ANNUAL REPORT

2024-25

U.P. COUNCIL OF SUGARCANE RESEARCH

SHAHJAHANPUR – 242001

MITHAS 2024-25

U.P. COUNCIL OF SUGARCANE RESEARCH

Shahjahanpur-242001 (U.P.) INDIA

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Director Message

Sugarcane is the backbone of the rural economy of the state and more than 46 lakhs sugarcane farmers and their families are directly and indirectly dependent on cane farming. Therefore, the state Government focus on income increase by the way of cost reduction and productivity enhancement through the adoption of new technology, availability of quality seeds, improved package of practices etc. The 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 to develop new sugarcane varieties, and a total of 243 varieties has been developed by the Institute till now. 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. Out of these varieties CoS 97264, CoS 767, CoS 8436, CoS 8432, CoS 88230, CoS 95255, CoSe 98231, CoSe 92423 and few others played vital role in sugarcane cultivation in past several decades in UP and neighboring States. Recently newly released sugarcane varieties like CoS 13235, CoS 17231, CoS 18231, 19231 (Early), CoS 14233, CoS 16233, CoS 15233 (mid late) have been developed by the Institute for normal situations and a variety i.e. CoS 10239, UP 14234 has also been developed for salinity conditions. For eastern part of UP variety CoSe 17451 was also developed. These prominent varieties are becoming popular among farmers and millers which are proving better alternatives for replacement of variety Co 0238. The institute and its centers are determined to provide the breeder seed cane of newly released varieties to the cane growers of the state and in 2024-25 over 93.03 thousand quintal breeder seeds were distributed to sugarcane producing districts of the state. Apart from this, 405 lakhs single buds of newly released varieties were also distributed through allotments/online mini seed kit booking system.

Apart from the above, research work is also focused 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, S.T.P methods are being applied. Awareness is created among farmers to adopt the recommended package of practices to avoid red rot disease in sugarcane and other pests. Based on surveillance on diseases and pest incidence 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. Biofertilizers and biopesticide have been made available to farmers by the Institute to sustain soil fertility and reduce the cost of chemical fertilizers and pesticides at farm level. Trichocard is also produced by the Institute for biological control of borer insect-pests.

A qualitative and focused training programme under experienced scientists also been organized time to time to train the sugarcane farmers as well as sugar mills personals to make him more efficient and technology oriented.

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. Apart from this a "Mithas Bulletin" has been started for the cane growers of the state.

Annual Report of 2024-25 is a report of all the experiments conducted by the Council during the year. I am thankful to the Editorial Board, Head of Divisions/Centres, Section in-charges and other scientific/nonscientific staff of the council who made contributions in preparing the Annual Report.

(V.K. 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 in 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 intensity 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 Sugarcane Research, U.P. at Shahjahanpur under the administrative control of Director of Agriculture, UP, Lucknow. Untill December, 1972, the U.P. Sugarcane Research Organization was under the administrative control of Director of Agriculture, U.P., Lucknow and 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 U.P., 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 a "Supplementary report" on Sugarcane Development and the need of Sugarcane Breeding in East U.P. The su-committee 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.

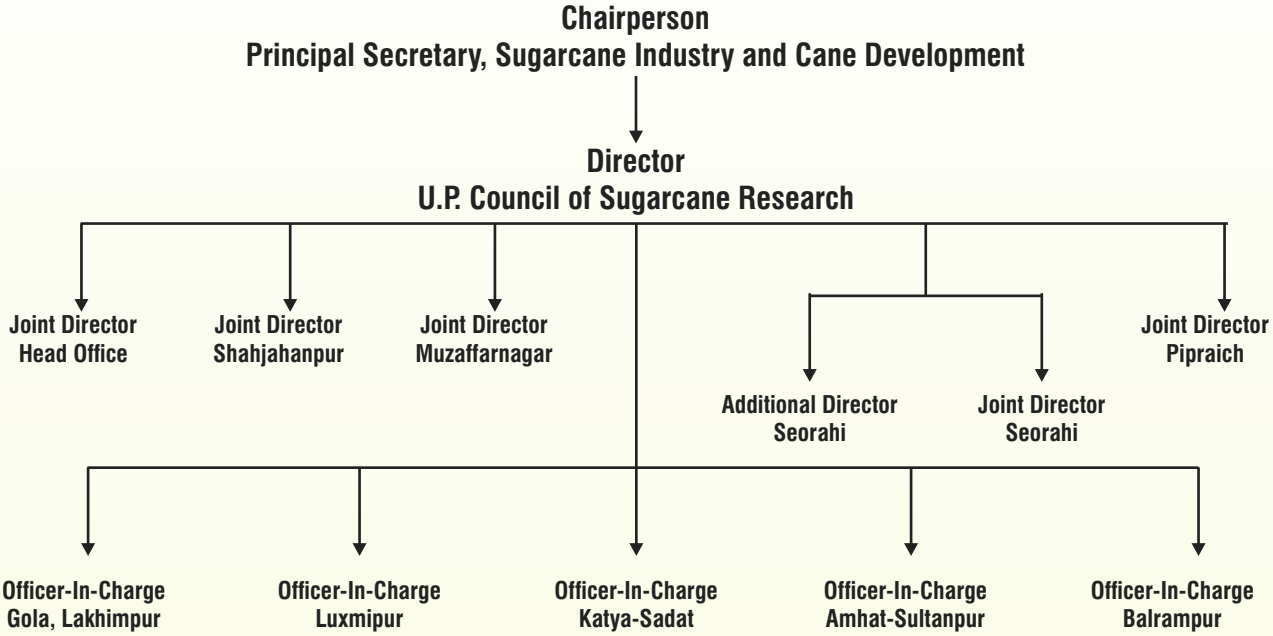
The objectives of U.P. Council of Sugarcane Research are to :

- 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 243 varieties have been developed and released for general cultivation in the state, so far. Some of the varieties viz. CoS 767, CoS 8436, CoS 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 and CoS 10239 and CoS 18231, 19231 were released for general cultivation in different tracts of U.P.

Organizational Structure



Research Disciplines under UPCSR

1	Genetics & Cytogenetics
2	Tissue Culture
3	Breeding
4	Agronomy
5	Sugar Chemistry
6	Soil Chemistry
7	Gur and Khandsari
8	Biochemistry
9	Pesticide Chemistry
10	Plant Physiology

11	Biotechnology
12	Central Lab
13	Plant Pathology
14	Entomology
15	Biological Control
16	Soil Microbiology
17	Seed Production
18	Extension
19	Economics
20	Statistic

