Top borer (% Incidence) Shoot borer(% incidence) Black bug/clump (intensity) Mealy bug/plant (intensity	34.33 1.67 2.87 1.0	23.33 1.00 1.2 0.67	29.02 1.34 2.03 0.835
15	Co 0238,CoS 13235	Deewan sugar Ltd. Agwanpur (Muradabaad)	Top borer (% Incidence)	6.25	4.37	5.31
16	Co 0238, CoS 13235,13231, Co 0118,15023 etc.	Sugarcane research centre,Muzaffarnagar	Top borer (% Incidence) Shoot borer(% incidence) Root borer% incidence Pyrilla/ leaf intensity Hispa/leaf intensity Army worm/clump (intensity	5.0 10.0 5.5 8.0 4.5 5.0	3.0 4.2 2.5 2.0 2.5 3.-00	4.0 6.1 4.0 5.0 3.5 4.0

Survey and Surveillance of Sugarcane Insect Pest in Western U.P. 2022-23 (Post monsoon)

S. N.	Varieties	Location	Name of Pest	% Incidence/Population		
				Max.	Min..	Avg.
1.	Co 0238	Naglamal sugar complex, Meerut	Top borer (% Incidence) Stalk borer (% Incidence mealybug/plant (intensity)* Mite/leaf (intensity)* Pyrilla/leaf (intensity)	13.42 3.50 2.10 14.2 4.92	7.92 1.25 1.25 4.2 2.42	10.67 2.40 1.70 9.20 3.67
2.	Co 0238, CoS 8436,CoJ 85 1	The kissan cop. Chini mill, Nazibabaad,,Bzn	Top borer (% Incidence) Mealybug/plant (intensity) White flies/ leaf(intensity Pyrilla/leaf (intensity	6.53 3.67 23.60 2.33	2.53 2.0 11.67 1.0	4.53 2.84 17.67 1.67
3.	Co 0238	The kissan cop. Chini mill, Sarsawan,Shahranpur	Top borer (% Incidence) Stalk borer (% Incidence) mealybug/plant (intensity)* Pyrilla/leaf (intensity) White flies/ leaf(intensity)	19.92 2.58 7.08 15.42 0.92	15.58 1.08 5.0 8.33 0.5	17.75 1.83 6.04 11.60 0.71
4.	Co 0238	Mandi dhanaura sugar mill,	Top borer (% Incidence) Stalk borer (% Incidence)	17.0 1.40	14.0 0.80	15.5 1.10

		Amroha	Root borer (% incidence) Mealy bug /plant(intensity) Pyrilla/leaf (intensity) White geub/clump	1.90 4.0 29.0 0.2	1.0 2.5 17.5 0.1	1.45 3.25 23.25 0.15
5.	Co 0238	DCM Unit, Mansoor pur(Mzn)	Top borer (% Incidence) Root borer (% incidence) Mealy bug /plant(intensity) White flies/ leaf(intensity) Mite/leaf (intensity) White grub/clump	30.47 0.548 16.29 5.29 101.2 0.88	21.65 0.23 8.89 1.18 37.1 0.35	26.06 0.409 12.46 3.24 69.13 0.62
6.	Co 0238,Co 0118	Triveni eng.&industries ltd.Sabitgarh (Buland sahar)	Top borer (% Incidence) Stalk borer (% Incidence)** Mealy bug/plant (intensity** pyrilla/leaf (intensity)***	12.73 1.0 4.13 4.0	7.33 0.8 2.33 2.2	6.37 0.9 3.23 3.10
7.	Co 0238,Co 13235	Upper do-aab chini mill,(Shamali)	Top borer (% Incidence) Stalk borer (% Incidence) Mealy bug/plant (intensity White flies/ leaf(intensity) Mite/leaf (intensity) Pyrilla /leaf (intensity)	10.36 2.64 2.70 295.5 36.4 6.40	5.82 1.45 1.8 109.1 18.2 4.10	8.09 2.05 2.25 202.3 27.3 5.25
8.	Co 0238,CoJ 85	BHLUnit Bilai (Biznore)	Top borer (% Incidence) Stalk borer (% Incidence) Mealy bug/plant (intensity White grub/clump	5.8 4.5 5.91 0.18	4.2 2.5 3.5 0.9	5.0 3.5 4.8 0.135
9.	Co 0238	BHLUnit Kinoni(Meerut)	Top borer (% Incidence) Stalk borer (% Incidence) Termite % incidence Pyrilla/leaf (intensity) White grub/clump	9.8 1.8 0.80 2.35 0.6	7.4 1.33 0.70 1.35 0.4	8.6 1.6 0.74 1.7 0.15
10.	Co 0238,Co 15023,0118,CoS 13235,CoLk 1401	SDEC,Malakpur Meerut	Top borer (% Incidence) Stalk borer (% Incidence) Mealy bug/plant (intensity White flies/ leaf(intensity) Pyrilla /leaf (intensity) White grub/clump	17.8 2.2 17.0 50.67 3.67 20.0	12.33 1.67 6.33 33.67 2.67 1.0	15.1 1.97 11.7 25.34 3.14 10.5
11.	Co 0238,CoH 160	BHLUnit Gangnauli (Shahranpur)	Top borer (% Incidence) Stalk borer (% Incidence) Mealy bug/plant (intensity Pyrilla /leaf (intensity)	14.26 9.5 9.29 33.2	11.1 7.15 6.79 27.4	13.02 8.34 8.04 30.31
12.	CoS 1323113235,Co0118 ,Co 0501, ,CoS 08279,Co 15023,CoLk 14201	Sugarcane cane research center,Mzn	Top borer (% Incidence) Stalk borer (% Incidence) Pyrilla /leaf (intensity Mealy bug (intensity) White flies/leaf(intensity)	5.75 6.5 10.25 10.5 5.0	2.5 2.5 3.45 2.5 2.0	4.25 4.5 7.5 6.75 3.5

Note: number of star indicated the number of plot in surveyed sugar factory.

Table: Stalk borer management 2022-23 (Filler experiment)

SN	Treatment	Germination %	Tillar/ha
1	Spraying of Fipronil 5% @ 1500 ml/ha	33.25	156111

	in the 2nd week of August and September		
2	Spraying of Rocket(profenophos 40%+cyper %) @ 1000 ml/ha in the 2nd week of August and September	36.75	157222
3	Spraying of cartop hydrochloride 50% @ 1.0 K.G. /ha in the 2nd week of August and September	36.26	152222
4	Application of virtako (Chlorantraniliprole 0.5%+ thiomethaxam 1.0%) @ 10 K.G. /ha in the 2nd week of August and September	35.50	157778
5	Spraying of *Beauveria bassiana* @ 5.0 K.G. /ha in the 2nd week of August and September	38.25	165556
6	Mechanical control(Removal of dry leaves &water shoots at 30 days interval from Oct. to November)	37.25	163333
7	Control(Untreated)	32.50	152778
8	**C.V.**	8.5839	3.5589
9	**S.E.**	52.5223	4.587
10	**C.D.**	Nil	Nil

Table:2 Stalk borer management (Filler experiment)

SN	Treatment	Month of August		Month of September		Stalk borer% at harvest		Stalk boere
		Before insecticide	After insecicide	Before insecticide	After insecicide	Cane basis	Internode basis	Infestation index
1	Spraying of Fipronil 5% @ 1500 ml/ha in the 2nd week of August and September	13.33	3.33	1333	6.67	26.70	2.47	0.66
2	Spraying of Rocket(profenophos 40%+cyper %) @ 1000 ml/ha in the 2nd week of August and September	6.67	3.30	10.0	4.70	26.70	2.01	0.19
3	Spraying of cartop hydrochloride 50% @ 1.0 K.G. /ha in the 2nd week of August and September	13.66	3.33	11.67	5.67	33.33.	2.50	0.67
4	Application of virtako (Chlorantraniliprole 0.5%+ thiomethaxam 1.0%) @ 10 K.G. /ha in the 2nd week of August and September	14.33	5.0	15.33	6.33	20.0	3.05	0.69
5	Spraying of *Beauveria bassiana* @ 5.0 K.G. /ha in the 2nd week of August and September	5.6	1.60	3.33	1.67	13.33	0.91	0.05
6	Mechanical	5.0	1.67	5.0	3.33	40.0	1.19	0.12

	control(Removal of dry leaves &water shoots at 30 days interval from Oct. to November)							
7	Control(Untreated)	15.0	8.33	16.67	10.0		3.56	1.42
8	**C.V.**	91.7047	101.261	86.8638	84.8907	93.6392	78.4649	-
9	**S.E.**	7.8086	3.149	7.6328	3.7957	18.0314	1.1246	-
10	**C.D.**	Nil	Nil	Nil	Nil	Nil	Nil	-

Seorahi

Varietal screening for the resistance to major insect-pest of sugarcane.

Objective: To identify different varieties resistant to major insect-pests.

Spring Planting: State Varietal Trial 1st Plant-Twelve genotypes viz . CoLk 18201, CoLk 18202, CoLk 18203, CoS 19231 , CoS 19233 , CoS 19234 , CoS 20234 , CoSe 20451 , CoSe 20452, CoSe 20453, CoSe 20454 and S-18451/15 including five standards viz. Co 0238, CoJ 64, CoLk 94184, CoS 767 and CoPant 97222 were planted in Randomized Block Design with three replications.

In hot weather conditions all the genotypes including standards showed less susceptible behavior to shoot borer. In ranged from 0.90% in CoSe 20453 to 5.32% in Co 0238 (standards).

At harvest, the infestation of top borer was found less in all the genotypes under testing including standards. It was found 3.03 % in CoSe 20452 and 4.40% in CoLk 18201. Similarly, stalk borer infestation was also found less in all the genotypes including standards. Infestation index for stalk borer ranged from 0.03 CoS 19233 to 0.20 Co 0238 (standards). (Table No 1).

State Varietal Trial 2nd Plant: Twelve genotypes viz. CoLk 16201, CoLk 16202, CoLk 16203, CoLk 16204, CoS 18233, CoS 18234, CoS 18241, CoS 19232, CoS 19235, CoSe 15451, CoSe 15452 and CoSe 15453 including five standards viz. Co 0238, CoJ 64, CoLk 94184, CoS 767 and CoPant 97222 were planted in Randomized Block Design with three replications in State Varietal Trial 2nd Plant.

In hot weather conditions all the genotypes including standards showed less susceptible behavior to shoot borer. In ranged from 0.99% in CoS 19235 to 4.92% in CoLk 16201.

At harvest, the infestation of top borer was found less in all the genotypes under testing including standards. It was found 1.40 % in CoS 19235 to 4.87% Co 0238 (standards). Similarly, stalk borer infestation was also found less in all the genotypes including standards. Infestation index for stalk borer ranged from 0.08 CoSe 15452 to 0.41 Co 0238 (standards). (Table No 1).

Survey and Surveillance of sugarcane insect-pests.

Objective: - To identify key insect-pests of sugarcane in the area.

Survey was made in Twenty different sugar factory zones viz. Seorahi, Ramkola, Dhadha, Pratappur, Khadda, Siswabajar, Sathiyav, Goshi, Captangaj, Pipraech, Munderwa, Babhanan, Manakapur, Balrampur, Tulshipur, Utrola, Rudhawali, Kunuderkhi, Akberpur and Mausudha for key insect–pests of sugarcane. During hot weather, the incidence of top borer 2nd brood was low and ranged from 2.50% in Akberpur factory zone to 8.00% in Munderwa factory zone. Regarding the sucking pest i.e. thrips population/ leaf was low. It was ranged from (6.00 / leaf) in Ramkola factory zones to (11.00/ leaf) in Khadda and Goshi factory zone. Low incidence of mealy bug was observed having range 5.00 /Plant Seorahi factory zone to 8.00/Plant Pratappur Captangaj factory Zone.

Table -1 Varietal screening for the resistance to major insect-pest of sugarcane.
SVT 1st plant -2022-23

S.N.	Genotype/Varieties	%incidence at hot weather		%incidence at harvest	
		Shoot borer	Top borer	Top borer	Stalk borer Infestation index
1	CoLk 18201	2.85	2.97	4.40	0.11
2	CoLk 18202	1.87	1.89	4.07	0.11
3	CoLk 18203	3.04	3.21	4.18	0.14
4	CoS 19231	0.95	1.90	4.05	0.10
5	CoS 19233	1.20	1.20	3.65	0.03
6	CoS 19234	2.43	2.40	3.11	0.04
7	CoS 20234	2.22	3.20	3.38	0.10
8	CoSe 20451	1.47	2.27	3.27	0.10
9	CoSe 20452	0.97	0.99	3.03	0.12
10	CoSe 20453	0.90	0.92	3.35	0.09
11	CoSe 20454	1.73	1.76	3.87	0.12
12	S- 18451/15	1.64	1.68	3.95	0.10
13	Co.0238	5.03	4.54	4.31	0.20
14	CoJ. 64	2.36	1.99	3.88	0.12
15	CoLk 94184	2.22	2.25	3.91	0.17
16	CoS. 767	1.31	0.86	3.24	0.12
17	CoPant 97222	2.20	2.21	4.37	0.13

SVT 2nd plant-2021-22

S.N.	Genotype/Varieties	%incidence at hot weather		%incidence at harvest	
		Shoot borer	Top borer	Top borer	Stalk borer Infestation index
1	CoLk 16201	4.92	1.08	3.27	0.17
2	CoLk 16202	2.60	1.86	1.43	0.26
3	CoLk 16203	2.49	1.69	3.12	0.22
4	CoLk 16204	3.76	1.68	4.46	0.16
5	CoS 18233	2.82	1.62	1.41	0.35
6	CoS 18234	2.06	1.80	3.41	0.18
7	CoS 18241	2.70	2.17	3.33	0.35
8	CoS 19232	2.56	2.24	3.25	0.22
9	CoS 19235	1.40	0.99	1.40	0.23
10	CoSe 15451	1.12	2.80	1.36	0.33
11	CoSe 15452	2.23	2.66	2.05	0.8
12	CoSe 15453	1.20	3.92	1.24	0.10
13	Co.0238	3.47	4.18	4.87	0.41
14	CoJ.64	3.11	1.81	3.08	0.31
15	CoLk 94184	1.33	1.08	2.26	0.18
16	CoS. 767	2.51	1.86	3.16	0.10
17	CoPant 97222	3.66	1.69	2.97	0.28

Table-2 Survey and Surveillance of sugarcane insect-pests in the area 2022-23

Variety	Name of Pest	%Incidence/population			Remark
		Min.	Max.	Aver.	
(1) Seorahi					
Co 0238,0118,98014,CoS 08272 CoLk 94184	Top Borer 2nd brood	02	07	4.50	
	Trips/Leaf	04	09	6.50	
	Mealy bugs/plant	03	07	5.00	
(2) Ramkola					
Co 0238,0118,98014,CoS 08272 CoLk 94184,CoP 9301,CoS 08279,	Top Borer 2nd brood	02	08	5.00	
	Trips/Leaf	02	10	6.00	
	Mealy bugs/plant	03	10	6.50	
(3) Dhadha					
Co 0238,0118,Co98014	Top Borer 2nd brood	02	07	4.50	
	Trips/Leaf	06	13	9.50	
	Mealy bugs/plant	03	10	6.50	
	Mite/Leaf	15	35	25.0	
(4) pratappur					
Co 0238,0118,98014,CoS 08272 CoLk 94184,CoP 9301,CoS 08279,	Top Borer 2nd brood	02	07	4.50	
	Trips/Leaf	09	12	10.5	
	Mealy bugs/plant	03	13	8.00	
(5)Khadda					
Co 0238,0118, 98014,CoS 08272 CoLk 94184,CoP 9301	Top Borer 2nd brood	03	07	5.00	
	Trips/Leaf	08	14	11.0	
	Mealy bugs/plant	04	09	6.50	
	Mite/Leaf	20	32	26.0	
(6)Siswabajar					
Co 0238,0118,98014, CoS 08272 CoLk 94184 ,CoP 9301,CoS 08279,	Top Borer 2nd brood	04	08	6.00	
	Trips/Leaf	05	14	8.50	
	Mealy bugs/plant	03	08	5.50	
	Mite/Leaf	10	25	17.5	
(7)Sathiyav					
Co 0238,0118,98014, CoS 8436,767,UP 39, 91269 CoLk 94184,,	Top Borer 2nd brood	04	10	7.00	
	Trips/Leaf	06	15	10.50	
	Mealy bugs/plant	02	10	6.00	
(8)Ghoshi					
Co 0238,0118,98014,	Top Borer 2nd brood	02	06	4.00	
	Trips/Leaf	08	14	11.0	

CoS e 01434,92423 CoLk 94184,	Mealy bugs/plant	03	08	5.50	
(9)Captanganj					
Co 0238,0118,98014, CoS 08272 CoLk 94184, CoP 9301,CoS 08279,	Top Borer 2nd brood	02	05	3.50	
	Trips/Leaf	-	-		
	Mealy bugs/plant	03	13	8.00	
(10)Pipraich					
Co 0238,0118,98014, CoS 08272 CoLk 94184, CoP 9301,CoS 08279,	Top Borer 2nd brood	02	10	6.00	
	Trips/Leaf	06	12	9.00	
	Mealy bugs/plant	03	08	5.50	
(11)Munderwa					
Co 0238,0118,98014, CoS 08272 CoLk 94184, CoS 08279,CoSe 08452	Top Borer 2nd brood	05	11	8.00	
	Trips/Leaf	07	12	9.50	
	Mealy bugs/plant	03	12	7.50	
(12)Babhanan					
Co 0238,0118,	Top Borer 2nd brood	02	10	6.00	
	Trips/Leaf	05	10	7.50	
	Mealy bugs/plant	03	10	6.50	
(13)Mankapur					
Co 0238,0118,	Top Borer 2nd brood	02	10	6.00	
	Trips/Leaf	05	12	8.50	
	Mealy bugs/plant	02	10	6.00	
(14)Balrampur					
Co 0238,0118, ,	Top Borer 2nd brood	02	09	5.00	
	Trips/Leaf	05	10	7.50	
	Mealy bugs/plant	03	08	5.50	
(15)Tulshipur					
Co 0238,0118,98014,	Top Borer 2nd brood	02	09	5.50	
	Trips/Leaf	05	10	7.50	
	Mealy bugs/plant	04	11	7.50	
(16)Utrola					
Co 0238,0118, CoS 08272 CoLk 94184, CoS 08279,	Top Borer 2nd brood	04	08	6.00	
	Trips/Leaf	06	12	9.00	
	Mealy bugs/plant	03	09	6.00	
	Mite/Leaf	14	22	18.0	
(17)Rudhawali					
	Top Borer 2nd brood	02	06	4.00	

, Co 0238,0118, CoS 08272 CoLk 94184	Trips/Leaf	03	10	6.50	
	Mealy bugs/plant	04	08	6.00	
(18)Kunuderkhi					
Co 0238,0118	Top Borer 2nd brood	02	06	4.00	
	Trips/Leaf	04	10	7.00	
	Mealy bugs/plant	02	09	5.50	
(19)Akberpur					
Co 0238,0118,	Top Borer 2nd brood	02	03	2.50	
	Trips/Leaf	03	10	6.50	
	Mealy bugs/plant	-	-	-	
(20)Mausudha					
Co 0238,0118,98014,	Top Borer 2nd brood	02	06	4.00	
	Trips/Leaf	04	10	7.00	
	Mealy bugs/plant	02	09	5.50	

SHAHJAHANPUR

Survey of sugarcane diseases in Uttar Pradesh

Extensive survey work was conducted duringpre-monsoon and post-monsoonin twenty three sugar factory zone of central UP.Red rot incidence was recorded up to 100% in Co 0238 in Sampurna Nagar and Khambarkheda sugar mills area. A wide range of red rot incidence was mentioned in Table 1. Occurrence of red rot in Co 0238, Co 0118, Co 98014, CoLk 94184, CoS 08279, CoPk 05191 and CoJ 85 was observed in different sugar mill areas. A wide incidence of red rot was recorded on cv Co 0238 up to 2-100 per cent in Khambarkheda, Palia, Gularia, Powayan, Aira, Rosa, Barkheda, Jwaharpur, Faridpur, Biswan, Nigohi Loni, Kumbhi, Rupapur, Gola, Nababganj, Karimganj, Maksoodapur, Tilharand Hargaon sugar mill areas (Plot wise assessment). Combine infection of red rot and wilt was also accessed up to 100 per cent on Co 0238 and Co 0118 in Khambarkheda and Palia Sugar mill area.The incidence of smut was observed up to 1-10 percent in Co 0238, Co 0118, CoS 13231, CoS 13235, UP 05125, Co 15023, Co 98014 and CoLk 14201 in various sugar mill area including research farms. The incidence of wilt was observed in Jawaharpur, Biswan, Gularia, Palia, Nababganj, Kumbhi, Faridpur, Rosa, Barkheda and Research farm Shahjahanpur which ranged from 0.5 to 10 per cent on varieties Co 0238, Co 15023, Co 0118, CoS 13235, Co 98014, CoJ 85 and CoLk 14201.Occurrence of grassy shoot disease was recorded up to 10 per cent in the varieties Co 0238, Co 98014, Co 0118, Co 15023, CoS 13235 and CoPk 05191 in many sugar mill areas. The incidence of pokkahboeng was recorded from 2 to 60 per cent on Co 0238, Co 0118, CoS 08279, Co 98014, CoJ 85, Co 15023, CoLk 14201, CoS 13235, CoPk 05191, CoLk 94184 and CoS 13231 at various sugar factory areas. The incidence YLD was also observed up to 1-60 per cent in various sugar mill areas as well as SRI Shahjahanpur. Incidence of mosaic disease was recorded up to 5-35 per cent on different sugarcane vaeieties in many sugar mill area and also SRI Shahjahanpur farm. Some minor diseases of sugarcane like leaf binding, leaf fleck, red strip, leaf scald, eye spot and banded sclerotial were also found in traces on different sugarcane varieties in various sugar mill area (Fig 1).