Affiliated Research Institute and Centres

S.No.	Institute/stations	Year of Establishment	Total Area (ha)	Cultivated Area (ha)
1	UPCSR-Sugarcane Research Institute, Shahjahanpur	1912	101.35	78.83
2	UPCSR-Sugarcane Research Station, Muzaffarnagar	1934	40.203	2.42
3	UPCSR-Sugarcane Research Station, Gola, Kheri	1961	104.96	89.40
4	UPCSR-Genda Singh Sugarcane Breeding & Research Institute, Kushinagar	1975	114.58	89.12
5	UPCSR-Sugarcane Seed Multiplication Center, Luxmipur, Kushinagar	1968	31.10	22.71
6	UPCSR-Sugarcane Research and Seed Multiplication Center, Amhat, Sultanpur	1987	14.17	13.13
7	UPCSR-Sugarcane Research Station, Sadat, Gazipur	1987	39.58	35.09
8	UPCSR-Sugarcane Seed Multiplication Center, Balrampur	2002	8.08	5.99
9	UPCSR-Sugarcane Seed Multiplication Center, Sirsa, Bareilly	2017	14.50	14.50
10	UPCSR-Sugarcane Research Station, Pipraich, Gorakhpur	2019	16.65	15.10
11	UPCSR-Sugarcane Seed Multiplication Center, Mahola, Kheri	2022	13.38	11.35
	Total		498.87	396.35

Salient Achievements (2024-25)

- Maintenance and evaluation of 533 accessions of sugarcane germplasm in genetically pure condition.
- Based on HR brix % performance, 07 accessions CoS 8436, CoS 88230, CoSe 92423, CoSe 98231, Co 0118, Co 0238, and CoLk 8102 performed better.
- Under molecular characterization, DNA isolation of 59 sugarcane accessions was done and DNA amplification profiles of nineteen accessions were generated with the help of 10 ISSR markers.
- Total 59 varieties (CoS group) *Saccharum species* has been evaluated, characterized for agro morphological traits according to DUS (27 characters).
- In 2024-2025, 112 genotypes/varieties, evaluate for red rot resistance. Total 94 were rated as R/MR, and rest were S/HS against CF 08 with plug method however with NCS method, total 99 were R/MR and rest were as S/HS against CF 08. With CF 13, 90 genotypes / varieties were rated as R/MR, rest were as S/HS with plug method and 92 were rated as R/MR and rest were as S/HS with NCS method.
- In 2024-25, a total of 41500 plantlets were transfer in green house for hardening and transplanting in field of varieties/genotypes CoS17231, CoS 18231, CoS 19231, S-5/19 and S-151/19. Total 888 quintal seed was obtained from tissue culture raised seedlings planted in the year 2022-23 and this breeder seed handed over to the seed section.
- An elite sugarcane variety CoS 19231(early) was released by 'State Varietal Release Committee' for general cultivation in various tracts of U P.
- DNA fingerprints of 10 sugarcane cultivars were developed with 05 polymorphic markers of SSR, RAPD and ISSR using Gene Amp PCR System 9700 (Applied Bio systems make, USA).
- Novel bacterial strains (*S. maltophilia* B2132 and *P. studzerry* B2133) expressed PGP activities under pot condition. These both strains are not found efficient against salt stress tolerance activity
- The study was conducted to formulate and determine the shelf-life of liquid formulation of efficient novel bacterial strain *S. maltophilia* B2132. This study clearly highlighted that the inoculation of 10% Glycerol was found to be better viability at 04^{0}C and CFU over all the treatment of liquid formulation of B2132
- One bud setts in tray with coco-pit gave maximum germination followed by raising in tray with bagasse. Transplanting of three settlings per running meter raised in tray with coco-pit gave significantly higher no. of shoots, NMC and cane yield.
- In salinity condition use of 10 t/ha SPME proved economically better in producing cane yield.
- Post-emergence application of topramezone + Atrazine (ready mix) 3 lit/ha at 2-4 leaf stage of weed followed by earthing up at 120 DAP gave significantly higher cane yield than the weedy check (Control plot).
- 100% NPK + drenching of soil health product at planting 30, 75 and 120 DAP + foliar application of soil health product at 60 DAP gave significantly higher cane yield.
- Variety CoS 19231 gave at par yield to Co 0238 at 125% RDF of NPK.
- Highest net return (Rs 469986/ha) and benefit: cost ratio (1.40 t/ha) was recorded by cropping system "sugarcane + potato - onion transplanting on 01st January" over cane+ potato (Rs 273222 and 0.94) and alone cane (Rs166344 and 0.71)
- Maximum cane yield of 97.24 t/ha, ccs yield (12.78t/ha) and net profit (Rs 153287/ha) was recorded by CoS 19235 variety when planted at 30:120 cm spacing in trench with 100% RDF + 25 kg N/ha through organics + Bio. Fertilizers (Azoto & PSB) @10 kg /ha each.
- As regards to gur % in cane, the sugarcane variety Co 0238 produced higher (12.50) followed by CoS 13235 (12.02), Co 15023 (11.80) and CoS 16233 (11.16). In respect of gur yield ton per hectare, highest was obtained in Co 0238 (10.67) followed by CoS 13235 (10.02), CoLk 14201 (8.74), CoS 18231 (8.60) and CoS 17231 (8.42).
- Genotypes CoS 20231, CoS 22232 and variety CoS 19231 gave higher yield under water stress condition along with minimum yield reduction present which indicated their water stress tolerant. Varieties CoS 17232, CoS 22231, CoS 22232 and CoS 19231 gave higher yield under saline soil condition. These varieties are found relatively more tolerant to saline soil condition. Varieties CoSe 96436, CoS 08279, CoS 14233, UP 09530 and CoS 13231 showed better yield than other tested varieties under water logged condition.
- During the year 2024-25 a total 74200 kg of Ankush, 205 kg of Azotobacter, 1400 kg of PSB, 370 kg of Organo decomposer and 885 Kg of *Beauveria bassiana & Metarrhizium anisopliae* (total 770.60 qtls) were supplied to the various farmers/ sugar mills and earned an amount of Rs. 44,04,850.00 (Rs Forty-

Four lakhs four thousand eight hundred fifty) only which is the highest production and revenue ever.