Table 1. Incidence of red rotreported in different sugar mill areas.

Sl. No.	Name of sugar mill area surveyed	District	% incidence	Varieties affected	Crop stage
1	Rosa	Shahjahanpur	3-70	Co 0238	9 Months
2	Nigohi	Shahjahanpur	2-40	Co 0238	9 Months
			10-40	Co 0118	9 Months
4	Powayan	Shahjahanpur	30-80	Co 0238	9 Months
5	Maksoodapur	Shahjahanpur	4-7	Co 0238	4 Months
	Tihar	Shahjahanpur	1-5	Co 0238	4 Months
6	Ajbapur	Lakhmpur Kheri	2-8	Co 0238	8 Months
			0.5-3	CoPk 05191	4 Months
			1-4	Co 98014	4 Months
7	Kumbhi	Lakhmpur Kheri	2-15	Co 0238	8 Months
			0.5-5	Co 0118	8 Months
			1-3	CoJ 85	8 Months
8	Khambarkheda	Lakhmpur Kheri	2-100	Co 0238	9 Month
9	Gola	Lakhmpur Kheri	4-10	Co 0238	4 Months
			1-3	CoLk 94184	5 Months

10	Aira	Lakhmpur Kheri	2-72	Co 0238	9 Months
			0.5-12	CoPk 05191	7 Months
11	Gularia	Lakhmpur Kheri	2-90	Co 0238	9 Months
			1-3	Co 0118	9 Months
			2-3	Co 98014	9 Months
12	Sampurna Nagar	Lakhmpur Kheri	10-100	Co 0238	9 Month
13	Palia	Lakhmpur Kheri	5-95	Co 0238	9 Months
			1-17	Co 98014	9 Months
			5-10	Co 0118	8 Months
			0.5-3	CoS 08279	4 Months
14	Loni	Hardoi	2-20	Co 0238	8 Months
15	Hariyawan	Hardoi	2-6	Co 0238	4 Months
16	Rupapur	Hardoi	0.5-25	Co 0238	8 Months
17	Barkheda	Pilibhit	4-70	Co 0238	9 Months
			0.5-10	CoS 8436	9 Months
18	Hargaon	Sitapur	2-20	Co 0238	9 Months
			10-45	CoPk 05191	6 Months
19	Jawaharpur	Sitapur	5-50	Co 0238	8 Months
20	Biswan	Sitapur	5-40	Co 0238	8 Months
21	Faridpur	Bareilly	3-50	Co 0238	9 Months
22	Nababganj	Bareilly	2-6	Co 0238	4 Months
23	Karimganj	Rampur	0.5-5	Co 0238	4 Months

Fig 1. Disease symptoms:A- Primary symptom of red rod on leaf sheath; B- Primary symptom of smut

Collection and maintenance of pathogenic isolates of sugarcane diseases

The fifty three new isolates (R 2201 to R 2253) of *C. falcatum* were collected and isolated from variety Co 0238, CoS 08279, Co 0118, CoPk 05191, Co 98014, CoLk 94184, CoS 19233 and CoJ 85 of different sugar factory areas. Out of 53 isolates of *C. falcatum,* thirty four isolates were isolated from variety Co 0238 and other isolates were isolated from different cane varieties namely Co 0118 (4 Isolates), CoS 08279 (1 isolate), CoS 19233 (1 Isolates), Co 98014 (5 isolates), CoPk 05191 (5

isolates), CoLk 94184 (1 isolate), and CoJ 85 (1 Isolates) of different sugar factory areas. The fifty three new isolates along with 8 designated patho types viz; CF 01, CF 02, CF 03, CF 07, CF 08, CF 09, CF 11, CF 13 were cultured and maintained in laboratory for further study.

Characterization and identification of pathotypes/races of red rot pathogen

The pathogenic variability of eight designated pathotypes and 21 isolates were assessed on 20 host differentials *viz*, Co 419, Co 975, Co 997, Co 1148, Co 7717, Co 62399, CoC 671, CoJ 64, CoS 767, CoS 8436, BO 91, Baragua (*S. officinarum*), Kakhai (S. sinense) and SES 594 (*S. spontaneum*), Co 7805, Co 86002, Co 86032, CoSe 95422, CoV 92102 and Co 0238 by plug method of inoculation. Disease intensity was assessed on the basis of resistant (R), intermediate (X) and susceptible (S) reaction. The old pathotype CF 11 displayed more virulence pathogenic behaviour on host differentials followed by CF 13 and 18 isolates of Cf 0238, Cf 98014, Cf 05191, Cf 8436, Cf 19233 and Cf08279. The differentials viz, BO 91 and SES 594 exhibited universal resistant behaviour to all the isolates and pathotypes. All the isolates of Cf 0238 exhibited virulent behaviour on host differentials such as Co 62399, CoC 671, Co 86032, Khakai and Co 0238. The other isolates of Cf 0238, Cf 98014, Cf 05191, Cf 8436, Cf 19233 and Cf 08279 exhibited similar pathogenic pattern to Cf 0238 while standard pathotypes CF 07, CF 08 and CF 09 exhibited the contrast pathogenic behaviour on same differentials (Co 62399, CoC 671, Co 86032, Co 0238). The red rot development on differential hosts indicated that all the seven pathotypes exhibited more or less similar reactions except CF 13 pathotype and all tested isolates. The results clearly indicated that the similar disease behaviour was assessed among all the twenty one isolates of Cf 0238 and CF 13 pathotype. The other isolates such as Cf 08279 (1), Cf 19233 (1), Cf 98014 (1), Cf 05191 (2) and Cf 08436 (1) exhibited almost similar disease behaviour to Cf 0238 on host differentials. It has been expected that all isolates has been originated from prevalent pathotypes CF 13 (Cf 238). All the isolates and pathotypes were maintained for further study.

Evaluation of genotypes/varieties for resistance to red rot

The new genotypes along with standard varieties were evaluated against 3 red rot standard pathotypes namely CF 07, CF 08 and CF 13 in state varietal trial, preliminary varietal trial and second generation trial by plug method as well as nodal cotton swab (NCS) method of inoculation. Inoculation was done in second week of August, 2021 with *C. falcatum conidial* suspension. The canes were cut at ground level and were split open longitudinally to assess red rot severity inside the canes after 60 days of inoculation. The following parameters, viz., lesion width, nodal transgression, presence of white spots and condition of the crown, were considered for assessing red rot severity, and they were given maximum scores of 3, 3, 2 and 1, respectively. The disease severity was rated according to standard disease scale of 0 to 9. The disease reactions were scored as resistant (0–2.0, R), moderately resistant (2.1–4.0, MR), moderately susceptible (4.1–6.0, MS), susceptible (6.1–8.0, S) and highly susceptible (8.1–9.0, HS).

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State Varietal Trial (SVT) I Plant:

A total of 11 genotypes and three standards Co 0238, CoJ 64 ans CoS 767 were evaluated against red rot pathotypes CF 07, CF 08 and CF 13 separately by plug and nodal cotton swab method. Out of 11, four genotypes viz; Seo 685/15, Seo 1019/16, CoS 19231 and CoLk 18201 exhibited moderately resistant (MR) to CF 07, CF 08 and CF 13 pathotypes by plug and resistant (R) to nodal cotton swab method. The genotypes such as S. 188/15, CoS 19234 and CoLk 18203 was evaluated MR/Rto CF 07, CF 08 by plug/NCS and S to CF13 by plug and NCS method. Two genotypes Seo 665/16 and CoLk 18204 were graded MR/R to CF 07 by plug/NCS and MS to CF 08 and CF 13 by plug and S toNCS method of inoculation. Susceptible standard Co 0238 and CoJ 64 expressed HS reaction to CF 13 and CF 07/08, respectively.

State Varietal Trial (SVT) II Plant:

A total of fourteen genotypes were tested for red rot pathotypes CF 07, CF 08 and CF 13 separately by plug and nodal cotton swab method. Out of 14 genotypes, 11 genotypes such as CoS 19232, CoS 19235, CoS 18336,CoS 18231, CoS 18233,

CoS 18234, Seo 1860/10, Seo 1067/15, CoSe 15453, CoLk 16201 and CoLk 16204 were identified as MR to CF 07, CF 08 and CF 13 by plug and R to NCS method of inoculation. One genotype S. 112/14 was rated as MR to CF 07 and CF 13, MS to CF 08 by plug and R to CF 07, CF 08 and CF 13by NCS method. Genotype CoLk 16202 identified MR to CF 08 and Cf 13, MS to CF 07by plug and R to CF 07, CF 08 and CF 13 by NCS method. Genotype CoLk 16203 was expressed MR CF 07 and CF 08 while it was rated MS to CF 13 by plug and R to NCS method of inoculation. Susceptible standard Co 0238 and CoJ 64 expressed HS reaction to CF 13 and CF 07/08, respectively.

Preliminary Varietal Trial (PVT)

A total of twenty six genotypes along with two red rot standards were evaluated to red rot using inoculum of CF 07, CF 08 and CF 13separately by plug and NCS method of inoculation. Red rot susceptible CoJ 64 and Co 0238 were found dry (HS) to CF 07/08 and CF 13 pathotypes, respectively.

Pathotype CF 07: Out of twenty six genotypes, sixteen genotypes viz, S. 1/18, S. 2/18, S. 4/18, S. 7/18, S. 13/18, S. 35/18 S. 77/18, S. 86/18, S. 89/18, S. 91/18, S. 121/18, S. 185/18, S. 124/18, S. 246/18 and S. 245/18were evaluated MR to CF 07 by plug and R by NCS method. Two genotype S. 151/18 and S. 75/18 were evaluated MS by plug and S by NCS method. Genotype S. 44/18 was screened as S by plug and NCS method. Seven genotypes such as S. 9/18, S. 189/18, S. 12/18, S. 129/18, S. 14/18, S. 20/18 and S. 22/18 found HS by plug and S by NCS method of inoculation.

Pathotype CF 08: Out of twenty six genotypes, sixteen genotypes viz, S. 35/18,S. 86/18, S. 91/18, S. 185/18, S. 245/18, S. 89/18, S. 238/18, S. 124/18, S. 2/18, S. 4/18, S. 7/18, S. 246/18, S. 1/18, S. 77/18, S. 13/18 and S. 121/18 were identified MR to CF 08 by plug and R by NCS method. Four genotype such as S. 189/18, S. 44/18, S. 129/18 and S. 75/18 were evaluated S to CF 08 by plug and NCS method. Six genotype such as S. 151/18, S. 9/18, S. 12/18, S. 14/18, S. 20/18 and S. 22/18 was screened HS to CF 08 by plug and NCS method.

Pathotype CF 13: Out of twenty six genotypes, ten genotypes such as S. 35/18, S. 245/18, S. 124/18, S. 4/18, S. 7/18, S. 246/18, S. 1/18, S. 77/18, S. 13/18 and S. 121/18 were evaluated R/MR by plug and R by NCS method. Seven genotypes such as S. 238/18, S. 12/18, S. 129/18, S. 2/18, S. 14/18, S. 20/18 and S. 22/18 were recorded MS by plug and R by NCS method. Three genotypes such as S. 151/18, S. 9/18 and S. 75/18 were found S by plug and NCS method. Six genotypes such as S. 86/18, S. 91/18, S. 185/18, S. 189/18, S. 44/18 and S. 89/18 were screened as HS by plug method and S by NCS method of inoculation.

C_2 generation

One hundred sixty eight newly developed progenies were examined against red rot resistance by using three standard pathotypes namely CF 07, CF 08 and CF 13 by plug and NCS method of inoculation. Susceptible standard CoJ 64 expressed HS reaction to CF 07/08 and Co 0238 as HS to CF 13 pathotypes. The results are as follow:

Pathotype CF 07, CF 08 and CF 13: A total of fifty sixprogenies viz, S. 108/19, 122/19, 123/19, 71/19, 171/19, 105/19, 86/19, 213/19, 03/19, 236/19, 261/19, 137/19, 7/19, 92/19, 151/19, 6/19, 120/19, 5/19, 170/19, 142/19, 19/19, 40/19, 153/19, 192/19, 91/19, 114/19, 85/19, 103/19, 78/19, 191/19, 136/19, 135/19, 74/19, 50/19, 31/19, 141/19, 2/19, 238/19, 42/19, 307/19, 370/19, 204/19, 313/19, 201/19, 75/19, 309/19, 268/19, 344/19, 235/19, 369/19, 211/19, 311/19, 215/19, 337/19, 326/19 and 263/17 were rated R/MR by plug and R by NCS method of inoculation to all the pathotypes.

Pathotype CF 07: Out of 168 genotypes, 79 genotypes such as S.139/19, 58/19, 131/19, 349/19, 371/19, 306/19, 149/19, 270/19, 129/19, 106/19, 32/19, 145/19, 152/19, 117/19, 90/19, 115/19, 68/19, 107/19, 138/19, 65/19, 164/19, 348/19, 154/19, 21/19, 200/19, 159/19, 147/19, 125/19, 1/19, 126/19, 80/19, 43/19, 37/19, 44/19, 229/19, 304/19, 346/19, 245/19, 232/19, 244/19, 320/19, 264/19, 243/19, 271/19, 274/19, 341/19, 203/19, 233/19, 181/19, 216/19, 277/19, 226/19, 218/19, 227/19, 315/19, 336/19, 357/19, 379/19, 222/19, 217/19, 234/19, 208/19, 209/19, 319/19, 330/19, 375/19, 323/19, 279/19, 303/19, 324/19, 269/19, 240/19, 241/19, 45/17, 497/17, 30/17, 353/17, 208/17 and 405/16 were assessed R/MR by plug NCS method, 09 genotypes viz; 280/19, 160/19, 70/19, 46/19, 88/19, 169/19, 148/19, 144/19 and 275/17 were found MS by plug and S to NCS

method, 17 genotypes such as 184/19, 228/19, 23/19, 13/19, 353/19, 188/19, 146/19, 96/19, 100/19, 82/19, 121/19, 163/19, 77/19, 302/19, 314/19, 261/17 were found S/HS by plug method and S to NCS method of inoculation.

Pathotype CF 08 : Out of 168 genotypes, 29 progeniessuch as S. 126/19, 302/19, 245/19, 274/19, 341/19, 227/19, 222/19, 208/19, 209/19, 319/19, 330/19, 323/19, 279/19, 303/19, 240/19, 45/17, 30/17, 275/17, 159/19, 117/19, 129/19, 106/19, 270/19, 349/19, 371/19, 228/19, 139/19, 58/19 and 131/19 were screened as R/MR by plug and NCS method. Twenty one progenies such as S. 13/19, 68/19, 306/19, 152/19, 115/19, 164/19, 21/19, 147/19, 144/19, 346/19, 232/19, 37/19, 264/19, 271/19, 277/19, 218/19, 315/19, 336/19, 357/19, 217/19 and 324/19 were screened as MS by plug and S by NCS method. The 45 progenies i.e.S. 184/19, 353/19, 149/19, 188/19, 160/19, 70/19, 61/19, 46/19, 88/19, 96/19, 100/19, 145/19, 169/19, 90/19, 138/19, 82/19, 107/19, 148/19, 65/19, 348/19, 154/19, 200/19, 121/19, 163/19, 125/19, 1/19, 77/19, 80/19, 43/19, 44/19, 229/19, 304/19, 244/19, 320/19, 243/19, 203/19, 233/19, 181/19, 379/19, 234/19, 375/19, 269/19, 241/19, 497/17 and 261/17 were screened as S/HS by plug and S to NCS Method of inoculation.

Pathotype CF 13 : Out of 168 genotypes, 24 genotypes viz; S. 228/19, 149/19, 160/19, 46/19, 145/19, 107/19, 65/19, 164/19, 200/19, 144/19, 37/19, 44/19, 320/19, 264/19, 243/19, 203/19, 181/19, 216/19, 315/19, 217/19, 234/19, 375/19, 269/19 and 497/17were showed R/MR reaction by plug and R by NCS method, 19 genotypes namely S. 139/19, 58/19, 184/19, 23/19, 88/19, 169/19, 113/19, 379/19, 208/19, 330/19, 323/19, 279/19, 241/19, 240/19, 45/17, 261/17, 275/17, 208/17 and 405/16 were showed MS reaction by plug and S by NCS method. The 56 genotypes such as S. 13/19, 353/19, 349/19, 371/19, 306/19, 188/19, 280/19, 270/19, 146/19, 129/19, 106/19, 70/19, 61/19, 96/19, 100/19, 152/19, 117/19, 90/19, 115/19, 68/19, 138/19, 148/19, 348/19, 154/19, 21/19, 159/19, 147/19, 121/19, 163/19, 125/19, 1/19, 126/19, 77/19, 80/19, 43/19, 229/19, 304/19, 346/19, 302/19, 245/19, 232/19, 244/19, 271/19, 274/19, 341/19, 277/19, 226/19, 218/19, 336/19, 357/19, 222/19, 209/19, 319/19, 303/19, 30/17 and 353/17 were showed S/HS reaction to Plug method and S to NCS Method of inoculation

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Multiplication trial : Ten genotypes were identified against CF 07, CF 08 and CF 13 pathotypes. Eight genotypes viz, S. 168/17, S. 146/17, S. 155/17, S. 310/17, S. 449/17, CoS 16231, S. 320/17 and S. 112/17 were assessed R/MR reaction to all the aforesaid pathotypes by plug and R by NCS method of inoculation. The genotype S. 374/17 was graded as S to CF 07 and MS to CF 08 and CF 13 by plug and S by NCS method of inoculation. The genotype S. 188/17 was found MR to CF 07 and CF 08 and MS to CF 13 by plug method and graded R to CF 07 and CF 08 and S to CF 13 by NCS method of inoculation. Susceptible standard Co 0238 and CoJ 64 expressed HS reaction to CF 13 and CF 07/08 pathotypes.

Preliminary Varietal Trial : Thirty two genotypes and two red standards were tested against CF 07, CF 08, and CF 13 pathotypes independently by plug and NCS method of inoculation. Twenty genotypes such as S. 2443/18, S. 1653/18, S. 2437/18, S. 1935/18, S. 2599/18, S. 2250/18, S. 1774/18, S. 1553/18, S. 1956/18, S. 1833/18, S. 1828/18, S. 1718/18, S. 1700/18, S. 2216/18, S. 1931/18, S. 2032/18, S. 102/18, S. 1536/18, S. 1494/18 and 1648/18 were screened as R/MR to CF 07, CF 08 and CF 13 by plug and R by NCS method of inoculation.. The genotype S. 584/18 and S. 1309/18 were evaluated as MS, genotype S. 2496/18, S. 1459/18 and S. 1143/18 were evaluated as HS to CF 07 by plug and S by NCS method. The genotypes such as S. 584/18 and S. 1550/18 evaluated as MS, genotype S. 2796/18 was graded S, genotype S. 2496/18, S. 1459/18 and S. 1309/18 were rated as HS to CF 08 by plug and S by NCS method. The genotype such as S. 1550/18 and S. 1398/18 were found MS, genotype S. 584/18, S. 2496/18 and S. 1295/18 were graded S, genotype S. 2168/18, S. 2796/18, S. 1459/18, S. 1143/18, S. 2186/18 and S. 1372/18 were screened as HS to CF 13 by Plug and S by NCS method of inoculation.

Evaluation of genotypes/varieties for resistance to smut

Sugarcane Research Institute, Shahjahanpur

State Varietal Trial (SVT) I Plant : Smut resistance

data were evaluated among eleven genotypes and three standards in this trial. The variety Co 1158 was used as susceptible check to smut. Four out of 11 genotypes such as Seo. 1019/16, S. 188/15, CoS 19233, CoLk 18203 were identified R/MR against smut. Two genotypes namely Seo. 665/16 and CoS 19234 were evaluated MS against smut. Rest genotypes Seo. 685/15, Seo. 1581/16, CoS 19231, CoLk 18201 andCoLk 18204 were assessed as S/HS to smut disease.

State Varietal Trial (SVT) II Plant : A total of 14 genotypes were tested for smut resistance and among them six genotypes viz, CoS 19232, CoS 18231, CoS 18234, CoSe 15453, CoLk 16202 and CoLk 16204 were identified as R/MR against smut. Two genotypes Seo. 1860/10 and CoLk 16201 were MS against smut. Six genotypes such asCoS 19235, CoS 18336, CoS 18233, S. 112/14, Seo. 1067/15 and CoLk 16203 were assessed as S/HS to smut disease against smut.

Preliminary Varietal Trial (PVT) : A total of twenty six genotypes and two standards were evaluated against smut. Nineteen out of 26 genotypes such as S. 35/18, S. 151/18, S. 91/18, S. 9/18, S. 185/18, S. 189/18, S. 44/18, S. 89/18, S. 238/18, S. 124/18, S. 129/18, S. 2/18, S. 14/18, S. 4/18, S. 246/18, S. 1/18, S. 20/18, S. 13/18 and S. 121/18 were evaluated as R/MR to smut. The genotypes such as S. 86/18, S. 245/18 and S. 7/18 were evaluated as MS to smut. Four genotypes such as S. 12/18, S. 22/18, S. 75/18 and S. 77/18 were evaluated as S/HS to smut.

C_2 generation: Total 168 progenies were were evaluated against smut. All 168 Three progenies were found R against smut. This data would be repeated further in next year for confirmation.

Sugarcane Research Centre, Gola Gokarannath (Lakhimpur Kheri)

Multiplication trial : Ten genotypes with one standard were tested against smut. Six genotypes such as S. 146/17, S. 155/17, S. 310/17, CoS 16231, S. 320/17 and S. 112/17 were assessed R to smut.The genotypes such as S. 168/17, S. 374/17, S. 449/17 and S. 188/17 were identified HS against smut.

Preliminary Varietal Trial: Thirty two genotypes including one standard were tested against smut. Of thirty two, 22 genotypes viz, S. 2443/18, S. 2168/18, S. 2437/18, S. 2796/18, S. 1774/18, S. 1553/18, S. 1833/18, S. 1828/18, S. 1718/18, S. 1700/18, S. 1143/18, S. 2216/18, S. 2186/18, S. 1309/18, S. 1372/18, S. 2032/18, S. 102/18, S. 1550/18, S. 1536/18, S. 1295/18, S. 1494/18 and S. 1648/18 were assessed R/MR to smut. Two genotypes such as S. 1956/18 and S. 1931/18 were found MS to smut. Eight genotypes such as S. 1935/18, S. 1653/18, S. 2599/18, S. 584/18, S. 2250/18, S. 2496/18, S. 1459/18 and S. 1398/18 were found S/HS against smut.

Studies on the incidence of diseases in autumn and spring planted crop of sugarcane

This experiment was carried out under natural condition in breeding experimental trials. Periodic observations of various diseases namely red rot, smut, wilt, grassy shoot disease (GSD), leaf scald, pokkah boeng (PB), *SCMV*, leaf flack, leaf and binding were inspected during pre-monsoon, monsoon and post-monsoon periods. Fourtien genotypes along with 4 standards were studied against natural incidence under SVT (I^{st} Plant). In this trial, the incidence of smut was noticed2% on CoS 18236 and 5% on CoLk 16202. Pokkah boeng disease was recorded 2 per cent on CoS 19235 and Seo. 1067/15.Leaf flack and *SCMV* also found on CoLk 16201 with 20 percent incidence and CoLk 16202 with 40% and 50%, respectively.In SVT (II^{nd} Plant), fourteen genotypes and 4 standards were assessed for various diseasesunder natural condition. The incidence of red rot was examined 5% and 45% on CoS 19333 and CoSe 20234, respectively. Pokkah boeng was found from2 to 5 percent incidence. Wide range of SCMV observed from 10% (CoS 19233) to 20% (Seo. 565/16). In SVT (Ratoon), 14 genotypes and four standards were studied against natural disease incidence.The range of smut disease varied from 4 (CoS 18236) to 10 per cent (CoS 19235).Pokkah boeng disease recorded on CoLk 16202 with 2 per cent. Incidence of GSD recorded with 2 per cent on CoS 18238 and Seo. 1067/15.

Under PVT, a wide range of SCMV disease varied from 10 (S. 13/18, S. 185/18, S. 20/18, S. 22/18) to 70 percent (S. 12/18).The range of SCBV disease was found 10 (S. 121/18 and S. 185/18) to 30 percent (S. 14/18). Pokkah boeng disease found range between 1 (S. 1/18, S. 129/18 and S.7/18) to 20 (S. 35/18) percent incidence. GSD was also found 05 percent highest in genotype S. 75/18.

Banded sclerotial disease was also found 02 percent highest in genotype S. 121/18. The incidence of Bacterial rot was recorded 02 percent highest in genotypes S. 44/18 and 77/18.

In multiplication trial of Gola research farm, the range of pokkah boeng disease was recorded from 2 (S. 168/17) to 5 per cent (S. 112/17 and S. 449/17). The incidence of smut disease also found 25 percnt on genotype S. 168/17. The incidence of SCMV was found 50 percent highest on the S. 155/17. In PVT, Pokkah boeng incidence was ranged fromThe incidence of smut also found 05 percent on S. 1956/18. 5 (S. 1536/18 and S. 1718/18) to 20 (S. 1935/18). SCMV also observed on S. 2186/18 and 2599/18 with highest range 50 percent incidence. GSD was also found with 2 percent on genotype S. 1553/18. The incidence of Bacterial rot also recorded with 02 percent on S. 2437/18.

Screening of sugarcane varieties for resistance to new strain of red rot

The twenty seven commercially cultivated sugarcane varieties such as Co 0118, Co 0238, Co 05011, Co 15023, Co 98014, Co 62399, CoC 671, CoJ 64, CoLk 14201, CoLk 15201, CoPk 05191, CoS 08272, CoS 08276, CoS 08279, CoS 09232, CoS 10239, CoS12232, CoS 13231, CoS 13235, CoS 14233, CoS 16233, CoS 17231, CoS 767, CoS 8436, CoSe 11453, CoSe 13452 and UP 05125 were screened against newly emergence prevalent pathotype (CF 13) of north Indian condition. These varieties were evaluated for the relative resistance against prevalent new strain of red rot. The varieties namely Co 0118, Co 98014, Co 62399, CoC 671, CoS 08279 and CoS 08272 exhibited susceptible reaction and CoLk 15201, CoPk 05191, Co 05011 displayed MS reaction to CF 13 and other two Cf 0238 isolates. Rest varieties were expressed MR reaction to CF 13 by artificially plug method of inoculation (Fig 2).

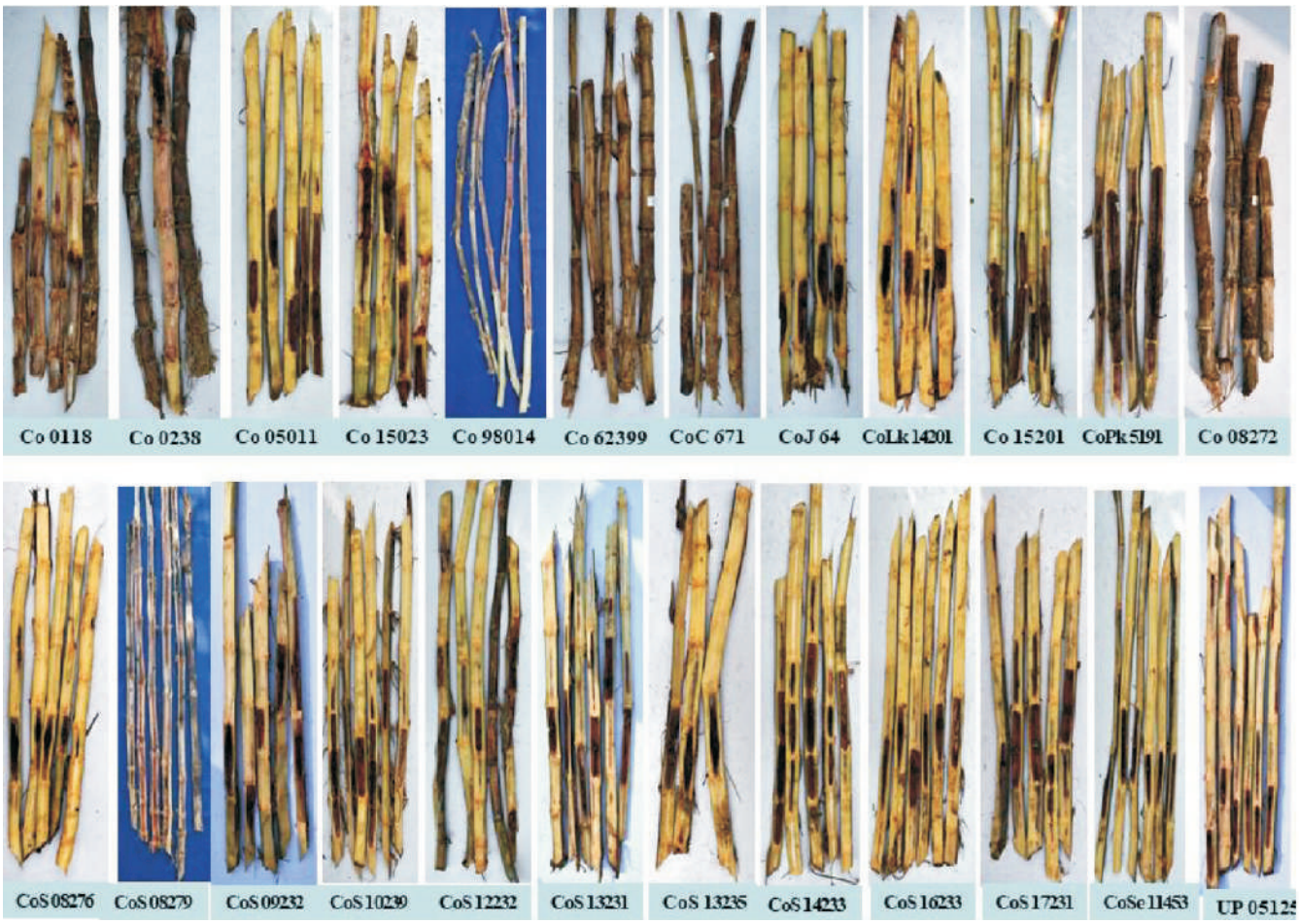


Fig 2. Disease behaviour of red rot among different varieties.

Management of yellow leaf disease through meristem culture

Two sugarcane varieties such as CoS 13235 and CoLk 14201 produced for virus free healthy seed of in tissue culture lab at Sugarcane Research Institute, Shahjahanpur. These tissue culture raised plantlets were observed free from yellow leaf virus. In the connection of that, the mother culture of aforementioned cane varieties was established for the production of breeder seed. The breeder seed of 400 quintal was produced among cane farmers of UP.A total of 14768 plants of CoS 13235 and CoLk 14201 raised through meristem culture were transplanted in the field for the production of breeder seed and also close observation was done for yellow leaf disease. The maximum seedlings were survived after transplanting in field. The incidence of yellow leaf was observed regularly in breeder seed and also observed in conventional planting with two budded setts. The plant growth and vigour of tissue culture seedlings was also found better. The result revealed that the breeder seed raised by tissue culture was free from yellow leaf, while the conventional planting with two budded setts was found affected with yellow leaf. Incidence of yellow leaf virus was also analysed by RT-PCR techniques. The tissue culture raised breeder seed was planted for next season as foundation seed(Fig 3).

Fig 3. The tissue culture raised breeder seed of CoLk 14201 (Right side) and conventional planting with YLD (Left), planted for next season as foundation seed

YLD affected crop (Conventional- Left) and YLD free tissue culture crop (Right)

Behaviour of primary infection of *C. falcatum* in sugarcane varieties having different red rot resistance level

An experiment was laid out to investigate the epidemiology of soil borne inoculum of red rot in sugarcane varieties with various resistance levels and to compare the reaction of new isolates/ pathogen from two methods of infections i.e. soil borne inoculum and artificially inoculated infection. In this experiment sixteen varieties such as Co 0238, Co 62399, CoC 671, CoJ 64, CoS 767, Co 0118, Co 98014, CoS 13235, Co 15023, CoLk 14201, CoS 08272, CoS 08279, UP 05125, CoS13231, CoSe 13452, CoS 09232 varying in disease resistance and four newly isolates namely Cf 0238, Cf 98014, Cf 0118 and Cf 08279 were taken for resistance used. Impact of *C. falcatum* on bud germination and post-emergent death of sprouts was assessed as death of buds and drying of germinated sprouts, respectively. Germination in the *C. falcatum* inoculated plots was compared with pathogen-free control plots. Overall germination in healthy control plots was 40.91%, whereas the pathogen inoculated plots recorded a mean germination of only 26.97%, indicating a drastic reduction of 34.07% in bud sprouting due to the pathogen presence in the soil. Among the 16 varieties tested, susceptible varieties viz; Co 0238, Co 0118, Co 98014, Co 62399, CoC 671, CoS 08272, CoS 08279 exhibitedreduction of sett germination in the range of 58.34 (Co 98014) to 91.88% (CoC 671).The germination percentage reduced in Co 0238 (90.96%), Co 0118 (70.34%), CoS 08279 (86.93%) and CoS 08272 (91.27%)in the trial plots. Apart from

these susceptible varieties, resistant varieties recorded no any reduction in germination. The results very clearly indicated that resistant variety like Co 0238, Co 0118, Co 98014, CoS 08272 and CoS 08279 suffer due to the origin of new strain *C. falcatum* and also susceptible varieties CoC 671 and Co 94012 suffered severely against novel strain under field condition (Table 2, Fig 4, 5).

Table 2. Impact of *C. falcatum* inoculum applied to the soil on sett germination (%) in different sugarcane varieties.

Varieties	Germination %					Germination without red rot (Healthy)
	CF13	Cf 0118	Cf 98014	Cf 08279	Mean	
CoS 09232	49.07	37.04	48.15	50.93	46.30	42.59
CoSe13452	47.22	44.44	49.07	41.67	45.60	41.67
CoS 13231	42.59	28.7	35.19	25.93	33.10	38.89
UP 05125	40.74	41.67	46.3	48.15	44.22	45.37
CoS 08279	8.33	6.48	5.56	0.93	5.33	40.74
CoS 08272	9.26	1.85	2.78	0	3.48	39.81
CoLk 14201	44.44	46.3	47.22	36.11	43.52	44.44
Co 15023	45.37	47.22	42.59	35.19	42.59	39.81
CoS 13235	41.67	45.37	49.07	50.93	46.76	40.74
Co 98014	8.33	15.74	12.04	28.7	16.20	38.89
Co 0118	35.19	0.93	2.78	8.33	11.81	39.81
CoS 767	40.74	39.81	38.89	29.63	37.27	41.67
CoJ 64	43.52	42.59	41.67	39.81	41.90	40.74
CoC 671	4.63	0.93	2.78	2.78	2.78	34.26
Co 62399	12.96	2.78	1.85	1.85	4.86	41.67
Co 0238	7.41	7.41	8.33	0	5.79	43.52

Table 3. Per cent losses in germination by pre-emergence incidence and post-emergence incidence of red rot on sugarcane varieties varying in red rot resistance level.

Sl. No.	Varieties	Per cent losses in germination (Pre- emergence)				Post emergence per cent red rot incidence (Mean data)			Red rot reaction (Plug)
		CF13	Cf 0118	Cf 98014	Cf 08279	(April-June)	(July-Sep)	(Oct-Dec)	
1	CoS 09232	0	0	0	0	0	0	0	MR
2	CoSe 13452	0	0	0	0	0	0	0	MR
3	CoS 13231	0	0	0	0	0	0	0	MR
4	UP 05125	0	0	0	0	0	0	0	R
5	CoS 08279	79.55	84.09	86.35	97.71	31.48	0.00	3.70	HS
6	CoS 08272	76.73	95.35	93.0	100	3.56	5.32	2.98	HS
7	CoLk 14201	0	0	0	0	0	0	0	MR
8	Co 15023	0	0	0	0	0	0	0	MR
9	CoS 13235	0	0	0	0	0	0	0	MR
10	Co 98014	78.58	59.52	69.04	26.2	2.58	7.70	5.19	HS
11	Co 0118	11.6	97.66	93.01	79.07	3.70	12.87	9.25	H
12	CoS 767	0	0	0	0	0	0	0	MR
13	CoJ 64	0	0	0	0	0	0	0	MR

14	CoC 671	86.48	97.28	91.88	91.88	38.89	16.67	0	HS
15	Co 62399	68.89	93.32	95.56	95.56	13.20	16.01	0	HS
16	Co 0238	100	82.97	80.85	100	9.82	10.68	1.85	HS

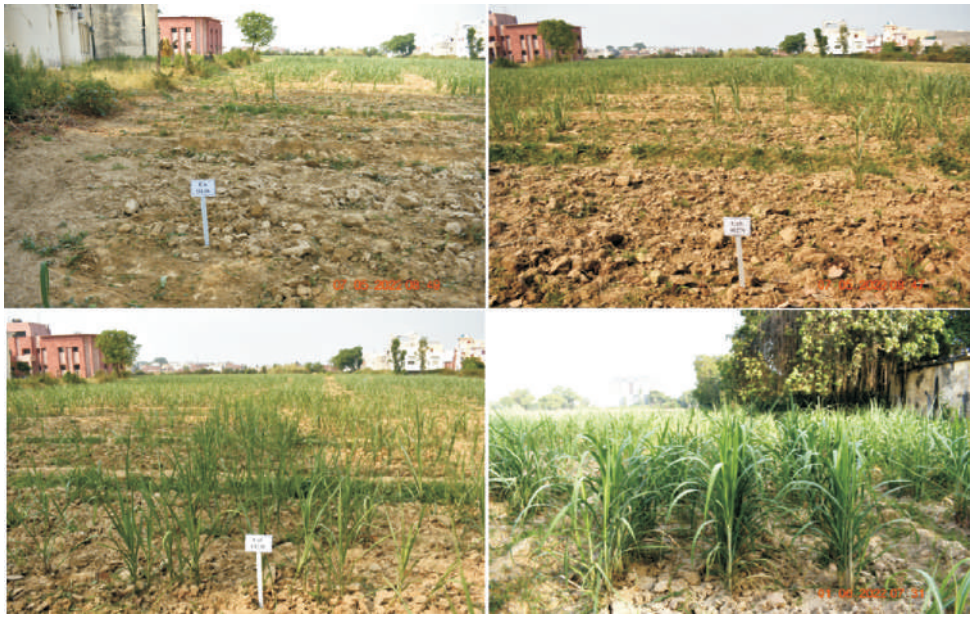


Fig 4. Sugarcane susceptible varieties (Both upper) exhibited death of plants by *C. falcatum* CF13 soil inoculum and resistant variety (Both lower) exhibited with green foliage.