- A total of 3395 kg of Vermi compost was produced, out of which 1230 Kg was sold to earn an income of Rs 12300.00 and 2165 kg was distributed to different section/Farm of SRI Shahjahanpur.
- A total 6448 soil samples of cane growers/ farmers were analysed in 2024-25 and the results were handed over with the recommendation to the concerned. Most of the soil samples were deficient in Zinc and Manganese as per rating of critical limit in respect of micro-nutrients. Available sulphur (ppm) ranged from 6.95 to 12.10 with a mean value of 8.35 ppm. It indicates that most of the soil samples were poor in nitrogen, phosphorous and sulphur whereas potash was found medium while zinc and manganese were found near to critical limit.
- Total 142 soil samples were collected from different plots of U.P. Council of Sugarcane Research farm, Shahjahanpur and analysed for fertility status before spring and autumn planting seasons. Results showed that the pH ranged from 6.62 to 7.65 with a mean value of 7.09, EC (dsm-1) ranged from 0.123 to 0.223 with a mean value of 0.169, Organic carbon percent ranged from 0.29 to 0.620 with a mean value 0.379, available phosphorus (kg/ha) ranged from 7.0 to 22.3 with a mean value of 9.22 and available potash (kg/ha) ranged from 78.4 to 212.8 with a mean value of 125.53.
- Biochemical study of macronutrients utilization in 20 promising sugarcane varieties, higher N, P and K contents were found in variety CoS 13235, CoLk 14201, CoS 15233, CoS 15453, CoLk 16202, CoS 18231, CoS 19231, CoS 20231 and CoS 22232, it may be one of the factor for higher yield. In case of micronutrients (Zn, Cu and Mn), higher content were observed in Co 0238, CoS 13235, UP 1434, CoS 15453, CoS 18232, CoS 16233, CoS 22232 and CoS 22233 variety in comparison to other varieties.
- The maximum NRA activity was recorded in variety CoS 13235 (2.68 µm/gm/hr) followed by CoS 18231 (2.68 µm/gm/hr) while it was lowest in UP 14234 (1.69 µm/gm/hr).
- In case of micronutrients application studies on tissue culture raised CoS 17231 variety, the analytical results showed that, at grand growth phase Sucrose Phosphate Synthase (SPS) activity in leaf was increased up to 8.48% by application of Zn and Mn along with RDF. The same trends were observed in case of Sucrose Synthase (SuSy) activity which were increased up to 9.75% by application of Zn and Mn along with RDF while Acid Invertase and Neutral Invertase activity increased 13.01% and 11.58% significantly by application of Zn, Mn and Cu along with RDF. Nitrate Reductase (NR) activity increased up to 10.12% by application of Zn and Mn.
- A total of 5193 samples of cane juice were analysed for Brix, sucrose and purity coefficient, 3001 cane samples were analysed for pol% in cane, and 1096 samples of cane were estimated for fibre% in cane. The sucrose content in juice for early varieties ranged from 13.94% (CoS 16233) to 16.17% (Co 15023) in October, with a gradual increase up to February, peaking between 19.06% (CoS 16233) and 19.87% (Co 15023). Mid-late varieties exhibited lower sucrose content, ranging from 12.26% (CoS 08279) to 14.80% (CoS 09232) in October, and then increased to 16.73% (CoS 17234) to 18.56% (CoS 10239) in February.
- Ten sugar mills viz; **(1).** The Ganga Kisan Sahkari Chini Mills Ltd., Morna, (Muzaffarnagar) **(2).** The Kisan Sahkari Chini Mills Ltd., Tilhar, (Shahjahanpur), **(3).** Parle Biscuits Pvt. Ltd., Unit-Paresendi (Bahraich), **(4).** Kisan Sahkari Chini Mills Ltd., Sampurnanagar, (Kheri), **(5).** Kisan Sahkari Chini Mills Ltd., Snehroad, Najibabad, (Bijnor), **(6)** Dwarikesh Sugar Ind. Ltd., Dwarikesh Nagar, (Bijnor), **(7).** The Ganga Kisan Sahkari Chini Mills Ltd., Morna, (Muzaffarnagar), **(8).** Tikaula Sugar Mills Ltd., Tikaula, (Muzaffarnagar), **(9).** The Kisan Sahkari Chini Mills Ltd., Anoopshahr, (Bulandshahr), and **(10).** Triveni Engineering & Industries Ltd., Sugar Unit-Sabitgarh, (Bulandshahr) were evaluated for sugar recovery.
- Intensive surveys were conducted in seventy-seven sugar mill areas under fifteen district in Central and Western part of UP during the season. Severe incidences of red rot recorded up to 100% in Co 0238 in Moradabad district. In central UP incidence of red rot gradually reduced due to replacement of Co 0238 in almost all the sugar mill areas. The various sugarcane varieties were found affected by either root borer, or wilt or both in the following varieties i.e., Co 0118, Co 15023, Co 11015, Co 15027, CoS 13235, CoLk 14201 and Co 0238. Smut disease was recorded in varieties C0 0238, CoS 13235 and CoLk 14201 and pokkah being disease was recorded up to 40%.
- The twenty new isolates (R 2401 to R 2420) of *C. falcatum* were collected and isolated from variety Co 0238, CoS 8436, Co 11015, CoPb 95, Co 98014 and CoJ 85 of different sugar factory areas. The red rot development on differential hosts indicated that all the new isolates exhibited more or less similar reactions to reference pathotypes CF13 on all the host differentials.
- The 129 genotypes/varieties of SVT I, SVT II, PVT

and C_2 trials were tested against CF 08 and CF 13 pathotypes. Of these, 103 showed resistant/ moderately resistant to either CF 08 or CF 13 pathotypes.

- The 129 genotypes/varieties were also tested against smut, and 99 showed resistant/ moderately resistant to smut disease.
- Forty three entries in six trials of AICRP were evaluated against red rot, smut, wilt, YLD and PBD. Forty-one entries were recorded R/MR to CF 08 and 34 entries were R/MR to CF 13. A total of 26, 21, 31, 25 entries were rated as R/MR to smut, wilt, YLD and pokkah boeng, respectively.
- Soaking of bud either 1 h or 24 hrs with bacterial strain *S. maltophilia* B2132 recorded good to prevent primary incidence of red rot and also enhance the germination, and all other quantitative parameters.
- Soaking of bud and red rot infected bagasse with carbendazim, TPM and STD exhibited better result to reduce red rot and also enhance the germination, and settling vigour.
- Most of the chlorotic symptoms of PB infected canes recovered automatically with weather condition from the symptoms at maturity stage. Once chlorotic stage shifted to top rot stage, affected all the varieties were showed death of entire emerging leaves and formed a whip-like dried spindle. The treatments such as Copper oxychloride, Carbendazim and Isoprothiolane exhibited 100 per cent recovery in chlorotic stage of PB.
- The variety CoPb 95 and Co 11015 were evaluated HS to both pathotypes i.e. CF 08 and CF 13 pathotypes. Hence, these two varieties could not propagate among cane growers in Uttar Pradesh.
- At Muzaffarnagar centre, 17 Genotypes/varieties (along with standard) were tested against red rot pathotypes i,e Cf 08 and Cf 13 in different trial (SVT) by plug and nodal cotton swab method of inoculation. Out of these 13 genotypes/varieties were showed R/ MR reaction by both methods.
- Sugarcane insect pests were surveyed in 32 sugar factories area, in this top borer incidence was found up to 70-80%, (Tiokola sugar factory Ltd., Muzaffarnagar). Shoot borer incidence were observed up to 9%, as well as root borer were up to 25%.
- Total 19 varieties / genotypes were evaluated against major insects pests of sugarcane in the SVT Trial, in this 5 varieties / genotypes showed MS reaction against stalk borer as well as 3 varieties / genotypes showed MS reaction against root borer.
- In the experiment "Impact of eco-friendly products on biotic stress" minimum incidence of insect pests were observed in treatments (use of nutrients through chemical resources and insect pest control by natural products (Bijamrit, Jeevamrit and Neemastra) comparison to other treatments.
- Drenching of BAL 175, @ 1800 ml mixed with 1000 liter of water/hectare was found best in controlling top borer and early shoot borer, at the time of sowing and at 30 DOP, 60 DOP as well as 90 DOP.
- Sugarcane setts dipping in UPFI 116, @ 1562.5 ml in 400 liter of water / hectare at 30 minutes and sowing after drying in shade, observed better controlling of top borer and early shoot borer than other treatments.
- In transfer of technologies among growers, total 13818 sugarcane growers were trained in 178 training programme conducted by UPCSR. Twenty-five Facebook live programme were done with the reach of 22.12 lakhs. 200 farmers from Haryana, Bihar were trained in one day/five days training programme at SRI, Shahjahanpur. Subject experts of UPCSR were delivered 952 lectures in different training/gosthi at farmers field. Over 5600 visitors (farmers, students) were visited fields and labs of UPCSR.
- During 2024-25 from the breeder seed cane planted in 2023-24, 4.5 crore single bud of newly released varieties (CoS 17231, 18231, 19231, CoLk 16202, 15466) and 93032 q of approved varieties for breeder seed production were distributed in sugarcane growing districts of Uttar Pradesh through the cane societies of the state as per allotment. Total production of breeder seed cane was 1,64,531 quintals.