Fig 5. Complete death of plants in an entire sugarcane clump due to *C. falcatum* inoculum

Management of soil inoculum of *Colletotrichum-falcatum* causing red rot in sugarcane

This experiment was conductedfor the management soil inoculum of *Colletotrichum-falcatum*by using the different agrochemicals. The trial was performed during the year by using soil drenching, sett treatment with fungicides and sett treatment device (STD). The sorghum grain with red rot inoculum (150 g of grain inoculum/ 20 feet row) was applied at the time of planting fir the induction of primary infection of red rot. There were nine treatments such as T_1- Application of bleaching power @10 Kg per ha with sand; T_2- Application of Thiophanate Methyl with soaking at planting; T_3- Application of Carbendazim with soaking at planting; T_4- Application of Trichoderma

@10 Kg per ha and at 45 and 90 DAP; T_5- Application of pseudomonas @10 Kg per ha and at 45 and 90 DAP; T_6- Drenching of Thiophanate Methyl at planting and 45 and 90 DAP; T_7- Mechanized sett treatment with Thiophanate Methyl; T_8- Untreated plot (With soil borne inoculum) and T_9- Healthy plot (Without soil borne) were characterized into randomized block design with three replications.

Maximum germination (52.31%) was found in T_6treatment (Drenching of Thiophanate Methyl at planting and 45 and 90 DAP) followed by T_2(Thiophanate Methyl with soaking), maximum shoot population (152468.16/ha) was found in T_9 treatment followed by T_3andT_2,maximum number of millable cane (108949.92/ha) was recorded in T_2 treatment followed by T_9andT_6. The primary incidence of red rot was observed maximum in T_8 (Untreated plot) from early month of May to July. The primary incidence of red rot was also assessed in almost all the treatments except T_9andT_6. In the month of July, minor incidence of red rot also found inT_9andT_6 treatments. In the months of April, May and June, primary infection of red rot is not recorded in T_6 andT_9 treatments. The secondary incidence of red rot was assessed in almost all the treatments, butin T_6 treatment there is no any incidence of red rot recorded in October, November and December months. Maximum mean incidence was recorded 8.87% in T_8 (Untreated plot) followed by 2.25% in T_5treatment (Application of pseudomonas @10 Kg per ha and at 45 and 90 DAP) (Table 4, 5 & Fig 6).

Table 4. Mean data of Per cent germination; Shoot population (per ha), Number of millable cane (NMC) and yield attributing traits.

Treatment	Germination (30 DAP)	Germination (45 DAP)	Shoot Pop. (000/ Ha)	NMC (000/ Ha)	Cane yield (t/ha)	Cane wt. (g)	Cane dia. (cm)
T_1	11.81	34.26	121	88	45.37	956	2.28
T_2	28.47	52.08	147	109	66.97	1186	2.35
T_3	22.92	49.07	147	101	67.90	1236	2.39
T_4	12.04	41.20	134	95	61.11	1110	2.48
T_5	18.06	42.82	131	88	57.10	1106	2.41
T_6	32.18	52.31	145	104	76.85	1270	2.49
T_7	29.86	44.68	139	86	65.12	1053	2.43
T_8	7.41	27.31	112	68	47.22	946	2.12
T_9	22.22	51.39	152	105	71.60	1181	2.37
CD	9.23	10.71	222	NA	NA	NA	0.15
SE (m)	3.05	3.54	7353.88	6327.72	0.08	94.89	0.05

Table 5. Month wise observation of red rot incidence up to December, 2022.

Treatments	April	May	June	July	August	September	October	November	December	Mean
T_1	0.00	0.61	2.59	1.05	1.77	2.05	1.28	0.77	0.71	1.20
T_2	0.00	0.00	0.63	1.07	1.21	2.02	2.52	1.92	0.84	1.13
T_3	0.00	0.00	0.19	1.12	1.65	1.24	1.49	2.36	1.81	1.10
T_4	0.00	0.00	0.95	1.38	2.44	2.14	2.17	1.91	0.98	1.33
T_5	0.55	1.08	1.89	2.40	4.39	2.39	4.32	1.38	1.81	2.25
T_6	0.00	0.00	0.00	0.42	1.22	1.77	0.00	0.00	0.00	0.38
T_7	0.00	0.48	0.22	4.42	1.65	2.10	0.68	0.00	0.48	1.11
T_8	3.55	5.58	7.00	11.3	14.57	18.60	6.11	5.65	7.45	8.8
T_9	0.00	0.00	0.00	1.69	1.52	5.05	1.67	3.01	0.39	1.48
CD	1.46	2.68	2.19	2.58	2.88	9.53	3.2	2.2	2.36	
SE (m)	0.49	0.89	0.72	0.85	0.94	3.15	1.08	1.03	1.1	

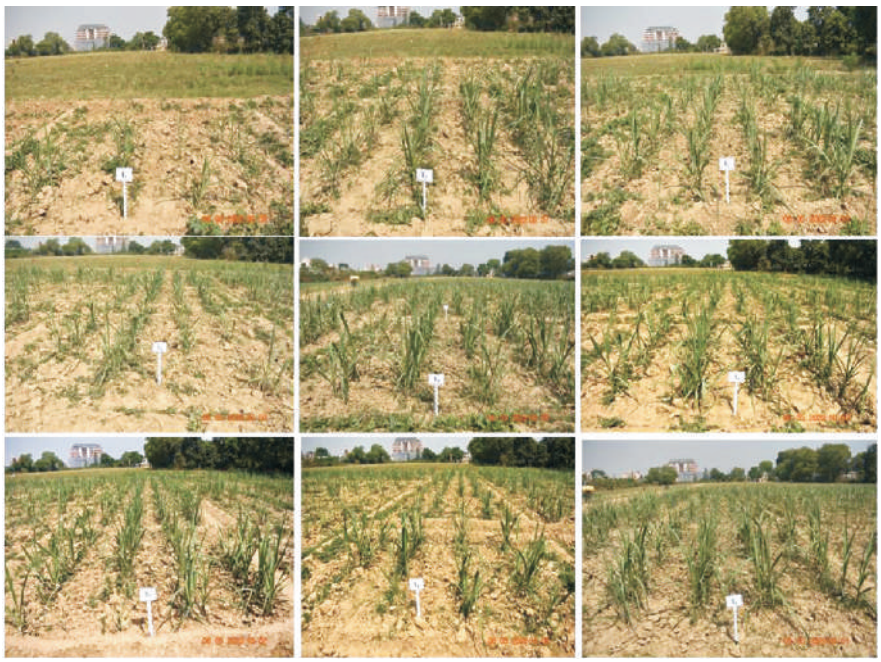


Fig 6. Treatments effect on germination and plant vigour.

Bio-efficacy of Provax 200 FF (Carboxin 17.5% + Thiram 17.5% FF) against diseases in Sugarcane

This experiment was conducted during 2022-23 seasons at Plant Pathology block. The highly susceptible sugarcane variety Co 0238 from new pathotype CF13 was planted to evaluate the bio-efficacy of "Provax 200 FF (Carboxin 17.5% + Thiram 17.5% FF)" against red rot diseases in sugarcane. There were eight treatments such as T_1-Provax 200 FF @ 3.0ml/L (1.05 gai/L); T_2-Provax 200 FF @ 3.5ml/L (1.22 gai/L); T_3- Provax 200 FF @ 4ml/L (1.40 gai/L); T_4- Provax 200 FF @ 4.5ml/L (1.57 gai/L); T_5- Carbendazim 50% WP @0.1% (Check); T_6-Thiophanate methyl 70%WP @0.1% (Check); T_7-Untreated Check and T_8 - Provax 200 FF @ 8ml/L (2.80 gai/L) were characterized into randomized block design with three replications. Two budded setts were soaked in fungicide with appropriate aforementioned doses. The one virulent *C. falcatum* pathotypes CF 13 was taken for disease initiation at primary level in soil. The trial was performed as per protocol of 2021-22 as soil drenching, sett treatment with fungicides and sett treatment device (STD). The sorghum grain with red rot inoculum (150 g of grain inoculum/ 20 feet row) was applied at the time of planting fir the induction of primary infection of red rot.

Maximum germination (56.94%) was found in T_2treatment followed by T_6 (55.90%), maximum shoot population (130323/ha) was found in T_6treatmentfollowed by T_1(128239/ha) andT_2 (127314/ha) and maximum number of millable cane (108564/ha) was recorded in T_2 treatment followed by T_6 (105786/ha) (Table 6) over untreated control (T_7). Qualitative attributes were also recorded among all treatments (Table 7).

Table 6. Impact of different treatment on *C. falcatum* inoculum applied to the soil on sett germination (%), shoot population and number of millable cane (NMC).

Treatment	Germination (%)		Shoot (000/ha)	NMC (000/ha)	Yield (MT/ha)
	15 DAP	45 DAP			
T_1	27.60	54.69	128	101	64.81
T_2	25.00	56.94	127	108	58.33
T_3	19.62	51.04	120	89	72.22
T_4	22.74	45.83	121	87	64.58

T_5	21.88	50.87	126	103	87.73
T_6	21.70	55.90	130	106	63.19
T_7	9.72	35.42	106	83	61.34
T_8	31.42	52.78	124	97	56.71
CD	10.50	NS	NS	NS	NS
SE (m)	3.43	4.47	6.0	8.0	0.16

Table 7. Mean quantitative parameters of all treatments.

Treatments	No of internode	No of green leaf	Length of green leaf (cm)	Girth (cm)	Stalk height (cm)	Cane weight (g)
T_1	23.4	8.8	151.4	2.8	238.8	1620.0
T_2	23.1	8.6	148.6	2.7	246.8	1623.0
T_3	23.2	9.3	149.2	2.7	250.2	1680.0
T_4	23.6	8.7	150.2	2.8	256.7	1550.7
T_5	21.5	8.4	149.4	2.6	233.4	1436.0
T_6	16.8	11.9	143.7	2.7	307.4	1560.0
T_7	22.4	8.9	150.3	2.7	253.4	1526.7
T_8	24.0	7.1	152.7	2.7	248.3	1653.3
CD	NS	NS	NS	NS	NS	NS
SE (m)	2.27	1.24	4.16	0.07	23.67	65.39

The primary incidence of red rot was observed maximum in T_7 (Untreated plot) from early month of April to June. The overall minimum incidence of red rot from April to December exhibited in treatments T_5 (1.60%) followed by T_6 (1.98%), T_2 (2.20%), T_1 (2.33%), T_8 (2.67%), T_3 (2.83 %), T_4 (3.53%) and while in untreated control it was recorded 8.45 per cent.

In the case of pokkah boeng the perusal of data reveals that minimum disease incidence (13.08%) was reported in T_1 followed by T_4 (13.47%), T_5 (14.69%), T_2 (14.94%), T_3 (15.41%), T_8 (15.74%), T_7 (17.44%) and T_6 (18.59). Pokkah boeng affected plants were recovered maximum in T_5 (94.55%) followed by T_3 (90.69%), T_8 (90.35%), T_2 (87.90%), T_1 (87.41%), T_4 (85.95%), T_6 (82.70%) and T_7 (17.24). The maximum incidence of was recorded in untreated control over all the treatments (Table 8). Phytotoxicity was not observed in treatments T_8 after germination. The product "Provax 200 FF" was recorded effective against red rot and pokkah boeng diseases, which offers not only a disease management but also it improves plant vigour and quantitative attributes of sugarcane crop.

Table 8. Incidence of red rot and pokkah boeng disease among all treatments.

Treatments	Mean red rot (%) (April, 2022 to December, 2022)	Pokkah boeng (July and August, 2022)	
		Pre-treatment (%)	Post-treatment recovered affected plant (%)
T_1	2.33	13.08	87.41
T_2	2.20	14.94	87.90
T_3	2.83	15.41	90.69
T_4	3.53	13.47	85.95

T_5	1.60	14.69	94.55
T_6	1.98	18.59	82.70
T_7	8.45	17.44	17.24
T_8	2.67	15.74	90.35

Bio-efficacy of Sutone against Pokkah boeng disease caused by *Fusarium moniliforme* in sugarcane

An experiment was continues in second year during 2022-23"To find out the efficacy of Sutone (Natural organic product 30%) against pokkah boeng disease in sugarcane".The highly susceptible sugarcane variety Co 0238 to this disease was taken for study. The experiments comprised of eight treatments such as T_1-Sutone @ 0.05% (Foliar spray at appearance of disease); T_2-Sutone @ 0.1% (Foliar spray at appearance of disease); T_3-Sutone @ 0.05% (Broadcast with urea at appearance of disease); T_4-Sutone @ 0.1% (Broadcast with urea at appearance of disease); T_5-Sutone (Conventional soaking @ 0.1% + Spray 0.05%); T_6- Sutone (Sett treated with Sett treatment device @ 0.1% + Spray @ 0.05%); T_7-Carbendazim 50WP @ 0.05% (Foliar spray at appearance of disease); T_8- Untreated check and characterized into randomized block design with three replications.

Incidence of pokkah boeng was also recorded more or less in all 8 treatments from May to September. Among all treatments of Suton, dose of 0.1% of this natural organic product was established better to inhibit pokkah boeng in field condition after foliar application at the appearance of this disease. Germination (%), shoot population and number of millable cane (NMC) data were depicted in Table 7. Out of eight treatments, carbendazim 50 WP @ 0.05% (T_7) was found more effective against pokkah boeng followed by Sutone @ 0.1% (T_2). Pokkah boeng affected plants were recovered almost similar in T_7 (80.56%) andT_2 (80.20%).While less recovery was recorded3.88 per cent in untreated control (Table 9, Fig 7). Phytotoxicity was not observed in any treatments after germination.

Table 9. Impact of different treatment on sett germination (%), shoot population and number of millable cane (NMC).

Treatments	Germination (%)	Shoot (per ha)	NMC (per ha)	Yield (MT/ha)	Pre-treatment (%)	Post-treatment recovered affected plant (%)
T_1	41.20	109567	90740	88.58	11.50	74.67
T_2	64.58	147839	108024	90.74	8.41	80.20
T_3	41.90	119135	94135	94.75	11.24	75.86
T_4	45.37	124999	104012	86.11	10.87	79.81
T_5	45.14	111419	99691	78.39	11.84	65.55
T_6	49.77	137345	108641	79.01	9.52	70.94
T_7	51.16	118518	98765	87.96	11.48	80.56
T_8	59.72	123765	101234	76.23	9.52	3.88
CD	NS	NS	NS	NS	-	-
SE (m)	8.0	11976	5546	0.161 (q)	-	-

Fig 7. Pokkah boeng affected plants (Left) and recovered plant after treatment application.

MUZAFFARNAGAR

Survey of Sugarcane disease in Western U.P.

Extensive survey of thirteen sugar factories areas and different farmers field were conducted during pre and post monsoon to record the incidence of major diseases such as red rot, Smut, Wilt, GSD, YLD and PBD. The cultivar Co 0238 was dominant cultivar captured more than 95% in area of Western Uttar Pradesh. The incidence of red rot varied from stray to 25 percent on cultivar Co 0238 in various sugar factory zone (Meerut and Saharanpur region). The variety Co 0238 affected by red rot with incidence of 25 percent, 15 percent and 10 percent at Dhanora (Amroha) Simbhawali (Hapur) and Mawana (Meerut), Najibabad (Bijnor) factory area respectively. Similarly, it was also observed on the same cultivar from Bilai (4-5% up and low land), Asmoli (6-8%), Agwanpur (3-4%) and Kinoni (Stray form) factory zone. In Khatauli factory zone red rot was also recorded in Co 0238 and CoS 8436 in some field with stray to mield form. In Malakpur, Sabitgarh and Naglmal also recorded red rot in stray form in some field. The Popular variety Co 0118 was also succumbed with red-rot in stray form in a village of Kinoni sugar factory. The incidence of smut diseases was also recorded in Co 0238 stray form all the factory area plant as well as ratoon. At research farm smut disease was also observed in Co 14201 and CoS 13235 in stray form. Grassy shoot disease was observed in stray form on Co 0238 in some factory zone i.e. Gangnoli, Malakpur, Naglamal, Kinoni, Dhanaura and Sarsawa. The incidence of Pokkah boeng was recorded all the sugar factory zone, surveyed with incidence stray to 40 % on Co 0238. Kinfe cut and top rot stage of PBD was also recorded at research farm and Mansoorpur factory zone respectively Severity of yellow leaf disease (SCYLV) was noticed up to 50% on CoLk 14201 and Co 15023 at Muzaffarnagar farm. Above diseases also recorded all the surveyed sugar factory area with incidence stray to 30%. Red strip/ top rot (Bactrial) was also recorded CoS 13235, CoJ 85, Co 0238 at Dhanaura, Shamli, Mansoorpur and Bilai in some fields with incidence stray to 30% (CoS 13235) respectively. Sugarcane mosaic, leaf binding and leaf curling were also noticed up to various extend some variety at different sugar factories area of Western U.P.

Studies on the incidence of diseases in autumn/spring planted crop of sugarcane.

Periodic observation of various diseases namely red rot, smut, wilt, grassy shoot diseases (GSD), leaf scald, pokkah boeng disease (PBD), top rot (Bacterial) and banded sclerotial (BS) were examined during pre-monsoon, monsoon and post- monsoon periods in three trials.

State varietal trial (1st Plant):- Under this trial 17 Genotypes/Varieties (13+4) i.e. CoS 19231, CoS 19233, CoS 19234, CoS 20234, S-188/15, Seo-685/15,

Seo-565/16, Seo-1019/16, Seo-581/16, CoLk 18201, CoLk 18202, CoLk 18203, CoLk 18204, CoJ 64, CoS 767, Co 0238 and CoPant 97222 were examined under field conditions. Pokkah boeng disease was recorded from 1.0 to 3.0 % on five genotypes/varieties viz CoS 18201 and 18202 (1.0 %), Seo-1581/16 (1.25 %), Seo-565/16 (2.0%) and Seo- 685/15 (3.0%). SCMV was reported on CoLk 18201, 18202, 182023 and CoS 19231 upto 50% incidence. Red rot was also observed on CoS 20234 in stray form.

State varietal trial (IInd Plant):- Under this trial 18 Genotypes/Varieties (14+4) i.e. CoS 18233, CoS 18234, CoS 18236, CoS 18238, CoS 18241, CoS 19232, CoS 19235, CoSe 15453, Seo-1067/15, Seo-1860/15, CoLk 16201 CoLK 16202, CoLk 16203, CoLk 16204, CoJ 64, CoS 767, Co 0238 and CoPant 97222 were examined under natural field condition. Pokkah boeng disease was recorded on two varieties with CoS 19232 and Co 0238 with incidence 1.4% and 1.3 % respectively. Smut diseases was observed on CoS 18233 with 0.7 % incidence. SVMV was noticed on five varieties CoSe 15453, CoLK 16201, 16202, 16203 and CoLk 16204 which raged up to 40-50%.