01. GENETICS AND CYTOGENETICS

UPCSR-SRI, Shahjahanpur

Collection, maintenance and evaluation of germplasm

During the year 2024-25 a total of 533 accessions of germplasm including *Saccharum officinarum, S. sinense, S. barberi, S. robustum* and *S. spontaneous* along with Indian and foreign commercial hybrids were maintained in an augmented block design at the farm of Sugarcane Research Institute, Shahjahanpur. (Table 1) an important centre of germplasm collection and maintenance in North India.

Table1. Details of germplasm at Shahjahanpur

S. No.	Species/hybrids	No. of accessions
1	*Saccharum officinarum*	03
2	*Saccharum sinense*	06
3	*Saccharum barberi*	08
4	*Saccharum spontaneum*	09
5	Inter specific hybrids	14
6	Indian commercial hybrids	445
7	Foreign commercial hybrids and others	48
Total		**533**

On the basis of HR brix % performance, 07 accessions viz. CoS 8436, CoS 88230, CoSe 92423, CoSe 98231, Co 0118, Co 0238 and CoLk 8102 performed better than other varieties/genotypes in germplasm.

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 "Assessment of genetic diversity in the sugarcane germplasm" was initiated in the year 2024-25 in collaboration with breeding and biotechnology division with the objectives of characterizing sugarcane germplasm for agro morphological traits (DUS) and assessment of genetic diversity with the help of molecular markers.

A total of 59 sugarcane accessions viz. CoS group's varieties and *Saccharum* spp were characterized morphologically using 27 DUS (Distinctiveness, Uniformity, and Stability) traits in the 2024-25.

Genomic DNA was isolated from the young leaves of each variety using CTAB method and quantified by electrophoresis in 0.8 % agarose gel and suitably diluted to a final concentration of 25ng/µl. Genotyping with Polymerase chain reaction (PCR) for genetic diversity estimation are in progress.

Under molecular characterization, DNA isolation of 59 sugarcane accessions was done and DNA amplification profiles of nineteen accessions were generated with the help of 10 ISSR markers. Out of fifty (50) markers, SSR UGSM 354, SSR UGSM 358 and ISSR UBC 811 showed highly polymorphic amplified bands. Hence, these diverse hybrid cultivars would be used in further breeding program to get the prominent sugarcane clones which may produce higher cane yield and sugar content.

Evaluation and utilization of sugarcane germplasm for red rot resistance

During the year 2024-25, a total 112 genotypes/varieties including 60 of last year was tested with CF 08 and CF 13 with standard inoculation methods

Out of 112 genotypes/varieties, 79 were rated as R/MR, and rest were S/HS against CF 08 with plug method and 90 were R/MR and rest were as S/HS against CF 08 with NCS method of inoculation.

With CF 13, 82 genotypes / varieties were rated as R/MR, rest were as S/HS with plug method and 92 were rated as R/MR and rest were as S/HS with NCS method.

A list of 112 varieties having R/MR by both CF 08 and CF 13 were handed over to breeding department section Shahjahanpur for their utilization in breeding programme.

Fig.1.1 Germplasm at Shahjahanpur

All the genotypes/varieties having reaction of R/MR with both the CF 08 and CF 13 may be used for future crossing programme by breeding division.

UPCSR-GSSBRI, Seorahi

Maintenance and evaluation of sugarcane germplasm

Genda Singh Sugarcane Breeding and Research Institute, Seorahi- Kushinagar has been designated 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. This Institute is situated at 27.2 N latitude and 84.2 E longitude in eastern region of Uttar-Pradesh. Germplasm includes Indian and interspecific hybrids. During 2024-25 a total of 156 accessions including *Sachharum* species, Indian commercial hybrid and inter-specific hybrids were successfully 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	14 8
Foreign commercial hybrid	04
Inter Specific Hybrid (ISH)	01
Total	**156**

02. TISSUE CULTURE

UPCSR-SRI, Shahjahanpur

Micropropagation of newly released sugarcane varieties

Fresh cultures and protocol of elite sugarcane varieties/genotypes namely CoS 17231, CoS 18231, CoS 19231, S-5/19 and S-151/19 were established for *in vitro* micro-propagation during the year 2024-25. For establishment of shoot cultures, healthy tops were collected from trials of Breeding division. A total of 41500 plantlets were transfer in green house for hardening and transplanting in field of varieties/genotypes CoS17231, CoS 18231, CoS 19231, S-5/19 and S-151/19.

In the year 2023-24, a total 1.27 ha area was planted under tissue culture raised seedlings of varieties CoLk 14201, CoS 13235, CoS 17231, CoLk 16233 and Co15023. Total 888 quintal seed was obtained from tissue culture raised seedlings planted in the year 2022-23 and this breeder seed was handed over to the seed department.

Table. 2.1 Observations on different traits

Observations	Varieties				
	CoS 17231	CoS 18231	CoS 19231	S-5/19	S-151/19
Culture establishment (%)	72	80	60	80	72
Shoot Initiation (%)	80	82	72	75	65
No. of Shoots / Culture	12	12	10	10	12
Rooting (%)	82	90	69	70	70
Survival Green House (%)	75	76	75	70	70
Survival in Field (%)	92	94	90	85	85

Fig. 2.1 Variety CoS 18231, Plot-C4

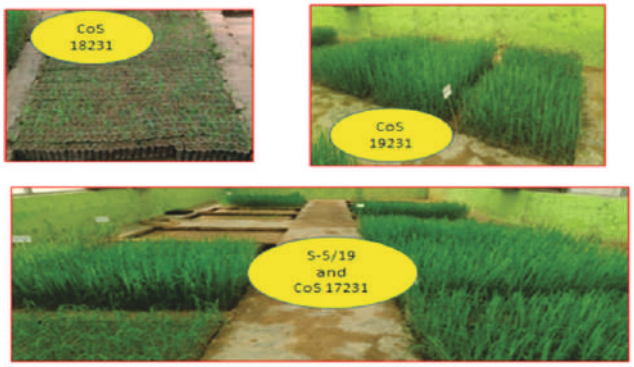


Fig. 2.2 Hardened plantlets in green house

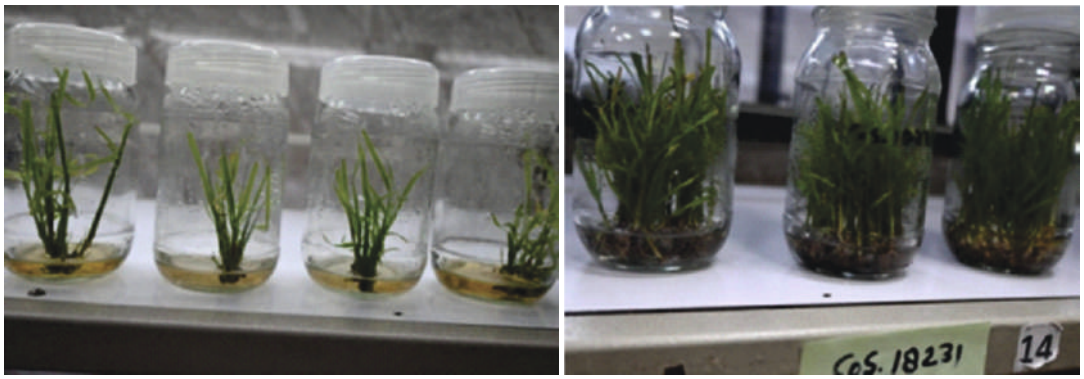


Fig 2.3 Fresh mother culture of CoS 19231 and CoS 18231

03. BREEDING

UPCSR-SRI, Shahjahanpur

Newly released variety CoS 19231 (CoSe 95422 P.C)

An early maturing variety CoS 19231 (Lahiri) was released by State Varietal Release Committee in 2025 for general cultivation in various tracts of U.P.

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 54 genotypes planted 39 flowered. The pollen fertility ranged from 4.30 percent (S.5083/11) to 72.37 percent (S.301/87). A total of 18 crosses were affected.

Hybridization was also performed at National Hybridization Garden, ICAR- Sugarcane Breeding Institute, Coimbatore as well as Agali, where 35 Bi-Parental Crosses, 02 PC, 31 GC and 08 Agali cross were affected.

Raising of seedlings

A total of 2320.68 g. (1995.68 + 325.0 local) fluff of 85 crosses from different crossing sites viz; Coimbatore, Agali and Shahjahanpur was sown which resulted in 6037 seedlings. A total of 5220 (4320 + 900 local) seedlings were transplanted for further studies and evolution of elite sugarcane varieties in future.

Ratooning of seedlings

In order to select superior clones with good ratoon ability along with other desirable attributes, a total of 15763 seedlings (15428 Coimbatore including 335 local seedlings) were transplanted out of which 10773 survived. These seedlings clones were ratooned during February 2024 for further evaluation. Out of these 638 (626+12Local) superior clones were selected for the study in C_1 generation. CoV 89101 X CoS 96260, MS 68/47 X Co 1148, Co 86011X CoH 70, CoV89101 X Co 775 gave good selections.

Details of seedlings

S N	Crosses	Weigh of fluff (gm.)	No. of seedlings obtained	No. of seedlings transplanted
A-	**Coimbatore crosses**			
01	Bi-parental (30) Co31+Agali 7	1344.46	4030	3575
02	Poly crosses (05)	47.14	448	388
03	General Crosses (29)	604.08	412	357
	Total (71)	**1995.68**	**4890**	**4320**
B-	**Shahjahanpur crosses** (14)	325.0	1147	900
	Grand Total (85)	**2320.68**	**6037**	**5220**

First clonal generation (C_1)

At Shahjahanpur 288 clones were promoted for the study in C_1 generation out of 11522 ratooned seedling on the basis of over all good performance. Some good crosses viz. CoV 89101 x CoPant 97222, Co 1158 x Co 62198, Co 0238 x CoSe 92423 gave a greater number of genotypes with desirable attributes. On the basis of HR brix, other desirable attributes and overall good performance, 91 genotypes were promoted for further evaluation in C_2 generation

Second clonal generation (C_2)

In this experiment 44 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 24 genotypes were selected for Preliminary Varietal Trial (PVT) and planted in RBD in two replications comprising of\six rows each.

Preliminary varietal trial:

A total of 41 genotypes viz. S.78/20, S.50/20, S.153/19, S.58/19, S.323/19, S.144/19, S.97/20, S.96/20, S.27/20, S.55/20, S.73/20, S.38/20,S.122/19, S.86/19, S.87/20, S.143/20, S.131/20, S.163/20, S.32/20, S.11/20, S.229/19, S.303/19, S.313/19, S.40/20, S.24/20, S.16/20, S.89/20, S.105/20, S.102/20,S.23/20, S.422/19, S.147/19, S.510/19, S.60/20, S.159/20, S.103/20, S.25/20,S.49/20, S.211/19, S.63/20, S.22/19 were tested with four standards Co 0238, CoJ 64, CoS 767 and CoPant 97222 in RBD with two replications. Highest Cane Yield (t/ha) was recorded in S.55/20 (85.18) followed by S.144/19 (82.86) and S.78/20 (81.94). In the month of November, the highest pol % in cane was recorded in S.153/19 (13.15) followed by S.11/20 (13.05) and S.131/20 (12.98). In the month of January, the highest pol % in cane was recorded in S. 11/20 (14.05) followed by S.32/20 (14.00) and Co 0238 (13.95). In the month of March, the highest pol % in cane was recorded in S.38/20 (14.50) followed by S. 510/19 (14.29) and S. 32/20 (14.26). Out of 41 genotypes studied, 30 genotypes were found MR/R against Red Rot with both the strains Cf 08 and Cf 13.

State varietal trial I plant

The performance of a uniform set of Sixteen genotypes CoS 17232, CoS 18232, CoS 22232 (S.45/17), CoS 22233 (S.161/17), S.155/17, S.168/17, S.01/18, CoSe 22451, U.P. 22452, CoLk 19201, CoLk 19202, CoLk 19204 along with standard CoJ 64, Co 0238, CoS 767, 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 18232 (97.92) followed by CoS 17232 (96.75) and S. 45/17 (92.59). The highest Pol per cent in Cane was recorded in CoLk 19201 (13.01), followed by CoLk 19202 (12.99) and CoLk 19204 (12.95) in Nov. In January S.161/17(13.33) followed by CoLk 19201 (13.27) and CoJ 64 (13.25). In March CoLk 19202 (14.62) followed by Co 0238 (14.35) and CoLk 19201 (14.33). The highest CCS t/ha was recorded in CoS 18232 (12.66) followed by CoS 17232 (11.92) and S. 45/17(11.65).

State varietal trial II plant

The performance of a uniform set of thirteen genotypes viz CoS 20231(S.38/16), CoS 20232 (S.43/16), CoS 21231(S.50/16), CoS 21232 (S.391/16), CoS 21233 (S.188/16), S.27/17, CoSe 21451 (SeO 1231/15), U.P. 21452 (Seol 261/17), S.310/16 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 S.27/17(99.53) followed by S.310/16 (98.14) and CoS. 21232(97.68). The highest Pol per cent in cane was recorded in Co 0238 (12.78) followed by CoJ 64 (12.67) and CoS 21232 (12.48) in November. In January CoS 20231(13.20) followed by Co 0238(13.19) and S.27/17 (13.11). In March Co 0238 (14.94) followed by S.27/17 (14.52) and S.310/16 (14.35). The highest CCS t/ha was recorded in S.27/17 (13.64) followed by S.310/16 (13.28) and CoS 20231 (12.65).