State varietal trial (Ratoon):- Under this trial 18 genotypes/varieties (Same set of varieties used in SVT ^{IInd} plant) were examined under natural field condition. Smut was recorded ranged 1.06 % to 3.06% in six varieties with CoS 18233, 18236, 19232, CoLk 16201, 16203 and Co 0238. YLD was also recorded on CoS 19232 with 10% incidence. SCMV was noticed on CoLk 6201, 16202, 16203 with more then 50% incidence in old and new leaf. Pokah boeng disease was also recorded in check variety Co 0238 with 1.8% incidence.

Evaluation of Genotypes/Varieties for resistance to red-rot

The various genotypes/varieties were tested again different pathotypes viz CF 07, CF 08 and CF 13 in state varietal trial and preliminary varietal trial by plug and nodal cotton swab method. Observations were taken after 60 days of inoculation. The diseases severity was graded based on 0-9 scale Srinivasan and Bhatt (1961). The disease indexing were rated at resistant (R; 0-2), moderately resistant (MR; 2.1-4), moderately susceptible (MS: 4.1-6), Susceptible (S; 6.1-8) and highly susceptible (HS; 8.1-above).

State varietal trial:- Under SVT, 24 genotypes/varieties (18+4+2) including agronomical and pathological standard were tested against red-rot with three pathotypes viz CF 07, CF 08 and CF 13. The various genotypes/varieties were tested against different pathotypes separately by plug and nodal cotton swab method. Total 07 genotypes/varieties (CoLk 18201, 18202, CoS 19231, Seo-685/15, 565/16, 1067/15, 1860/15) were found MR with all the pathotypes by plug method. All 18 genotypes/varieties were found resistant (R) with all the pathotypes with nodal cotton swab method. Variety CoSe 15453 was found MR with CF 07 and CF 13 whereas it was found MS with CF 08. Variety CoLk 18203 was found MR with CF 07 and CF 08 whereas it was found MS with CF 13. Excluding standard all the 18 genotypes/varieties almost similar result by nodal cotton swab method. Result and behaviour described given in the Table.-10.

Filler trial:- A total of 08 genotypes/varieties (CoS 15233, 16231, 16233, 17231, 18234, CoSe 17451 and CoLk 15207) were evaluated/tested (Those were not tested against CF 13 during the year 2018-19, 2019-20 and 2020-21) against red ot with Cf 13 by plug method. Out of 08, only one variety CoS 16231 was found MS and rest were rated as MR (CoS 15233, 16233, 17231, 18234, CoSe 17451, CoLk 15207 and Seo-1860/15) with CF 13. Four genotypes (M-124/17, M-176/17, M-434/17 and M-442/17) was also tested with CF 07, CF 08 and CF 13 by plug method. Two genotypes were found (M-124/17 and M-442/17) R/MR with above three pathotypes and rest were rated as MS/HS. Result and behaviour described given in the Table.-11.

Evaluation of genotypes/varieties for resistance to smut.

Under this trial 06 genotypes/varieties (CoLk 18203, CoS 19233, CoS 19234, CoS 20234, Seo 1581/16, and Seo 1860/15) were tested against smut excluding Co 1158 as a standard. All the genotypes/varieties were found R/MR against smut except standard.

Table-10 Behaviour of SVT Genotypes/varieties against different pathotypes of red-rot

SN	Genotypes/ Varieties	CF 07			CF 08			CF 13		
		Plug method		NCSM	Plug method		NCSM	Plug method		NCSM
		Behavi.	Av.		Behavi.	Av.		Behavi.	Av.	
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
1	CoLk 18201	MR	3.1	R	MR	3.6	R	MR	3.6	R
2	CoLK 18202	MR	3.2	R	MR	3.3	R	MR	4.0	R
3	CoLK 18203	MR	3.2	R	MR	2.1	R	MS	4.9	R
4	CoLk 18204	MS	4.6	R	MS	5.6	R	MS	5.1	R
5	Cos 19231	MR	3.5	R	MR	4.0	R	MR	3.3	R
6	CoS 19233	MS	4.9	R	MS	4.8	R	HS	9.0	S
7	CoS 19234	MR	4.0	R	MR	3.3	R	HS	8.1	S
8	CoS 20234	MS	4.5	R	MS	5.5	R	HS	9.0	S
9	S-188/15	MR	2.6	R	MR	4.0	R	MS	5.3	R
10	Seo 685/15	MR	3.5	R	MR	3.4	R	MR	3.0	R
11	Seo 565/16	MR	2.8	R	MR	3.5	R	MR	2.8	R
12	Seo 1019/16	MR	2.1	R	MR	3.5	R	MS	5.2	R
13	Seo 1581/16	MS	4.5	R	MS	4.4	R	MS	5.6	R
14	CoSe 15453 (F)	MR	3.3	R	MS	4.6	R	MR	3.2	R
15	CoS 18241(F)	MR	3.0	R	MS	4.8	R	MS	4.3	R
16	Seo 1067/15(F)	MR	2.8	R	MR	3.5	R	MR	2.8	R
17	Seo 1860/15(F)	MR	2.3	R	MR	2.7	R	MR	2.8	R
18	CoLk 16203(R)	MR	2.6	R	MR	3.2	R	S	6.1	R
19	CoJ 64	HS	8.7	S	HS	9.0	S	MS	4.7	R
20	CoS 767	HS	8.5	S	HS	8.3	S	MS	4.9	R
21	C0 0238	MS	4.6	R	MS	4.3	R	HS	9.0	S
22	CoPant 97222	MS	4.2	R	MS	4.2	R	HS	9.0	S
23	Co 312	HS	9.0	S	HS	9.0	S	S	7.4	S
24	Co 453	HS	9.0	S	HS	9.0	S	MR	3.1	R

Table- 11 Behaviour of Filler Varieties/ Genotypes against different pathotypes of red-rot

S, No	Varieties/ Genotypes	Plug Method					
		CF 07		CF 08		CF 13	
		Behaviour	Average	Behaviour	Average	Behaviour	Average
1	CoS 15233	-	-	-	-	MR	2.1
2	CoS 16231	-	-	-	-	S	7.8
3	CoS 16233	-	-	-	-	MR	3.8
4	CoS 17231	-	-	-	-	MR	3.8
5	CoS 18234	-	-	-	-	MR	3.1
6	CoSe 17451	-	-	-	-	MR	2.2
7	CoLk 15207	-	-	-	-	MR	2.8
8	Seo 1860/15	-	-	-	-	MR	2.7
9	M-124/17	R	2.0	MR	3.2	MR	3.4
10	M-176/17	HS	9.0	HS	9.0	HS	9.0
11	M-434/17	MS	4.6	MS	4.6	MS	5.3
12	M-442/17	R	2.0	MR	3.2	MR	3.8

SEORAHI

Survey of Sugarcane Diseases in Eastern Uttar Pradesh.

Periodic observations were recorded in pre monsoon to collect the information on disease incidence in promising sugarcane varieties. The survey was conducted in various sugar factory zones of eastern Uttar Pradesh. An incidence of red rot severity varied from trace to 15% on Co 0238 followed by trace to 12% on CoS 08272, CoS 08279, CoPk 05191 and CoLk 94184 were observed. Smut incidence (01 to 08%) was observed in the varieties *viz*. Co 0238, Co 98014, Co 0118, CoSe 92423, CoP 9301, CoLk 94184, CoS 08272, CoSe 01434 and CoS 13231. Grassy shoot disease was observed in the varieties *viz.* CoLk 14201, Co 0118, Co 98014, Co 0238, CoS 8436, CoLk 94184 and CoS 08279 ranging from (trace to 10%). An incidence of pokkah boeng varied from (02 to 16 %) in the varieties *viz.* CoS 08272, CoLk 94184, CoS 8436, CoS 08279, and Co 0238. Top rot was noticed on CoS 13235, Co 0118, CoLk 94184, CoS 08279 and Co 0238, ranging from (trace to 4%). Ratoon stunting disease (trace to 10%) incidence was found in CoS 08272 and Co 0238. YLD was observed on CoLk 14201, CoS 09232, CoS 19233 and CoLk 18203 and sugarcane mosaic was also noticed in CoS 08272 and CoS 18233 an experimental trial stray incidence at Seorahi.

Collection and maintenance of pathogenic mycoflora.

An extensive survey of various districts of Eastern U.P. was conducted during 2022-23 to collect the isolates of *C. falcatum* prevalent in the area from various infected varieties of sugarcane. Six new isolates *viz.* R2201Seo (Source: Co 0238), R2202Seo (Source: CoLk 94184), R2203Seo (Source: CoS 08279), R2204Seo (Source: CoS 13231), R2205Seo (Source: CoS 08272), R2206Seo (Source: Co 0238) were isolated and their cultures were maintained for further identification of red rot disease. Seven designated pathotype *viz.* CF01, CF02, CF03, CF07, CF08, CF09 and CF13 along with 40 old isolates *viz.* R1601Seo (CoSe 92423), R1602Seo (UP 9530), R1603Seo (Co 0238), R1701Seo (Co 0238), R1702Seo (CoS8436), R1703Seo (CoS 07250), R1704Seo (CoSe 92423), R1705Seo (CoJ 88), R1801Seo (Co 0238), R1802Seo (Co 0238), R1803Seo (Co 0238), R1804Seo (Co 0238), R1805Seo (Co 0238), R1806Seo (Co 0238), R1901Seo (Co 0238), R1902Seo (Co 0238), R1903Seo (Co 0238), R1904Seo (Co 0238), R1905Seo (Co 0238), R2001Seo (Co 0238), R2002Seo (Co 0238), R2003Seo (Co 0238), R2004Seo (Co 0238), R2005Seo (Co 0238), R2006Seo (Co 0238), R2007Seo (Co 0238), R2008Seo (Co 0238), R2010Seo (CoS 08272), R2011Seo (CoS 08279), R2101Seo (Co 0238), R2102Seo (Co 0238), R2103Seo (Co 0238), R2104Seo (Co 0238), R2105Seo (Co 0238), R2106Seo (Co 0238), R2107Seo (Co 0238), R2108Seo (CoS 08272),, R2109Seo (CoS 08279) and R2110Seo (CoSe 98231) were maintained and purified for further studies.

Characterization and identification of pathotypes /races of red rot pathogen.

Two old reference pathotypes (CF07 & CF08) compared reaction to new reference pathotype (CF13) was found contrast reaction on 20 sugarcane differentials. 13 old isolates (Source-Co 0238) an isolated from different location of eastern UP were disease reaction of 20 pathological sugarcane differentials showed virulence pattern similar reaction to CF13. Four new isolates (R2010Seo-CoS 08272, R2011Seo - CoS 08279, R2108Seo - CoS 08272, R210Seo - CoS 08279) isolated from different location of eastern UP and found similar and dissimilar reaction to CF13. It was observed that four isolates have originated from CF13 pathotypes, which was declared as new pathotype in India. Except the one isolate obtained from (R2110Seo - CoSe 98231) the virulence pattern of the other isolates were more or less matched with the existing pathotypes of this area. It was observed that CoSe 98231 isolates have specific virulence. Thus the development of a new specific virulence at this area.

Title: Varietal resistance test against red rot disease.

(A) Standard varietal trial SVT (I & II plant): Red rot

In this experiment, 24 varieties were evaluated against red rot along with five checks *viz.* Co 0238, CoJ 64, CoS 767, CoPant 97222 and CoSe 95422 at Seorahi center by plug and nodal cotton swab inoculation techniques. Three designated pathotype *viz.* CF07, CF08, CF13 inoculums were used for red rot evaluation. Out of 24 varieties, 16 varieties were rated as MR, 06 varieties rated as MS, 01 variety was Susceptible and 01 variety found as

Highly susceptible to CF07. Sixteen varieties were rated as MR, 04 varieties rated as MS, 03 varieties rated as Susceptible and 01 variety was found HS to CF08, while 15 varieties were found MR, 03 varieties rated as MS and 06 varieties were found as Susceptible to CF13 by plug method. By nodal cotton swab method, 20 varieties were rated as R and 04 varieties were found as susceptible to all designated pathotype.

(B) Preliminary Varietal Trial (PVT): Red rot

In this experiment, 22 genotypes were tested at Seorahi along with 7 standards (CoJ 64, BO 91,, CoSe 95422, CoP 06436, CoS767, CoLk 94184 and Co 0238) by plug and nodal cotton swab methods of inoculation against inoculums i.e. CF07, CF08 and CF13.

Out of 22 genotypes, 02 genotypes (Seo 203/19, Seo 200/19) were found highly susceptible, 06 genotypes *viz*., Seo 55/19, Seo 286/19, Seo 64/19, Seo 125/19, Seo 170/19, Seo 202/19) were rated as Susceptible, 05 genotypes *viz*., Seo 173/19, Seo 111/19, Seo 252/19, Seo 229/19, Seo 48/19 were found as MS, while rest genotypes were found as R/MR to CF07 and 01 genotype (Seo 229/19) was found highly susceptible, 08 genotypes *viz*., Seo 173/19, Seo 286/19, Seo 64/19, Seo 125/19, Seo 252/19, Seo 170/19, Seo 48/19, Seo 202/19) were rated as Susceptible, 04 genotypes *viz*., Seo 55/19, Seo 111/19, Seo 203/19, Seo 200/19 were found as MS, while rest genotypes were found as R/MR. to CF08 and 03 genotypes (Seo 125/19, Seo 48/19, Seo 202/19) were found highly susceptible, 09 genotypes (Seo 173/19, Seo 55/19, Seo 286/19, Seo 64/19, Seo 252/19, Seo 170/19, Seo 229/19, Seo 203/19, Seo 200/19) were rated as Susceptible, 01 genotype (Seo 111/19) was found as MS, while rest genotypes were found as R/MR to CF13 designated pathotype.

4. Varietal resistance test against smut disease.

Standard Varietal Trial (SVT): Smut

A total of 24 varieties along with one standard (Co 1158) were tested by primary and secondary methods of inoculation against smut disease. Out of these 03 varieties (CoLk 18202, CoLk 18203 and CoS 18241) were found susceptible, 01 variety CoSe 19452 was found as moderately susceptible, while rest varieties were found either R/MR reaction to smut.

Studies on the incidence of diseases in autumn and spring planted crop of sugarcane

The incidence of major diseases *viz*. red rot, wilt, root rot, smut, pokkah boeng and yellow leaf disease were observed in stray condition in SVT Ist plant under natural conditions. Minor diseases such as grassy shoot, leaf scald, rust, leaf spot and banded scloretial disease were recorded in stray condition under standard varietal trial plant and ratoon crop.

14- STATISTICS

SHAHJAHANPUR

During the year 2022-23 statistics division of Shahjahanpur institute received data of research experiments mainly from Shahjahanpur institute, Gola centre and some data from Muzaffarnagar station. During the period about 478 data sheets of experiments conducted by different disciplines of these stations were received for statistical analysis. The data were in different statistical designs mainly in RBD, factorial, split plot, strip plot and CRD. The data were analyzed using appropriate statistical methods in Microsoft Excel and summary results sent to the respective disciplines.

Statistics division also received around 240 data of All India Coordinated Research project from Breeding, Agronomy, Plant Pathology, Entomology and Physiology divisions for analysis. The data were analysed and summary results were sent to the concerned scientists.

The data of earlier experiments repeated for three or more years of some disciplines was received for pooled analysis to see the combined effect of the experiments over years. The data were analysed and summary results sent to concerned disciplines. The correlation and regression analysis was done on some data received from some disciplines.

Appropriate statistical designs and layout were suggested to the scientists for their new experiments proposed in autumn and spring seasons of planting.

Sampling by crop cutting method to estimate the yield of various crops at Shahjahanpur was carried out by Statistics division. The harvesting, weighing and sale of these crops was also supervised by statistics division as part of committee.

Statistics division managed the centralised diesel procurement and distribution of Shahjahanpur Institute for farm and estate requirements.

The *Jansunwai-Samadhan* system of the government for public was monitored by statistics division and the complaints received were sent to the establishment section for necessary action and the replies received were uploaded on the website.

The quarterly information of *sevayojan* provided by *niyukti khand* was uploaded on the website by statistics division.

U.P. COUNCIL OF SUGARCANE RESEARCH, SHAHJAHANPUR
Cost of cultivation/production of sugarcane in U.P. Crushing Season (2022-2023)

S. N.	Particulars	2022-23 Plant	2022-23 Ratoon
1.	**Field preparation**		
	Disc Ploughing – 4 hrs		-
	Harrow – 2 - 3 hrs		-
	Cultivator – 2 - 3 hrs		-
	Pata – 2 - 1 hrs		-
	11 hrs	7700	
	Labours - 2	500	
		8200	
2.	**Seed and preparation**		
	Seed – 70 qtl.	28000	-
	Harvesting – 12 labour	3000	-
	Sett cutting – 8 labour	2000	-
	Seed transportation – 1 hr	700	-
		33700	
3.	**Planting**		
	Seed treatment – 112g bavistin	76	-
	Labour – 2	500	-
	Furrow opening – 3 hrs	2100	-
	Sett placing – 8 labour	2000	-
	Sett covering with soil 4 labour	1000	
		5676	
4.	**Ratoon preparation**		
	Spreading of trash – 4 labour	-	1000
	Shredding with tractor drawn mulcher -4 hrs	-	2800
	Seed cane for gap filling – 5qtl.	-	2000
	Labour 4	-	1000
			6800
5.	**Irrigation** –		
	6+1 (pre-sowing) and 5 (15 hrs/ irrigation)	26250	18750
	Labour – 14 and 10	3500	2500
		29750	**21250**
6.	**Manure, fertilizer & application**		
	Plant – FYM @ 100 q/t	7500	-
	Transportation FYM -2 hr	1400	-
	Spreading -4 lab.	1000	-
	DAP – 174 Kg	4176	-
	Urea – 323 kg	1913	-
	MOP – 100 kg	2200	-
	Zinc sulphate –25 kg	2125	-
	Bio-fertilizer-	-	-
	i.Azotobactor – 10kg	500	
	ii.PSB – 10kg	500	
	Labour- 01	250	
	Ratoon –		
	DAP -174 kg	-	4176

	Urea -323 kg MOP -100 kg Transportation (3/4 hr. ½ hr.) Labour – 3	- - 525 750 **22839**	1913 2200 350 750 **9389**
7.	**Plant protection** Fipronil GR 0.3% – 20 kg Labour – 1 Chlorantraniliprole 18.5 S.C. 0.375 lit. Labour- 1 Profenofos + Cypermethrin 44% @ 1.0 lit./ h2 times (2.0 lit.) Labour – 2 **Bio-Agent-** i. Trichoderma 20kg ii. Beauveria & Metarhizium 10kg	 1720 250 4618 250 1260 500 1120 1680 **11398**	 - - 4618 250 1260 500 **-** **-** **6628**
8.	**Interculture operation** Hoeing with Tractor (3/2 times)- 9 hrs Line hoeing with kassi – (3/2 times) 36/24 labour Earthing with tractor 3 hrs Mannual earthing –1/1 @ 30 labour Binding – 2 @ 20 labour/ binding	 6300 9000 2100 7500 10000 **34900**	 5400 6000 2100 7500 10000 **31000**
9.	**Harvesting @ 50/q**	40,000	37,500
10.	**Supervision**	25,000	25,000
Cost of cultivation Rs/ha		**2,11,463**	**1,37,567**
11.	**Overhead charges** i) Rental value of land ii) Loading & Transportation @ Rs 15/qtl. iii) Depreciation on machines iv) Interest on working capital @ 12% for 6 months	 43000 12000 2114 12688 **69802**	 43000 11250 1375 8254 **63879**
Cost of production Rs./ha		**2,81,265**	**2,01,446**
Average yield q/ha		**800**	**750**
Cost of production Rs./q		**351.58**	**268.59**
Average cost of production **Average yield q/ha** **Cost of production Rs/q**		**2,41,356** **775** **311.42**	

Rates

Sugarcane (seed)	Rs 400/ q	Zinc Sulphate	Rs. 85/kg
Tractor	Rs.700/ hr	Carbendazim	Rs. 680/kg
Labour	Rs.250/ day	Fipronil	Rs 86/ kg
FYM	Rs 75/q	Chlorantraniliprole	Rs 12340/lit.
Azotobactor	Rs 50/kg	Trichoderma	Rs 56/kg
PSB	Rs 50/kg	Beauveria& Metarhizium	Rs. 168/kg
Urea	Rs. 592.22 /q	Profenofos+Cypermethrin 44%	Rs. 630/ lit.
DAP	Rs. 2400/q	Irrigation	Rs. 250/ hr
MOP	Rs. 2200/q		

Shahjahanpur

1. Result Demonstration

A Result demonstration in Autumn planting of different varieties with intercropping was conducted at Sugarcane Research Farm Shahjahanpur for adoption of farmers. All varieties were transplanted by preparation of S.T.P nursery . Total 03 varieties were planted on 4.5 fit distance . As a Intercrop Potato and Garlic taken in this demonstration .Farmers from different sugar mill zone of U.P and nearby state visited at the plot.

ii-Another Result Demonstration was conducted at Sugarcane research farm Shahjahanpur during spring planting 2022-23with four Early and four mid late variety by trench planting method. All varieties were planted on 4.5 fit distance. Farmers from different districts of Uttar Pradesh as well as other state and neighboring country Nepal visited time to time at demonstrate plot. Cane officials of U.P. also visited at demonstration plot.