State varietal trial, ratoon:

The performance of a uniform set of thirteen genotypes viz CoS 20231 (S.38/16), CoS 20232 (S.43/16), CoS 21231 (S.50/16), CoS 21232 (S.391/16) , CoS 21233 (S.188/16), S.27/17, CoSe 21451 (SeO 1231/15), UP 21452 (Seol 261/17), S. 310/16 alongwith standards CoJ 64, Co 0238, CoS767 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 21233(80.09) was highest followed by S. 27/17(79.39), and CoS 20231(79.16). The highest Pol per cent in cane was recorded in CoJ 64 (12.44) followed by CoS 21231 (12.41) and Co 0238 (12.00) in October. In November, CoJ 64 (13.39) followed by Co 0238 (12.94) and CoSe 21451 (12.87). In December CoJ 64 (13.42) followed by S.310/16(13.34) and CoS 20231 (13.16). The highest CCS t/ha was recorded in CoS 20231 (9.57) followed by S. 310/16 (9.41) and S.27/17 (9.12).

UPCSR-SRS, Muzaffarnagar

First clonal generation (C_1):

Total 38 genotypes were studied in augmented design with three standards CoJ 64, Co 0238 and CoS 767. On the basis of qualitative and quantitative attributes 18 genotypes were selected for Preliminary Varietal Trial (PVT).

Standard varietal trial I plant:

Sixteen entries including four standards (CoS 767, CoPant 97222, Co 0238, and CoJ 64) were studied in randomized block design with two replications. Three entries viz. S.01/18, S.161/16 and CoS 18232 in cane yield and S.01/18 entry in CCS t/ha were significantly superior over the best standard Co 0238 (81.90, 11.14). In the month of November and January highest pol % in cane recorded in CoLk 19204 (12.05, 13.08) followed by check variety CoJ 64 (12.02, 13.07) and CoLk 19201(11.55, 12.91) respectively, while in March CoLk 19202 (14.10) was highest followed by CoLk 19204 (14.07) and check CoJ 64(14.02).

Standard varietal trial II plant:

Thirteen entries including four standards viz. CoS 767, CoPant 97222, Co 0238 and CoJ 64 were evaluated in randomized block design with two replications. Seven entries viz. CoS 21232, CoS 21233, CoS 21231, UP 21452, S.27/17, CoS 20231 and CoSe21451 in cane yield and 05 entries viz. CoS 221232, UP 21452, CoS 21233, S.27/17 and CoS 20231 in CCS t/ha were significantly higher over the best standard Co0238 (81.55,11.27) respectively. In pol % in cane, standard CoJ 64 (11.49), Co 0238 (11.41) and CoS 20231 (10.71) stood first, second and third in November respectively. In January CoS 20231(12.77) was highest followed by Co 0238 (12.74) and CoS 20232 (12.71). While in the month of March check CoJ 64 (14.11), CoS 20232 (14.06) and Co 0238 (13.98) exhibited I, II and III respectively.

Standard varietal trial, ratoon:

The ratooning ability of preceding SVT 1st plant 13 entries including 4 standards viz. CoS 767, CoPant 97222, Co 0238 and CoJ 64 were studied in randomized block design with two replications. Four entries CoS 20232, UP 21452, CoS 21233 and CoSe 21451 recorded significantly higher cane yield over the best standard CoPant 97222 (71.18) and in CCS t/ha two entries CoS 20231 and S. 27/17 were significantly higher over the best standard Co 0238 (9.46). In pol % in cane in October, S. 27/17(12.05) was highest followed by standard CoJ 64 (11.84) and CoS 21231 (11.41). In November the standard variety Co 0238 (13.25) recorded highest pol % in cane followed by CoJ 64 (13.22) and S. 27/17 (13.21), while in December Co 0238 (13.54) was highest followed by S. 27/17 (13.50) and CoJ 64 (13.46).

Multiplication:

To conduct the State varietal trial during 2026-27 sixteen entries of different Institute/ centres viz, S. 5/19, S. 151/19, S.77/18, S 124/18, S 245/18, S 4/18, S246/18, Seo 66/18, SeoL 327/18, Seo 21/18, Seo 22/16, CoLk 15201, CoLk 20202, CoLk 20203, CoLk 20204 and CoLk 20205 were taken under multiplication.

UPCSR- GSSBRI, Seorahi

Newly released variety CoSe 17451 (BO 120 GC)

An early maturing variety CoSe 17451 (Krishna) for eastern UP was released by State Varietal Release Committee in 2025 for general cultivation in various tracts of U.P.

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 32 genotypes/ varieties at G.S.S.B.R.I., Seorahi (Kushinagar) to study the pollen fertility. The pollen fertility was recorded, which ranged from 10 to 72.6 %. A total of 28 biparental crosses at Coimbatore and 4 biparental crosses at Agali (Keral) were affected. At Seorahi, 16 biparental crosses were affected.

Raising of seedling fluff received from Coimbatore and produced locally

In the month of November/December 2024 total 28 biparental, 17 GC and 4 PC were affected at national hybridization garden, Coimbatore (Tamil Nadu) and 4 biparental crosses were affected at regional research center, Agali (Kerala). Sixteen biparental crosses were also affected at local hybridization garden, Seorahi. Total 2.078 kg fluff was received from the crosses affected at Coimbatore and fluff was sown for raising seedling using UP method of seedling management.

Seedling ratoon

After ratooning, 6635 seedlings were survived and studied during 2024-25. On the basis of desirable attributes, a total of 640 seedlings were sown in augmented design in C_1 generation for further study.

Evaluation of seedling clones for selection of desirable types

C_1– Generation: - Total 452 genotypes along with 2 standards (CoS 767 and Co 0238) were studied during 2024-25 in augmented design to select desirable types. Based on desirable attributes, 15 genotypes were selected for PVT and 65 genotypes selected for C_2 generation.

Multiplication of seedling clones for disposition of their real character in order to select the desirable types

C_2–generation: - Total 47 genotypes along with 2 standards (CoS 767 and Co 0238) were studied during 2024-25 in augmented design to select desirable types. On the basis of desirable attributes 6 genotypes were selected for Preliminary Varietal Trial.

To test the suitability of new genotypes selected from multiplication stages: -

Preliminary varietal trial

In this experiment, a total of 21 genotypes including six standards (CoSe 95422, CoJ 64, CoLk 94184, CoS 767, BO 91 and CoP 06436) were studied in randomized block design with two replications. Based on cane yield t/ha genotype Seo 383/22(105.78 t/ha) was found superior followed by Seo 331/22 (94.44 t/ha) and Seo 348/22(90.51 t/ha). Based on CCS yield t/ha genotype Seo 383/22(13.42 t/ha) was found superior followed by Seo331/22(12.12 t/ha) and Seo 348/22(10.93 t/ha). In the month of November highest sucrose % in juice was recorded in genotype Seo 383/22(14.66) followed by CoSe 95422(14.64) and CoLk 94184 (14.58). Whereas, in the month of January the highest sucrose % in juice was recorded in genotype Seo 383/22(16.41) followed by Seo 348/22 (16.39) and Seo 244/22 (16.38). Highest sucrose % in juice was recorded in genotype Seo 383/22 (18.28) followed by Seo 398/22(18.06) and Co 0238(17.71) in the month of March.