2. Face Book Live programme

To provide contemporary information of sugarcane cultivation to farmers Extension division conducted Face book live programme on weekly basis. During the year total 37 Face book live programme has conducted through Council face book page covering all aspect of sugarcane cultivation likes Breeding, Agronomy, Entomology, Plant Pathology, Tissue culture, Soil chemistry, Sugar chemistry and Gur Chemistry, Microbiology etc. This programme is being telecast on every Saturday at 4.00 pm to 5.00 pm named "Mithas". Farmers from all over India and other neighboring country regularly watching this programme so the reach of this page is increased more than 28 lakh. Along with lecture we also answered the questions asked by farmers related to their cane cultivation. U.P.C.S.R face book page followers were only 1820 before start of this programme and now it has increased 22574. This programme is very popular among cane farmers and cane development personnel.

3. Transfer of technology through Mass Media-

To communicate with the large numbers of farmers in short duration, mass media (method of contact) were used by Extension department. Details are as under.

(i) Live T.V Talk at National Channel D.D. Kisan, Delhi

Four T.V. talk on D.D. Kisan channel under "Hello Kisan"programme were delivered by extension department during the year. All Programmes were based on contemporary issues of sugarcane cultivation. Under Live programme solutions were suggested to the farmers regarding their problems related to sugarcane cultivation .

(ii) T.V Talk at State Channel D.D.U.P.Lucknow

ThreeT.V. talk on D.D.U.P channel under "Krishi Darshan"programme were delivered. Talk was related to contemporary issue of sugarcane cultivation in which farmers suggested solutions regarding their problem.

iii) Talk on All India Radio Delhi

Two Radio talk regarding sugarcane cultivation delivered on AIR Delhi during the year.

iv) You-Tube Channel

To provide quick & contemporary issues of sugarcane cultivation to the farmer in Audio visual mode, 05videos related to variety identification, intercropping, ratoon management, insect and pest control prepared and uploaded time to time for the updating of farmers.

4. Training Programme:

Conducted 15 training programme (Offline and online) for the sugarcane farmers and sugar mill officials regarding new scientific technique of sugarcane cultivation. Five days paid training programme was conducted during month of September 2022 in which 50 sugar mill representatives were participated from which Rs. 3.00 Lakh revenue generated. Another two days paid training programme was conducted on jaggery production during the month of February 2023 in which 31 rural entrepreneurs participated from which Rs 0.62 Lakh revenue generated. Moreover 13 training programme conducted offline and online free of cost for the sugarcane farmers. Free trainings were conducted with the cooperation of farmer, sugar mills and cane department. Total 1310 people trained during the

year of 2022-23 without any budget.

5. Exhibition-

Participated in three exhibitions and shows the technique of sugarcane cultivation before farmers so that they can understand easily. These exhibitions were placed at Shahjahanpur, Dhaighat and KVK Niyamatpur. Our stall awarded by Excellent award by KVK Niyamatpur.

6. Lecture on farmers training-

18 lectures delivered on scientific sugarcane cultivation in Village meeting before farmers.

7. Visitors

During the year 5565 farmers from different places visited our research institute .

8. "KisanMela" (Mithas)

Extension Deptt. conducted "Virat Kisan Mela" at our Campus on 04 March 2023 in which more than 4000 farmers, sugar mill representatives and cane development personals participated from all over India as well as Nepal. This is the first time when mini seed kit was distributed through online booking. This is the result of extension activities through social media.

Seorahi

1. Result Demonstration

Autumn Planting

A Varietal demonstration experiment was conducted at Seorahi farm with a total of ten varieties in which five varieties viz. CoLk 94184, Co 0118, CoS 13235, CoS 08272, UP 05125 were early maturing and other five varieties such as CoSe 08452, CoSe 11453, CoS 08279,CoS 09232 and CoSe 13452 were mid late maturing. Data were recorded for germination percent, number of tillers/ha, number of millable cane/ha and yield (MT/ha). Maximum yield potential was recorded in variety CoS 08272 (98.00t/ha) followed by 0118 (97.22 t/ha) in the early maturing group, whereas in the mid -late group, variety CoSe 11453 (96.66 t/ha) had the maximum yield potential.

Spring Planting

A Varietal demonstration experiment was conducted at Seorahi farm with a total of twelve varieties viz. CoLk 94184, CoLk 14201, CoS 13235, Co 0118, UP 05125, CoSe 01421 and CoS 08272 in early maturing group and CoS 08279, CoSe 15453, CoS 09232, CoSe 11453 and CoSe 13452 in mid-late maturing group.Data were recorded for germination percent, number of tillers/ha, number of millable cane/ha and yield (MT/ha). Maximum yield potential was recorded in variety Co 0118 (104.22 t/ha) followed by CoS 08272 (98.00t/ha) in the early maturing group, whereas CoSe 11453 (96.66 t/ha) had maximum yield potential in mid-late maturing group.

Other Extension Activities:

1.	Demonstration Trials	02
2.	Exhibition/ Farmer's Fair	04
3.	Field days/ Gosthis	08
4.	Training	02
5.	Literature distribution	40
6.	Visitors	315

Muzaffernagar

A varietal demonstration was conducted at research station, Muzaffarnagar farm during the year 2022-23 in spring planting with CoS 13235, Co 0118, Co 15023, CoS 12232, Co 05011, CoS 08279 and Colk 14201 varieties of sugarcane. The highest yield of sugarcane 91.60 t/ha. was recorded in CoS 13235 followed by 82.80 t/ha. in Co 0118 respectively.

1. A method demonstration was conducted at farmers field in 2022-23 during the spring planting with CoS 13235, CoLk 14201, Co 15023 and Co 0118 varieties of sugarcane. The highest sugarcane yield of 82.50 was recorded in CoS 13235 followed by 76.60 in CoS 13235 respectively.

2. The demonstrate the sugarcane production technology improve the knowledge level, skill and attitudes of the cane growers through different communication media/methods as demonstration, kisan mela, Ghosties, Field days, Exhibitions, Sugarcane talks, No. of visitors counting and literature distribution.

3. Demonstration-04, Ghosties-22, G.K.S. Talk-46, Visitors-584 and literature distribution 1050.

17- SEED PRODUCTION

Planting and Maintenance of Breeder Seed Cane Nurseries

During 2022-23 breeder seed cane nurseries were planted in 284.07 ha area in autumn 2022 and spring 2023 at research farms and sugar mill's farms (Table 1a and 1b). In autumn 2022 total 71.75 ha area was at research farms while in spring 2023, it was 105.32 ha. At sugar mill farms total 107.00 ha area was under breeder seed cane out of which 41.90 ha in autumn 2022 and remaining 65.10 ha in spring 2023. The early maturing varieties covered 85.97% area at research and sugar mill's farms as compared to mid late varities

All approved culture practices *i.e.*, seed selection, seed and soil treatments, fertilizer application, irrigation, hoeing, earthing, binding; plant protection measures etc were done as per recommendation to raise the healthy breeder seed cane nurseries. These nurseries were kept genetically pure and free from insect-pests and diseases.

Production and Distribution of Breeder Seed Cane

Under three tier system of seed-cane production program, prior to distribution of breeder seed-cane for raising foundation seed-cane nurseries, all breeder seed nurseries were thoroughly checked and certified for their genetic purity and freedom from insect-pest and disease, inspected by a team of different subject matter specialists. The certified breeder seed cane was supplied to different Cane Development Councils as per allotment made by the Cane Commissioner, U.P.

During 2022-23 from the breeder seed cane nurseries planted in 2021-22 a total of 5,65,60,873 single buds of CoS 13235, CoLk 14201 and Co 15023 and 110788.08 qt of other varieties of breeder seed cane was produced at research and sugar mill's farms (Table 2a and 2b).

Table 1a- Planting area of breeder seed cane nurseries at research and sugar mill's farms during 2022-2023

S.N.	Research/Sugar Mill's Farms	Area (ha)		
		Autumn 2022	Spring 2023	Total
A. Research farms				
1	Shahjahanpur	14.08	12.22	**26.60**
2	Gola	15.68	25.32	**41.00**
3	Seorahi	18.28	19.77	**38.05**
4	Muzaffarnagar	4.43	8.91	**13.34**
5	Sultanpur	2.35	4.12	**6.47**
6	Balrampur	1.34	1.67	**3.01**
7	Laxmipur	3.59	6.71	**10.30**
8	Sadat	5.00	5.05	**10.05**
9	Sirsha	2.00	4.60	**6.60**
10	Arnikhana	0.00	5.35	**5.35**
11	Pipraich	0.00	5.00	**5.00**
12	IISR Lucknow	5.00	6.60	**11.60**
Total		**71.75**	**105.32**	**177.07**
B. Sugar Mill's Farms				
i.	**Private Sugar Mill's Farms**			
1	Pilibhit	6.00	10.00	**16.00**
2	Seohara	4.00	20.00	**24.00**
3	Dhampur	8.00	9.00	**17.00**
4	Biswa	4.60	3.60	**8.20**
5	Neoli	0.81	4.00	**4.81**
Total		**23.41**	**46.60**	**70.01**

ii.	Co-Operative Sugar Mill's Farms			
1	Mhemudabaad	1.89	0.00	**1.89**
2	Morna	1.95	1.97	**3.92**
3	Tilhar	2.04	0.63	**2.67**
4	Puwayan	0.84	4.00	**4.84**
5	Semikheda	1.43	1.00	**2.43**
6	Ramala	0.39	0.53	**0.92**
7	Nanauta	2.21	0.00	**2.21**
8	Gazraula	2.88	1.76	**4.64**
9	Naziwabaad	2.00	0.00	**2.00**
10	Sultanpur	2.50	1.21	**3.71**
11	Puranpur	0.00	2.00	**2.00**
12	Baghpath	0.36	0.56	**0.92**
13	Agauta	0.00	2.00	**2.00**
14	Bilashpur	0.00	2.84	**2.84**
Total		**18.49**	**18.50**	**36.99**
Sub -Total		**41.90**	**65.10**	**107.00**
Grand Total		**113.65**	**170.42**	**284.07**

Table 1b- Variety wise planting area (ha.) of breeder seed cane nurseries at research and sugar mill's farms during 2022-2023

S. No.	Varieties	Autumn 2022		Total	Spring 2023		Total	Grand Total (ha.)
		Research Farms	Sugar mill's Farms		Research Farms	Sugar mill's Farms		
1	CoLk 14201	19.05	10.66	**29.71**	33.13	17.39	**50.52**	**80.23**
2	CoS 13235	24.81	18.28	**43.09**	19.03	15.88	**34.91**	**78.00**
3	Co 0118	8.67	5.12	**13.79**	7.23	15.02	**22.25**	**36.04**
4	CoS 17231	0.35	0.00	**0.35**	13.26	0.00	**13.26**	**13.61**
5	Co 15023	0.29	4.30	**4.59**	0.44	10.38	**10.82**	**15.41**
6	UP 05125	1.85	0.00	**1.85**	7.15	0.00	**7.15**	**9.00**
7	CoS 13231	1.43	0.09	**1.52**	1.85	0.90	**2.75**	**4.27**
8	CoLk 11203	0.90	0.00	**0.90**	1.30	0.00	**1.30**	**2.20**
9	Co 98014	0.60	0.00	**0.60**	1.35	0.00	**1.35**	**1.95**
10	CoS 08272	-	1.25	**1.25**	-	0.43	**0.43**	**1.68**
11	CoLk 15466	0.30	0.00	**0.30**	0.60	0.00	**0.60**	**0.90**
12	CoLk 12207	0.40	0.00	**0.40**	0.20	0.00	**0.20**	**0.60**
13	CoLk 9709	0.20	0.00	**0.20**	0.00	0.00	**0.00**	**0.20**
14	CoLk 94184	0.00	0.00	**0.00**	0.15	0.00	**0.15**	**0.15**
Total		**58.85**	**39.70**	**98.55**	**85.69**	**57.16**	**145.69**	**244.24**

Mid Late Varieties								
1	CoSe13452	4.12	2.00	**6.12**	1.78	2.00	**3.78**	**9.90**
2	CoS 09232	4.43	0.20	**4.63**	2.76	0.80	**3.56**	**8.19**
3	CoS 10239	1.10	0	**1.10**	4.55	0	**4.55**	**5.65**
4	CoSe 08452	2.03	0	**2.03**	2.19	0	**2.19**	**4.22**
5	CoS 16233	0	0	**0.00**	4.15	0	**4.15**	**4.15**
6	Co 12029	0.05	0	**0.05**	0	2.00	**2.00**	**2.05**
7	CoLk 14204	0.30	0	**0.30**	1.10	0	**1.10**	**1.40**
8	CoS 14233	0.57	0	**0.57**	0.78	0	**0.78**	**1.35**
9	CoLk 15207	0.30	0	**0.30**	0.90	0	**0.90**	**1.20**
10	CoSe 11453	0	0	0.00	0.82	0	**0.82**	**0.82**
11	CoS 15233	0	0	**0.00**	0.35	0	**0.35**	**0.35**
12	CoS 12232	0	0	**0.00**	0	0.30	**0.30**	**0.30**
14	UP 14234	0	0	0	0.25	0	**0.25**	**0.25**
Total		**12.90**	**2.20**	**15.10**	**19.63**	**5.10**	**24.73**	**39.83**
Grand Total		**71.85**	**41.90**	**113.75**	**105.62**	**62.26**	**167.88**	**284.07**

Table 2a - Single bud distribution of CoS 13235, CoLk 14201 and Co 15023 at research farms and sugar mill's farms (2022-2023)

S. N	Research farms	Autumn 2022				Spring 2023					Grand Total
		CoS 13235	CoLk 14201	Co 15023	Total	CoS 13235	CoLk 14201	Co 15023	Seed Mini Kit	Total	
1	Shahjahanpur	3631248	5413233	62000	**9106481**	1505438	3188613	506170	364600	**5564821**	**14671302**
2	Gola	1757026	482794	-	**2239820**	3314620	1585700	6000	70440	**4976760**	**7216580**
3	Seorahi	441094	83380	-	**524474**	717751	178242	-	-	**895993**	**1420467**
4	Muzaffarnagar	3800308	164999	-	**3965307**	5601219	1079970	409530	137075	**7227794**	**11193101**
5	Sultanpur	289296	218030	-	**507326**	584900	158425		4350	**747675**	**1255001**
6	Balrampur	311866	-	-	**311866**	219592	169043	11218	-	**399853**	**711719**
7	Laxmipur	220280	-	-	**220280**	495253	-	-	-	**495253**	**715533**
8	Sadat	41150	-	-	**41150**	231098	-	-	-	**231098**	**272248**
9	Sirsha	245000	129119	-	**374119**	742507	642048	-	-	**1384555**	**1758674**
10	IISR Lucknow	-	1566586	-	**1566586**	-	2595907	-	4000	**2599907**	**4166493**
Total		**10737268**	**8058141**	**62000**	**18857409**	**134123798**	**9597948**	**932918**	**580465**	**24523709**	**43381118**

S.N.	Research farms	CoS 13235	CoLk 14201	Co 15023	Total	CoS 13235	CoLk 14201	Co 15023	Seed Mini Kit	Total	Grand Total
1	Biswa	501137	277338	122270	**900745**	1981415	701862	-	0	**2683277**	**3584022**
2	Pilibhit	147520	136250	-	**283770**	740457	676400	-	0	**1416857**	**1700627**
3	Seohara	431000			**431000**	430000	-	-	0	**430000**	**861000**
4	Neoli	146800	200309	-	**347109**	163982	-	1371046	0	**1535028**	**1882137**
5	Dhampur	924300		490000	**1414300**	159500	-	648500	0	**808000**	**2222300**
Total		**2150757**	**613897**	**612270**	**3376924**	**3475354**	**1378262**	**2019546**	**0**	**6873162**	**10250086**
Co-Operative Sugar Mill's Farms											
1	Tilhar	123120	-	-	**123120**	266276	-	-	0	**266276**	**389396**
2	Morna	108922	-	-	**108922**	136284	-	-	0	**136284**	**245206**
3	Gazraula	383500	-	-	**383500**	-	60000	-	0	**60000**	**443500**
4	Mhemudabaad	260900	188900	-	-	-	-	-	0	-	**449800**
5	Baghpath	189300	-	93100	-	-	-	-	0	-	**282400**
6	Agauta	-	-	-	-	75020	-	-	0	**75020**	**75020**
7	Ramala	-	-	-	-	168000	-	89100	0	**257100**	**257100**
8	Agwanpur	-	-	-	-	261500	154500	191000	0	**607000**	**607000**
9	Sultanpur	-	-	-	-	12500	53837	-	0	**66337**	**66337**
10	Puwayan	-	-	-	-	21000	92910	-	0	**113910**	**113910**
Total		**1065742**	**188900**	**93100**	**1347742**	**940580**	**361247**	**280100**	**0**	**1581927**	**2929669**
Grand Total		**13953767**	**8860938**	**767370**	**23582075**	**17828252**	**11337457**	**3232564**	**580465**	**32978798**	**56560873**

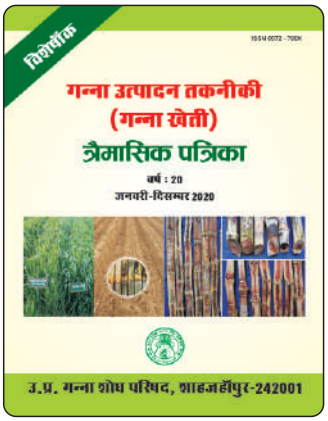
Table 2b - Breeder seed cane production/distribution (qt) at research farms and sugar mill's farms during (2022-23)