State varietal trial II plant

This experiment was carried out with fourteen varieties namely, CoSe 21451, UP 21452, CoS 20231, CoS 20232, CoS 21231, CoS 21232, CoS 21233, S 310/16, S 27/16, along with five standards CoJ 64, Co 0238, CoLk 94181(Early), CoS 767 and CoPant 97222 (mid-late) were tested in RBD with two replications.

Highest cane yield was recorded in variety UP 21252 (94.21 t/ha) followed by CoSe 21451 (90.51 t/ha) and CoS 20231 (85.42 t/ha). Based on CCS yield t/ha variety UP 21452(12.14 t/ha) was found superior in CoSe 21451 (11.70 t/ha) and CoS 20231 (10.78 t/ha). Sucrose % in juice was found highest in variety CoS 21232(16.38) followed by CoS 21233(16.18) and Co 0238 (15.50) in the month of November. While, in the month of January the highest sucrose % in juice was recorded in the variety CoSe 21451(17.69) followed by CoLk 94184 (17.39) and UP 21452 (17.34). In the month of march highest sucrose % in juice was found in the variety CoSe 21451 (18.72) followed by UP 21452 (18.52) and genotypes S.310/16 (18.39).

State varietal trial I plant ratoon

This experiment was carried out with fourteen varieties namely, CoSe 21451, UP 21452, CoS 20231, CoS 20232, CoS 21231, CoS 21232, CoS 21233, S 310/16, S 27/16, along with five standards CoJ 64, Co 0238, CoLk 94181(Early), CoS 767 and CoPant 97222 (mid-late) were tested in RBD with two replications.

Highest cane yield was recorded in variety UP 21425 (84.72 t/ha) followed by CoSe 21451 (84.03 t/ha) and CoS 20231 (81.71 t/ha). UP 21452 gave the highest CCS yield t/ha (9.69 t/ha) followed by CoS 20231 (9.51 t/ha) and CoSe 21451(9.37 t/ha). Sucrose % in juice was found highest in variety CoSe 21451(16.72) followed by UP 21452 (16.25) and CoLk 94184 (16.25) in the month of Nov. While, in the month of December the highest sucrose % in juice was recorded in the variety CoS 20231 (17.16) followed by CoS 21231 (17.00) and CoSe 21451 (16.97).

State varietal trial I plant

Seventeen varieties, namely CoSe 22451, UP 22452, CoS 17232, CoS 18232, S 45/17 S155/17, S 161/17, S 168/17, S 1/18, CoLk 19201, CoLk 19202, CoLk 19204 along with five standards CoJ 64, Co 0238, CoSe 95422 (Early), CoS 767 and CoPant 97222 (mid-late) were tested in RBD with two replications. Based on cane yield variety UP 21452 (96.30 t/ha) gave highest yield followed by CoSe 22451(91.20t/ha) and genotypes S 161/17(88.19 t/ha). Whereas highest CCS t/ha was recorded in UP 22452 (12.02 t/ha) followed by CoSe 22451(12.02 t/ha) and CoS 18232 (10.86 t/ha). Highest sucrose % in juice was recorded in variety CoLk 19202 (15.95 %) followed by CoS 17232 (15.62 %) and S 45/17 (15.38 %) in the month of November. Whereas, in the month of January highest sucrose % in juice was recorded in the variety CoLk 19202 (17.92 %) followed by CoS 17232 (17.62 %) and CoSe 22451 (17.28 %). In the month of March the highest sucrose % juice was found in the variety CoSe 22451 (19.08 %) followed by standard CoLk 94184 (18.60 %) and CoJ 64 (18.48 %).

UPCSR- SRS, Gola

First clonal generation (C_1)

A total of 1324 genotypes along with four standards *viz*. CoJ 64, Co 0238, CoS 767, Co Pant 97222 were tested. Out of these, 104 desirable genotypes were selected for multiplication and detail study in the C_2 generation.

Second clonal generation (C_2)

A total of 104 genotypes of 2024-25 series along with four standards *viz.* CoJ 64, Co 0238 , CoS 767, Co Pant 97222 were studied. Out of these, 24 desirable genotypes were selected for multiplication and detailed study in preliminary varietal trial for 2025-26.

04. BIOTECHNOLOGY

UPCSR-SRI, Shahjahanpur

DNA fingerprinting for identification and protection of elite sugarcane (*Saccharum* spp) varieties, using molecular markers

The DNA fingerprinting was developed for the identification and protection of elite newly developed sugarcane varieties (*Saccharum spp*. Hybrids) by using molecular markers. Different three types of molecular markers viz; Simple Sequence Repeat (SSR), Inter Simple Sequence Repeat (ISSR) and Random Amplified Polymorphic DNA (RAPD) were taken for this study. Genomic DNAs from 10 sugarcane cultivars *viz*; CoSe 21451, CoS 21231, CoS 21232, CoS 20232, CoS 20231, UP 21452, CoS 21233, CoS 767, CoS 19231 and CoS 19235 were amplified with 05 polymorphic markers of SSR, RAPD and ISSR using Gene Amp PCR System 9700 (Applied Bio systems make, USA). Markers UGSM 354, UGSM 358, RAPD GCC 02, ISSR UBC 811 and ISSR UBC 815 were found highly amplified pattern and could distinguish the cultivars tested. A total of 168 bands were obtained. A total of 168 fragments originated in all used primers. An average number of fragments were obtained as 11.42 fragments per cultivar, which ranged from 1 to 5 fragments. This system is informative and useful in protecting new varieties and identifying cultivars because it consists of not only important information for a cultivar but also its specific molecular identification (Table 4.1 and Fig 4.1, 4.2).

Table 4.1. DNA fingerprinting of elite sugarcane genotypes/varieties with SSR, ISSR and RAPD markers.

S. N.	Variety/ Genotype	SSRs		RAPD	ISSRs	
		UGSM 354	UGSM 358	GCC 02	UBC 811	UBC 815
1	CoSe 21451	200, 239, 278	197, 278	163, 183, 249	500, 1094, 1331	500, 1194, 1331
2	CoS 21231	239, 278, 308, 383	278, 900	163,183, 249	971, 1194, 1331	971, 1194, 1331
3	CoS 21232	239, 278, 308, 383	2780, 900	163, 183, 249	971, 1194, 1331	971, 1194, 1331
4	CoS 20232	186, 200, 239, 278, 308	278	163, 183, 249	500, 1331	500, 1331
5	CoS 20231	186, 239, 278, 308	278	163, 183, 249	500, 569, 1194, 1331	500, 569, 1194, 1331
6	UP 21452	200, 308, 383	163, 278, 900	163, 183, 204, 249	163, 183, 204, 249	971, 1194, 1331
7	CoS 21233	239, 278, 308, 600	150, 206, 278, 900	163, 183, 204, 249	163, 183, 204, 249	-
8	CoS 767	186, 200, 278	278, 900	163, 183	163, 183	569, 1194, 1331
9	CoS 19231	278, 3.8, 383, 600	278, 350, 900	163, 183, 204, 249	163, 183, 204, 249	500, 1194, 1331
10	CoS 19235	200, 278, 308, 440	150, 278, 350, 900	163, 183, 204	163, 183, 204	500, 971, 1194, 1331