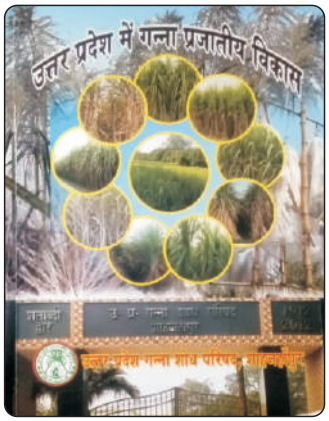
S.N.	Research and Sugar mill's Farms	Distribution		Seed cane used in planting		Sugar mill's supply	Production (qt)
		Autumn 2022	Spring 2023	Autumn 2022	Spring 2023		
A. Research farms							
1	Shahjahanpur	1749.04	2514.70	980	814	2627	**8684.74**
2	Muzaffarnagar	455.86	597.85	288	624	-	**1965.71**
3	Gola	4290.16	4966.75	1344	2266	5456	**18322.91**
4	Seorahi	4802.99	5931.32	1195	1203	4313	**17445.31**
5	Laxmipur	1810.82	4511.92	250	470	253	**7295.74**
6	Sultanpur	571.06	714.92	165.00	280.00	-	**1730.98**
7	Balrampur	581.57	370.91	87	117	-	**1156.48**
8	Sadat	800.04	801.01	350	325	-	**2276.05**
9	Sirsha	75.15	1322.02	130	370	1257	**3154.17**
10	Arnikhana (mahola)	-	-	-	348		**348.00**
11	Pipraich	0.00	590.86	0	166	677	**1433.86**
12	IISR Lucknow	102.00	757.43	350	280	-	**1489.43**
Total		**15238.69**	**23079.69**	**5139**	**7263**	**14583**	**65303.38**
B. Sugar mill farms							
1	Pilibhit	4489.27	2561.49	408	650	950	**9058.76**
2	Seohara	1959.21	10589.74	280	700	1960	**15488.95**
3	Dhampur	3243.00	6936.45	552	630	1355	**12716.45**
4	Biswa	-	-	231	476	-	**707.00**
5	Neoli	633.58	-	0.00	0.00	-	**633.58**
6	Nanauta	-	-	144	-	-	**144.00**
7	Mhemudabaad	483.12	-	123	-	-	**1213.76**
8	Agauta	-	-	-	135	1100	**4110.94**
9	Sultanpur	-	-	168	84	-	**767.98**
10	Tilhar	-	247.75	100	35	-	**658.3**
11	Nazimabaad	628.85	959.88	137	140	188.00	**510.28**
12	Morna	-	65.00	196	69	123.00	**289.11**
13	Gazraula	-	104.60	28	37	85.00	**908.08**
14	Ramala	-	-	0.00	40	-	**506.00**
15	Agvaanpur	-	-	25.0	-	-	**478.3**
16	Baghpath	-	-	98	68	-	**50.56**
17	Semikhera	-	87.76	0.00	73	78.0	**2471.25**
18	Puranpur	-	-	69	260	-	**82.67**
19	Puwayan	-	-	0	64	636.00	**1401.89**
20	Bilaspur	-	-	144	-	-	**144.00**
Total		**1111.97**	**1464.99**	**1088**	**1005**	**2210**	**6879.96**
Grand total		**26675.72**	**44632.36**	**7698**	**10724**	**21058**	**110788.08**

18- PUBLICATIONS OF UPCSR

PAMPHLETS

BOOKS





RESEARCH PAPER PUBLISHED (2022–23)

Research Article/Book/Book Chapter:

1. Bharti Y. P., V.B. Singh, K. Nand and K. Pal (2022). Screening of C_{-1} generation of sugarcane genotypes for resistant to red-rot disease in eastern Uttar Pradesh. International Journal of Agricultural Sciences. Ref. No: AEDS/IC/740/2021; (Accepted).
2. Malhotra, P.K., A. Kumar, A. Kaur and G.S. Sanghera (2023). Understanding Plant Biological Clocks: A prospective to Boost Future Agriculture. Chapter published in book titled "Modern Plant Bitechnology: Risks and Implications In Agriculture". Published by MRFSW Varanasi, pp: 1-18
3. Sanghera, G.S., R. Bhatt, P.S. Sanghera and A. Kumar (2022). Understanding bolting resistance in sugarbeet: Recent approaches for sustainable development. . Chapter published in book titled "Recent Advances in Agriculture Science and Technology for Sustainable India".Pub. MRFSW Varanasi, pp:171-182
4. Singh P. (2023) Scripting the success story of Indian Sugar Industry, Sugar Tech News letter, Vol.5, Issue 1 & 2 Society for sugar research & promotion, SSRP, Feb 2023.
5. Singh P. and S. Vishwakarma (2023). Training Book: Jaivik gud utpadan takniki evam mulya sanvardhan, Publisher- UPCSR, Shahjahanpur
6. Singh S.P., N.N. Tiwari, S.P. Singh, S. Kashyap and S.K. Vishwakamra (2022). Gene Bank Submission: *Stenotrophomonas maltophilia* strain B2132 16S ribosomal RNA gene, partial sequence. Accession number: OP457179.1
7. Siraree, A. (2022). Artificial Seed Technology. In: Sugar Beet Cultivation, Management and Processing. Pp- 131-142. Springer, Singapore.
8. Tiwari N.N., S.P. Singh, S. Kashyap and A. Kumar (2023). DNA Fingerprinting of Sugarcane Genotypes/verities for molecular evidence and protection. Biological Forum – An International Journal, 15(2): 86-88.

Conference/Seminar/Workshop:

1. Ahmad A., S.P. Singh, S.P. Singh, S.K. Vishwakarma, S. Kashyap, N.N. Tiwari, J. Mandal and S. Yadav (2023). Screening of sugarcane varieties/genotypes against red rot. Proc. Natl. Symp., IPSMEZCON, 2023, SVPUAT, Meerut, 6-7 January 2023, pp 52. pp-53.
2. Gupta G.N., R. Gupta, A. Singh and V.K. Shukla (2022). Effects of micronutrients application on yield and sucrose content of sugarcane. In: International Conference SUGARCON. 16-18 October 2022. pp- 92
3. Joshiya O.S., A.P. Singh and V. Singh (2022). Comparative performance of early maturing clones of sugarcane in Western Uttar Pradesh, *7th IAPSIT International sugar conference SUGARCON,* held at ICAR-IISR Lucknow, from 16-19th October, 2022.
4. Kashyap S., P. Kumar, S.P. Singh, N.N. Tiwari, S.K. Vishwakarma and S.P. Singh (2023). Pathogenic study among new isolates of *Colletotrichum falcatum* causing red rot in central Uttar Pradesh. Souvenir, Intl. Conf., SUGARCON, at IISR Lucknow, 16-19 Oct, 2022, pp- 218.
5. Kashyap S., S. P. Singh, S.P. Singh, S.K. Vishwakarma and N.N. Tiwari (2023). Efficacy of Amistar top 325 SC (Azoxystrobin 18.2% + Difenoconazole 11.4% SC) against red rot of sugarcne. Proc. Natl. Symp., IPSMEZCON, 2023, SVPUAT, Meerut, 6-7 January 2023, pp-52.
6. Kumar P., M. Singh and P. Singh (2022). Impact of renewable sugar industry wastes on post–harvest quality attributes of sugarcane during high temperature" International sugar conference SUGARCON-2022, 16 to 19 October, 2022 at IISR, Lucknow., pp-257.
7. Kumar P., M. Singh and P. Singh (2023) Impact of sugar industry wastes on quality jaggery production, IPS (MEZ), National Symposium on *Plant Health for Sustainable Agriculture* at SVPUAT, Meerut, January 6–7, 2023, pp- 66.
8. Kumar S. and S.C. Singh (2022). Increasing the productivity of sugarcane through trench planting. In: 5th international conference Advances in smart agriculture and biodiversity conservation for sustainable development (SABCD-2022), at Jaipur pp- 172.
9. Kumar S., M.L. Srivastava, S.C. Singh and Ved

Prakash Singh (2022). Effect of organics and inorganics sources of nutrients on productivity of sugarcane (*Saccharum species)* in plant-ratoon cropping system. International conference on sustainability of the sugar and integrated industries: Issues and initiatives at ICAR- IISR Lucknow TS-I/ pp-32

10. Kureel N. and V. Singh (2022), Sucking pest mealybug management in sugarcane crop, A case study, 7th International conference in hybrid mode on global research initiatives for sustainable and allied sciences (GRISAS) 21-23 Nov 2022, Birsa Agriculture University, Ranchi, Jharkhand, India.
11. Kureel N., A.K. Singh and V. Singh (2022). Effect of novel insecticide Chlorantraniliprole 0.5%+ Thiomethaxam 1%) Virtako 1.5 Gr against shoot borer in sugarcane. Proceeding and souvenir book, 5th international conference in smart agriculture and biodiversity conservation for sustainable development SABCD, Jaipur, Rajasthan, India pp-115.
12. Singh A., P. Singh, R. Kumar and P. Kumar (2022). Effect of molybdenum and boron application on yield and quality attribute of sugarcane. E-proceedings of 80th annual convention of STAI, 28-29 July, Goa, P- 28-35.
13. Singh A., P. Singh, V.K. Shrivastava and R. Kumar (2022). Integrated nutrient management escalates the growth components and yield of high sugar early maturing sugar-cane variety UP 05125. International sugar conference SUGARCON, 16-19 Oct. 2022 at IISR lucknow, pp– 255
14. Singh J. P., Sunderpal and V. Singh (2022). Yield and net profit of sugarcane in western Uttar Pradesh as affected by different planting method and plant geometry. International Conference SUGARCON, Organized by IISR, Lucknow, 16-19 October 2022, souvenir pp- 85-86.
15. Singh P. (2022). Impact of ortho silicic acid on quantitative and qualitative attributes of early and mid-late sugarcane varieties. International sugar conference SUGARCON, 16 to 19 October, 2022 at IISR, Lucknow.pp-119
16. Singh P. (2023). Contributions of the Indian sugar industry to sustainable development – Agenda 2030: a case study of Dalmia Bharat Sugar and Industries Limited" XXXI ISSCT Congress at Hyderabad, India, February 20-23, 2023, pp- 97.
17. Singh P. (2023). Validation of renewable sugar-industry wastes towards a circular bio economy for sustainable sugarcane production" XXXI ISSCT Congress at Hyderabad, India, February 20-23, 2023, pp- 30.
18. Singh P., (2022). Effect of chemical and vegetative/organic clarificants on quality attributes of jiggery. International sugar conference SUGARCON, 16 to 19 October, 2022 at IISR, Lucknow., pp-255.
19. Singh P., (2022). Mitigation of dietary deficiencies through jaggery based value added products. In: National conference on 'Organic and natural farming in context to Indian agriculture'. (NCONFIA) May 13-14, 2022 at C.S. Azad University of Agriculture & Technology, Kanpur. pp- 170.
20. Singh S.P., S.P. Singh, S.K. Vishwakarma, S. Kashyap and J. Singh (2022). Emerging of new pathotype CF13 (Cf 0238) of *Colletotrichum falcatum* in sub-tropical India. Souvenir, Intl. Conf., SUGARCON, at IISR Lucknow, 16-19 Oct, 2022, S-II-P-44, pp- 161.
21. Singh, S.P., S.P. Singh, S.K. Vishwakarma, Y.P. Bharti, A. Dagar, S. Kashyap, and J. Singh, (2022) Journey of red rot in wonder sugarcane variety Co 0238 in Uttar Pradesh. International conference: *SUGARCON,* held at ICAR Indian Institute of Sugarcane Research, Lucknow, U.P., India on Oct.16-19
22. Srivastav V.K., A. Kumar, M.M. Das, O.S. Josia, K. Nand, K. Pal, N.K. Karma and J. Singh (2022). CoS 13235 (Sahaj-5) - A new early maturing sugarcane variety for Uttar Pradesh. International conference on sustainability of the sugar and integrated industries: Issue and Initiatives held at ICAR-IISR Lucknow, pp-75.
23. Yadav S., S.P. Singh, S.P. Singh, A. Kumar and S. Kashyap (2023). Compatibility of *Trichoderma* spp. with systemic fungicides. Proc. Natl. Symp., IPSMEZCON, 2023, SVPUAT, Meerut, 6-7 January 2023, pp 52-54.

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SEED PRODUCTION

Sri Bhagwan Deen	Scientific Asstt.

SUPERANNUATION

No.	Name & Designation	Date of Superannuation	Place
1	Shri V.K. Shukla, Director	15.02.2023	Shahjahanpur
2	Dr. Viresh Singh, Joint Director	31.12.2022	Muzaffarnagar
3	Shri Vinay Kumar Shrivastava, SSO (Breeding)	31.10.2022	Shahjahanpur
4	Shri Avdhesh Pratap Singh, SSA (Breeding)	30.11.2022	Muzaffarnagar
5	Shri Mukteshwar Lal Srivastava, SSA (Agronomy)	22.01.2023	(Death)Seorahi (Kushinagar)
7	Shri Vivek Bahadur Singh, SSA (Pathology)	28.02.2023	Seorahi (Kushinagar)
8	Shri Subhash Ram, SA (Agronomy)	31.08.2022	Katya-Sadat-Ghazipur

20 - WEATHER REPORT

April 2022 to March 2023

Shahjahanpur							
S. N.	Month	Temp. Mean(C)		Relative Humidity(%)		Total Rainfall(mm)	No. of Rainy Days
		Max.	Min.	Forenoon	Afternoon		
1	April 2022	40.6	22.9	60	32	NIL	-
2	May 2022	39.9	24.8	68	35	36.0	05
3	June 2022	39.5	27.5	70	31	81.0	03
4	July 2022	34.6	27.5	83	65	74.0	08
5	August 2022	34.4	26.7	85	66	108	09
6	September 2022	33.5	25.6	88	65	71.0	09
7	October 2022	30.7	20.7	88	65	136.0	06
8	November 2022	27.9	13.7	81	65	NIL	-
9	December 2022	23.0	8.4	91	68	NIL	-
10	January 2023	18.1	7.5	94	76	21.8	03
11	February 2023	27.0	11.0	86	68	NIL	-
12	March 2023	29.2	16.2	82	58	44.0	05

Muzaffarnagar							
S. N.	Month	Temp. Mean(C)		Relative Humidity (%)		Total Rainfall(mm)	No. of Rainy Days
		Max.	Min.	Forenoon	Afternoon		
1	April 2022	38.2	19.3	52	19	NIL	-
2	May 2022	36.4	23.3	61	43	84.0	05
3	June 2022	37.1	23.7	59	43	69.8	03
4	July 2022	33.6	25.2	82	70	144.6	12
5	August 2022	33.9	25.0	84	65	68.6	04
6	September 2022	32.5	23.9	82	68	282.4	13
7	October 2022	30.2	18.5	88	56	74.4	05
8	November 2022	26.9	12.6	82	50	NIL	-
9	December 2022	21.6	07.1	88	52	NIL	-
10	January 2023	17.7	06.7	89	64	16.0	03
11	February 2023	26.0	10.2	80	41	NIL	-
12	March 2023	28.2	15.0	76	47	79.4	06

21 - IMPORTANT COMMITTEES

आदेश

इस कार्यालय के आदेश संख्या 1833–36/चौदह–21, दिनांक 03.08.2021 द्वारा उ.प्र. गन्ना शोध परिशद के कार्यों में उत्तरोत्तर गति लाने तथा चरणबद्ध नियोजित एवं सुचारू रूप से कार्यों के सम्पादनार्थ निम्नलिखित कार्मिकों की समितियाँ निम्नानुसार गठित की जाती हैं।

1–	**शोध प्राथमिकता, निगरानी एवं मूल्यांकन समिति**	
	(क) संस्थान/केन्द्रों की शोध प्राथमिकता, निगरानी एवं मूल्यांकन। (ख) राज्य सरकार, भारत सरकार एवं वाह्य सहायतित परीक्षणों की निगरानी। (ग) शोध कार्यों में गुणोत्तर सुधार हेतु सुझाव। (घ) परीक्षणों से प्राप्त परिणामों का मूल्यांकन।	**अध्यक्ष–** निदेशक **सदस्य** संयुक्त निदेशक मुख्यालय एवं सम्बद्ध केन्द्र समस्त अनुभागध्यक्ष लेखाधिकारी **सदस्य सचिव–** श्री विनय कुमार श्रीवास्तव, वरिष्ठ वैज्ञानिक अधिकारी
2–	**वित्तीय/प्रशासनिक नीति निर्धारण एवं अन्य समीक्षा हेतु समिति**	
	(क) परिषद के कार्मिकों के सम्बन्ध में मा. गवर्निंग बाडी के माध्यम से वित्तीय/प्रशासनिक नीतियों के निर्धारण हेतु सुझाव प्रस्तुत करना। (ख) प्रोन्नति/ए.सी.पी./अन्य सेवा सम्बन्धी/वित्तीय लम्बित प्रकरणों की समीक्षा। (ग) समस्त कार्मिकों से सेवा अभिलेखों का समय परीक्षण। (घ) सक्षम न्यायालयों में चल रहे वादों की समय–समय पर समीक्षा।	**अध्यक्ष–** निदेशक **सदस्य–** डा. विनय कुमार श्रीवास्तव, वरिष्ठ वैज्ञानिक अधिकारी डा. सुभाष चन्द्र सिंह, वरिष्ठ वैज्ञानिक अधिकारी डा. अनेंग सिंह, वरिष्ठ वैज्ञानिक अधिकारी लेखाधिकारी **सदस्य सचिव–** श्री गुरजीत सिंह, वरिष्ठ सहायक
3–	**अभिजनक बीज उत्पादन कार्यक्रम समिति**	
	(क) शासन द्वारा निर्धारित लक्ष्य के अनुरूप अभिजनक बीज गन्ना पौधशालाओं की स्थापना हेतु प्लाटों का चयन (शोध, चीनी मिल एवं कृषक प्रक्षेत्र) एवं उत्पादन। (ख) किस्मों का चयन, शुद्धता सुनिश्चित करते हुए अभिजनक बीज गन्ना बुवाई, पर्यवेक्षण एवं वितरण। (ग) बीज गन्ना का गर्म जल उपचार। (घ) वितरण के समय बीज प्रमाणीकरण।	**अध्यक्ष–** निदेशक **सदस्य–** डा. सुभाष चन्द्र सिंह, वरिष्ठ वैज्ञानिक अधिकारी डा. अनिल कुमार सिंह, प्रक्षेत्र प्रबन्ध अधिकारी डा. अरविन्द कुमार, वैज्ञानिक अधिकारी श्रीमती सोनिया यादव, वैज्ञानिक अधिकारी **सदस्य सचिव–** डा. अर्चना सिराड़ी, वैज्ञानिक अधिकारी
4–	**नियोजन एवं व्यय समिति**	
	(क) आवंटित बजट के सापेक्ष व्यय की समीक्षा (ख) वेतन/गैरवेतन व्यय की समीक्षा (ग) राज्य सरकार, भारत सरकार एवं वाह्य संस्थाओं से पोषित परीक्षणों में व्यय एवं प्राप्तियाँ की समीक्षा। (घ) प्रयोगशाला, अचल सम्पत्ति, प्रक्षेत्र तथा अन्य अनुभागों में लगाये गये श्रमिकों के भुगतान की समीक्षा।	**अध्यक्ष–** निदेशक **सदस्य–** डा. अनेंग सिंह, वरिष्ठ वैज्ञानिक अधिकारी डा. अनिल कुमार सिंह, प्रक्षेत्र प्रबन्ध अधिकारी डा. गोरखनाथ गुप्ता, वैज्ञानिक अधिकारी लेखाधिकारी **सदस्य सचिव–** श्री नवल कुमार सक्सेना, लेखाकार
5–	**क्रय सलाहकार समिति**	
	(क) प्रयोगशाला उपकरणों, कृषि यंत्रों, ग्लासवेयस, फ्लीवेयर्स एवं रसायनों का क्रय। (ख) केन्द्रीय भण्डार से सम्बन्धित समस्त क्रय यथा कार्यालय एवं स्टेशनी (ग) कम्प्यूटर, प्रयोगशाला उपकरणों तथा अन्य के वार्षिक अनुरक्षण अनुबन्ध सम्बन्धी कार्यवाही। (घ) निष्प्रयोज्य समानों/वाहनों/कृषि यन्त्रों की नीलामी सम्बन्धी कार्यवाही।	**अध्यक्ष–** डा. अनेंग सिंह, वरिष्ठ वैज्ञानिक अधिकारी **सदस्य–** डा. सुभाष चन्द्र सिंह, वरिष्ठ वैज्ञानिक अधिकारी श्री शिवपाल सिंह, वैज्ञानिक अधिकारी डा. श्रीप्रकाश यादव, वैज्ञानिक अधिकारी डा. सुजीत प्रताप सिंह, वैज्ञानिक अधिकारी लेखाधिकारी अथवा उनके द्वारा नामित सदस्य **सदस्य सचिव–** डा. सुनील कुमार विश्वकर्मा, वैज्ञानिक अधिकारी

6–	**प्रक्षेत्र सलाहाकार समिति**	
	(क) प्रक्षेत्र पर नियोजन एवं आधुनिकीकरण (ख) श्रमिकों का उचित उपयोग (ग) प्रक्षेत्र उत्पादित फसलों का निस्तारण एवं उनके उचित मूल्य का निर्धारण। (घ) संविदा पर श्रमिकों को लगाये जाने हेतु उनकी आवश्यकता का निर्धारण (च) परीक्षणों हेतु प्लाट का आबंटन (छ) प्रक्षेत्र हेतु निवेशों यथा बीज, खाद, रसायन, डीजल आदि की आवश्यकता का निर्धारण एवं क्रय समीक्षा। (ज) प्रक्षेत्र की आय बढ़ाने हेतु सुझाव एवं प्रयास। (झ) प्रक्षेत्र पर ट्रैक्टर, नलकूप, कृषि यंत्रों एवं जैनरेटर की मरम्मत	**अध्यक्ष–** डा. सुभाष चन्द्र सिंह, वरिष्ठ वैज्ञानिक अधिकारी **सदस्य–** डा. अनेंग सिंह, वरिष्ठ वैज्ञानिक अधिकारी डा. सुनील कुमार विश्वकर्मा, वैज्ञानिक अधिकारी श्री वी.सी. जादौन, प्रक्षेत्र अधीक्षक श्री मौजीलाल यादव, लेखाकार **सदस्य सचिव–** डा. अनिल कुमार सिंह, प्रक्षेत्र प्रबन्ध अधिकारी
7–	**मानव संसाधन विकास समिति**	
	(क) कार्यालय, तकनीकी एवं वैज्ञानिक स्टाफ की ट्रेनिंग सम्बन्धी कार्ययोजना (ख) अध्ययन अवकाश संबधी पालिसी (ग) वैज्ञानिक/शोध सहायक स्टाफ को वाह्य संस्थानों में आयोजित सेमानीर/सिम्पोजियम/ प्रशिक्षण/कार्यशाला में भाग लेने सम्बन्धी कार्यवाही। (घ) शोध परिषद के वैज्ञानिकों/शोध सहायकों के संस्थान में समय–समय पर लेक्चर का आयोजन। (च) गन्ना किसान संस्थान/चीनी मिलों द्वारा आयोजित संगोष्ठियों में वैज्ञानिक वार्ता हेतु वैज्ञानिकों का चयन	**अध्यक्ष–** डा. अनिल कुमार सिंह, प्रक्षेत्र प्रबन्ध अधिकारी **सदस्य–** डा. सुजीत प्रताप सिंह, वैज्ञानिक अधिकारी श्री संजीव कुमार पाठक, प्रसार अधिकारी डा. अर्चना सिराड़ी, वैज्ञानिक अधिकारी **सदस्य सचिव–** डा. प्रियंका सिंह, वैज्ञानिक अधिकारी
8–	**पुस्तकालय समिति**	
	(क) पुस्तकालय हेतु जर्नल्स, पुस्तके, मैग्जीन आदि क्रय करने की कार्यवाही। (ख) पुस्तकालय में उपलब्ध जर्नल्स, पुस्तकों, न्यूजपेपर आदि का अनुरक्षण एवं वैज्ञानिकों एवं स्टाफ के वाचन सम्बन्धी व्यवस्था। (ग) पुस्तकालय के डिजीटिलाइजेशन/कम्प्यूटरीकृत किये जाने की कार्यवाही।	**अध्यक्ष–** डा. विनय कुमार, वरिष्ठ वैज्ञानिक अधिकारी **सदस्य–** श्री सुनील कुमार विश्वकर्मा, वैज्ञानिक अधिकारी डा. श्रीप्रकाश यादव, वैज्ञानिक अधिकारी डा. अर्चना, वैज्ञानिक अधिकारी श्रीमती सोनिया यादव, वैज्ञानिक अधिकारी लेखाधिकारी अथवा उनके द्वारा नामित सदस्य **सदस्य सचिव–** डा. एन.एन. सक्सेना, वरिष्ठ पुस्तकालयाध्यक्ष
9–	**कार्य एवं अनुरक्षण समिति**	
	(क) कार्यायोजना तैयार करना। (ख) चल रहे कार्यों का पर्यवेक्षण। (ग) सिविल, मैकेनिकल एवं इलेक्ट्रिक कार्यों को समय से सम्पन्न कराना। (घ) जेनेरेटर का अनुरक्षण एवं मरम्मत। (च) आडिटोरियम, सभाकक्ष, अतिथिगृह एवं कार्यालय तथा प्रयोगशालाओं का अनुरक्षण एवं मरम्मत। (छ) विद्युत आपूर्ति की निरन्तरता सुनिश्चित् करना। (ज) कार्यालय एवं अनुभागों में कैमरों का आबंटन। (झ) वाहनों का अनुरक्षण एवं मरम्मत। (य) परिषद परिसर, प्रयोगशाला, अतिथिगृह की स्वच्छता की समीक्षा एवं सुधार हेतु कार्ययोजना एवं कार्य।	**अध्यक्ष–** डा. अनेंग सिंह, वरिष्ठ वैज्ञानिक अधिकारी **सदस्य–** डा. श्री प्रकाश यादव, वैज्ञानिक अधिकारी डा. सुजीत प्रताप सिंह, वैज्ञानिक अधिकारी डा. गोरखनाथ गुप्ता, वैज्ञानिक अधिकारी लेखाधिकारी अथवा उनके द्वारा नामित सदस्य **सदस्य सचिव–** श्री शिवपाल सिंह, वैज्ञानिक अधिकारी

10–	**सुरक्षा सलाहकार एवं अनुशासन समिति**	
	(क) प्रक्षेत्र, आवासीय भवनों, प्रयोगशाला भवनों तथा कार्यालय सहित सम्पूर्ण परिसर की सुरक्षा की समीक्षा तथा हेतु सुझाव। (ख) सुरक्षा कर्मियों के भुगतान की समीक्षा। (ग) अनुशासन सम्बन्धित शिकायत।	**अध्यक्ष–** डा. सुभाष चन्द्र सिंह, वरिष्ठ वैज्ञानिक अधिकारी **सदस्य–** श्री अनिल कुमार सिंह, प्रक्षेत्र प्रबन्ध अधिकारी डा. संजीव कुमार पाठक, प्रसार अधिकारी डा. सुजीत प्रताप सिंह, वैज्ञानिक अधिकारी लेखाधिकारी अथवा उनके द्वारा नामित सदस्य **सदस्य सचिव–** श्री सुनील कुमार विश्वकर्मा, वैज्ञानिक अधिकारी
11–	**प्रकाशन समिति**	
	गन्ना उत्पादन तकनीकी "गन्ना खेती" वार्षिक प्रतिवेदन तकनीकी प्रोग्राम, न्यूजलेटर, मिठास, प्रशिक्षण पुस्तिका, फोल्डर, पम्पलेट आदि का प्रकाशन।	**अध्यक्ष–** डा. अनिल कुमार सिंह, प्रक्षेत्र प्रबन्ध अधिकारी **सदस्य–** डा. सुनील कुमार विश्वकर्मा, वैज्ञानिक अधिकारी डा. अर्चना सिराड़ी, वैज्ञानिक अधिकारी श्री संजीव कुमार पाठक, प्रसार अधिकारी **सदस्य सचिव–** डा. प्रियंका सिंह, वैज्ञानिक अधिकारी
12–	**आवास आबंटन समिति**	
	कार्मिकों आर्हता/वरिष्ठता के अनुसार उनके आवासों का आबंटन, अनाधिकृत रूप से काबिज आवासों को रिक्त कराना, आवासों में विद्यमान समस्याओं का निरीक्षण कर सुझाव देना।	**अध्यक्ष–** डा. सुभाष चन्द्र सिंह, वरिष्ठ वैज्ञानिक अधिकारी **सदस्य–** डा. अनिल कुमार सिंह, प्रक्षेत्र प्रबन्ध अधिकारी श्री एन.एन. सक्सेना, वरिष्ठ पुस्कालयाध्यक्ष श्री संजीव कुमार पाठक, प्रसार अधिकारी लेखाधिकारी अथवा उनके द्वारा नामित सदस्य **सदस्य सचिव–** डा. शिवपाल सिंह, वैज्ञानिक अधिकारी
13–	**सेवा सम्बन्धी मामलों की समिति**	
	स्थापन लेखा एवं अन्य लम्बित प्रकरण/शिकायत।	**अध्यक्ष–** डा. अनेंग सिंह, वरिष्ठ वैज्ञानिक अधिकारी **सदस्य–** डा. सुभाष चन्द्र सिंह, वरिष्ठ वैज्ञानिक अधिकारी डा. अरविन्द कुमार, वैज्ञानिक अधिकारी लेखाधिकारी अथवा उनके द्वारा नामित सदस्य **सदस्य सचिव–** श्री गुरजीत सिंह, वरिष्ठ सहायक

(वी.के. शुक्ल)
निदेशक,
उ.प्र. गन्ना शोध परिषद,
शाहजहॉपुर

उ.प्र. गन्ना शोध परिषद, शाहजहाँपुर।

पृ.सं. 1833–36 चौदह–21 दिनांक शाहजहाँपुर अगस्त, 03, 2021

प्रतिलिपिः– निम्नलिखित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित।

1. सम्बन्धित समितियों के सदस्य/सदस्य सचिव एवं अध्यक्ष को अनुपालनार्थ।
2. प्रधान सहायक/वैयक्तिक सहायक, शाहजहाँपुर।
3. लेखाधिकारी, मुख्यालय, शाहजहाँपुर।
4. प्रक्षेत्र/केन्द्रीय भण्डार/अचल सम्पत्ति/अतिथि गृह/वाहन अनुभाग, शाहजहाँपुर।

निदेशक,
उ.प्र. गन्ना शोध परिषद,
शाहजहॉपुर

उ.प्र. गन्ना शोध परिषद के प्रक्षेत्र एवं व्यवसायिक कार्यों से 2022–23 में राजस्व सृजन की स्थिति

क्र.सं.	मद / विवरण	राजस्व (रू0)
1	प्रक्षेत्र आय	8,44,84,899/-
2	जैव उत्पाद	45,75,206/-
3	ट्राइकोकार्ड	4,93,850/-
4	मृदा परीक्षण	3,46,850/-
5	प्रशिक्षण कार्यक्रम	5,62,000/-
6	बीज गन्ना उत्पादक कृषक पंजीकरण	12,23,000/-
7	लाजिस्टिक (गेस्ट हाउस, आडिटोरियम)	4,83,548/-
8	कान्ट्रैक्ट फील्ड ट्रायल	42,00,000/-
9	अन्य आय	28,28,353/-
	कुल आय	**9,91,97,706/-**

MEMORIES AT GALNCE

दैनिक जागरण बरेली, 18 अप्रैल, 2023 — शाहजहांपुर जागरण

फसल सुरक्षा को महिलाएं तैयार करेंगी जैविक अस्त्र

उत्तर प्रदेश गन्ना शोध परिषद दो दिवसीय प्रशिक्षण से स्वयं सहायता समूह की महिलाओं को बनाएगा दक्ष

प्रदेश के 3,176 महिला स्वयं सहायता समूह की करीब 22 हजार महिलाएं गन्ना नर्सरी उत्पादन से जुड़ी है।

इस तरह तैयार होता है ट्राइकोकार्ड

56 रुपये में एक एकड़ गन्ना सुरक्षा और अतिरिक्त कमाई भी

कोशा 16233 एवं कोशा 15233 मध्य देर की किस्में प्रदेश के लिए, कोलख 15466 पूर्वी उप्र के लिए

गन्ने की पांच उन्नत किस्मों को स्वीकृति

पूरे उत्तर प्रदेश के लिए स्वीकृत गन्ना किस्म की खासियत

मध्य और पश्चिमी उत्तर प्रदेश के लिए स्वीकृत गन्ना किस्म की खासियत

कोशा 16233 एवं कोलख 14204 अगेती किस्मों के समतुल्य

पूर्वी उत्तर प्रदेश के लिए स्वीकृत गन्ना किस्म की खासियत

12 गन्ना किस्म को सूची से हटाया गया

गन्ना शोध परिषद को सर्वोत्तम स्टाल का पुरस्कार

शाहजहांपुर, संवाददाता। फसल अवशेष प्रबंधन योजना अंतर्गत किसान मेला एवं कृषक गोष्ठी का आयोजन कृषि विज्ञान केंद्र नियामतपुर पर किया गया। कार्यक्रम की अध्यक्षता पूर्व जिला पंचायत अध्यक्ष वीरेंद्र पाल सिंह यादव ने की। मुख्य अतिथि डाक्टर पीके सिंह निदेशक प्रसार सरदार वल्लभभाई पटेल कृषि एवं प्रौद्योगिक विश्वविद्यालय मेरठ एवं विशिष्ट अतिथि उत्तर प्रदेश गन्ना शोध परिषद के निदेशक डाक्टर सुधीर शुक्ल ने फीता काटकर मेले का उद्घाटन किया। इस दौरान सर्वोत्तम स्टॉल का पुरस्कार गन्ना शोध परिषद शाहजहांपुर को दिया गया।

मुख्य अतिथि निदेशक डाक्टर पीके सिंह ने कृषकों को कृषि विविधीकरण के विभिन्न आयाम जैसे पशुपालन डेयरी कुकुटपालन बागवानी एवं फूलों की खेती मधुमक्खी पालन एवं मशरूम उत्पादन को अपनाने के लिए प्रेरित किया। केंद्र के बागवानी विशेषज्ञ डॉक्टर महेश, पशु वैज्ञानिक डाक्टर शिव कुमार यादव, डाक्टर नूतन वर्मा, विद्या गुप्ता, डाक्टर विमल कुमार, इफको के जिला प्रबंधक एके पालीवाल ने नैनो यूरिया एवं नैनो डीएपी की जानकारी दी।

सर्वोत्तम स्टाल का पुरस्कार गन्ना शोध परिषद शाहजहांपुर को मिला: कृषि उद्योग प्रदर्शनी में जनपद में कृषि से जुड़ी विभिन्न प्राइवेट कंपनियां एवं सरकारी संस्थाओं ने अपने-अपने स्टाल लगाए, इनमें मुख्य रूप से जेंडर इंडिया, एग्रीज एग्रो, धानुका एग्रोटेक, धरड़ा केमिकल्स इफको शाहजहांपुर संत सेवा संस्थान शाहजहांपुर उत्तर प्रदेश गन्ना शोध परिषद शाहजहांपुर गन्ना किसान प्रशिक्षण संस्थान शाहजहांपुर जिला कृषि विभाग उद्यान विभाग एवं जनपद में कार्यरत एवं एफपीओ ने अपने-अपने स्टाल लगाए।

किसान मेले का आयोजन कृषि विज्ञान केंद्र नियामतपुर पर किया गया।

शाल ओढ़ाकर प्रमाण पत्र एवं स्मृति चिन्ह भेंट किए

अवशेष प्रबंधन पर जिले में उत्कृष्ट कार्य करने वाले 21 कृषकों को शाल ओढ़ाकर प्रमाण पत्र एवं स्मृति चिन्ह भेंट किए गए। एफपीओ के निदेशक प्रेम शंकर गंगवार, राकेश कुमार पांडे को भी सम्मानित किया गया। मेले में डॉक्टर एवी सिंह डाक्टर एस के पाठक, अशोक कुमार ग्राम बड़ा बन के प्रधान रुपेश पांडे, विज्ञान केंद्र के प्रभारी प्रोफेसर डाक्टर एनसी त्रिपाठी मनीष तिवारी प्रतिनिधि सांसद राज्यसभा संतोष कुमार द्विवेदी भूमि संरक्षण अधिकारी गोमती खंड एवं प्रगतिशील कृषक कौशल मिश्रा आदि उपस्थित रहे।

आर्गेनो डीकंपोजर से नरई सड़ाकर पर्यावरण और मृदा उर्वरता बचाएं

गन्ना शोध परिषद के निदेशक डॉ. सुधीर शुक्ला ने बैठक में दी जानकारी

निदेशक डॉ. सुधीर शुक्ला। स्रोत : संस्था

शाहजहांपुर। किसान धान की कटाई के बाद फसल अवशेष (नरई) को खेत में ही जला देते हैं, जो कि गलत है। इससे पर्यावरण प्रदूषित होने के साथ-साथ मिट्टी की भौतिक एवं रासायनिक संरचना और सूक्ष्म जीवों पर प्रतिकूल प्रभाव पड़ता है। गन्ना शोध परिषद के निदेशक डॉ. सुधीर शुक्ल ने आज यहां बैठक के दौरान यह जानकारी दी।

उन्होंने कहा कि उप्र गन्ना शोध परिषद में फसलों के अवशेष जैसे नरई, गन्ने की सूखी पत्तियां, पुआल इत्यादि को खेत में ही सड़ाने के लिए जीवाणु कल्चर आर्गेनो डीकंपोजर विकसित किया गया है। इससे मात्र 30 से 45 दिनों में ही फसलों के अवशेष खेत में ही सड़ जाते हैं। इससे मृदा के कार्बनिक स्तर में वृद्धि के साथ-साथ लाभदायक जीवाणुओं की संख्या में भी वृद्धि होती है।

निदेशक ने इसके प्रयोग के संबंध में बताया कि आर्गेनो डीकम्पोजर को 10 किग्रा प्रति हेक्टेयर की दर से 100 किग्रा कंपोस्ट खाद और प्रेसमड में मिलाकर पूरे खेत में पहले प्रयोग करते हैं। फिर अगले दिन सिंचाई करने के पश्चात 40 किग्रा यूरिया और 50 किग्रा सिंगल सुपर फास्फेट प्रति हेक्टेयर की दर से खेत में टॉप ड्रेसिंग करने के पश्चात पर्याप्त नमी की दशा में ट्रैक्टर चालित डिस्क हैरो से पूरे खेत की जुताई कर दी जाती है। उन्होंने कहा कि इससे खेत की मिट्टी ऊपर और फसल अवशेष नीचे दब जाते हैं।

बाद में पूरे खेत की सिंचाई कर दी जाती है। आवश्यकतानुसार 10-15 दिन के अंतराल पर पर्याप्त नमी की दशा में दो से तीन जोताई करके सिंचाई करते रहना चाहिए। इस प्रकार 30-45 दिन में नरई अथवा गन्ने की सूखी पत्तियां सड़कर कंपोस्ट खाद का काम करने लगती हैं। प्रसार अधिकारी एसके पाठक ने बताया कि इसके उपयोग से पर्यावरण प्रदूषण को रोकने में मददगार साबित हो सकते है। संवाद

ऐसे प्राप्त करें डीकंपोजर

यह जीवाणु कल्चर शोध परिषद से किसी भी कार्यदिवस में प्राप्त किया जा सकता है। इसके संबंध में अधिक जानकारी के लिए शोध परिषद की हेल्पलाइन 05842-222509 और वैज्ञानिक अधिकारी डॉ. एसके विश्वकर्मा के मोबाइल नंबर-6389025313 पर संपर्क कर सकते हैं।

MEMORIES AT GALNCE

KISAN MELA MITHAAS 2022

U.P. COUNCIL OF SUGARCANE RESEARCH

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