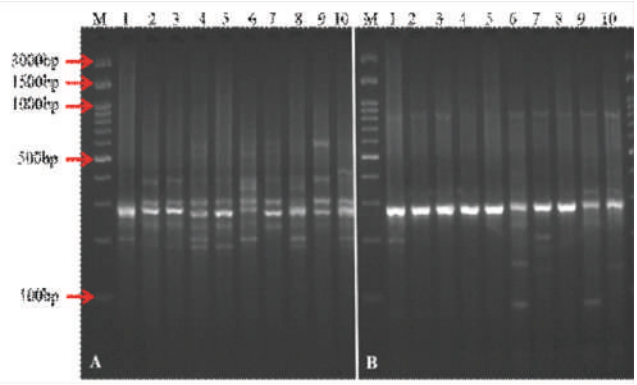


Fig. 4.1. DNA profile and banding pattern of 10 genotypes/varieties with two SSR markers. A: -UGSM 354 and B: - UGSM 358, Lane detail is as M- 100 bp ladder (lane-1); **1**- CoSe 21451, **2-** CoS 21231, **3-** CoS 21232, **4-** CoS 20232, **5-** CoS 20231, **6-** UP 21452, **7-** CoS 21233, **8-** CoS 767, **9-** CoS 19231 and **10**- CoS 19235

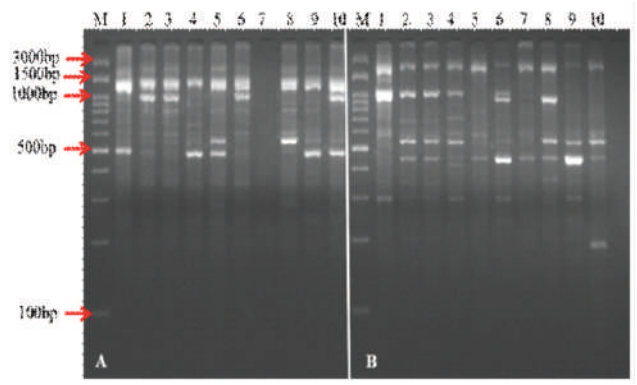


Fig. 4.2. DNA profile of 10 samples of sugarcane genotypes/varieties with two ISSR markers. **A: -** UBC 811 and **B:-** UBC 815, Labe detail is as M- 100 bp ladder (lane-1); **1**- CoSe 21451, **2-** CoS 21231, **3-** CoS 21232, **4-** CoS 20232, **5-** CoS 20231, **6-** UP 21452, **7-** CoS 21233, **8-** CoS 767, **9-** CoS 19231 and **10**- CoS 19235.

Plant growth promoting and salt stress tolerance activity of novel bacteria in sugarcane crop.

A. To evaluate the plant growth-promoting activities of novel bacterial strain (*Stenotrophomonas maltophilia* B2132 and *Psedomonas studzerry* B2133) in sugarcane plant

An experiment was carried out in pot conditions under glass houses with the objective "*To evaluate the Plant Growth-Promoting activities of novel bacterial strain (Stenotrophomonas maltophilia B2132 and Psedomonas studzerry B2133) in sugarcane plant*". The experiment was laid out in a randomized block design with thre replications. Four treatments such as **T_1:** Control-No bacterial inoculation (Inoculation with sterile water) **T_2:** Inoculation with *S. maltophilia* B2132 **T_3:** Inoculation with *P. studzerry* B2133 **T_4:** Inoculation with B2132 and B2133) were taken under PGP activity experiment. Bacterial applications increased the biomass of sugarcane plant under pot conditions. Each pot was filled with 6 kg of autoclaved soil. The soil was analysed according to standardized protocol of UPCSR. The main physical and chemical properties of the soil used a represented in Table 4.2. Each pot was contained five sterilised single bud and irrigated with sterilized tab water. All treatments received the recommended dose of fertilizers at the time planting in February month. Pots were arranged in a complete randomized block design with three replicates. For inoculation treatments, cane setts were soaked for 2h in the bacterial suspension of 10^9 CFU and placed at the same depth (approximately 2.5 cm below the soil surface) in all inoculated pots. The uninoculated control treatment consisted of water-treated seeds (without bacterial inoculation) was included.

The effect of both the bacterial strain with multiple PGP activities on cane plant growth was evaluated in a pot experiment (Table 4.3, Fig.4.3). Germination were recorded maximum in T_4 (100%) followed by 93.3% T_2 (*S. maltophilia* B2132) and 86.7% in T_3 (*P. studzerry* B2133) treatments as compared to control T_1 (80%). Maximum shoot height was observed 195.53 cm in T_2 treatments. Fresh per cane weight was recorded 550 gram in T_2 as compared to other

Table 4.2. Soil analysis of different treatments for EC, pH, organic carbon, macro and micronutrient contents (Mean value) for PGP.

Treatments	Mean value of micronutrient in soil										
	PH	E.C	Organic C (gm/km)	N kg/ha	P kg/ha	K kg/ha	S (ppm)	Zn (ppm)	Fe (ppm)	Mn (ppm)	Cu (ppm)
T_1	7.34	0.16	0.43	223.98	7.80	130.67	9.93	2.79	5.48	0.41	2.41
T_2	6.99	0.16	0.47	235.18	10.71	100.80	10.60	1.51	15.72	0.97	1.64
T_3	7.18	0.15	0.52	250.59	8.40	317.00	11.10	4.30	6.85	0.58	2.17
T_4	7.28	0.18	0.35	265.56	19.77	238.93	32.53	5.61	7.75	4.80	5.80
Control (Sterilized soil)	7.16	0.3	4.37	225.73	7.6	351.58	9.6	1.4	4.11	45.7	1.61

treatments. Similarly, improvements in leaf area, chlorophyll (A & B), total chlorophyll content and biomass weight were also found more in T2 treatments over untreated control (Table 4.3, 4.4 and Fig 4.3). PGP activities of both the bacterial strains (*S. maltophilia* B2132 and *P. studzerry* B2133) were recorded under pot condition. No remarkable changes were recorded in all the treatments.

Table 4.3. PGP activity on germination, plant height, cane weight, root weight, leaf area, biomass (Fresh and Dry wt.) and quality data.

Treatment	Germination %	Plant Height	Cane Weight (gm)	Root Weight (gm)	Leaf Area	Fresh wt. (g)	Dry wt. (g)
T_1	80.0	177.76	436.00	212.00	190.79	245.33	84.33
T_2	93.3	195.53	550.00	279.33	191.44	279.33	108.00
T_3	86.7	166.88	360.33	185.33	178.02	185.33	68.67
T_4	100.0	154.45	501.33	249.67	180.75	226.00	96.00

Table 4.4. PGP activity as chlorophyll and quality contents in plant.

Treatments	Chlorophyll contents (µ mol/m-2)			Quality content (%)		
	Chlorophyll a	Chlorophyll b	Total Chl.	Brix	Sucrose	Purity
T_1	12.33	15.65	316.41	21.02	18.5	87.9
T_2	13.90	17.90	409.79	21.32	18.7	87.5
T_3	8.52	10.96	262.61	19.43	16.7	86.1
T_4	13.36	14.34	382.86	20.79	18.2	87.4

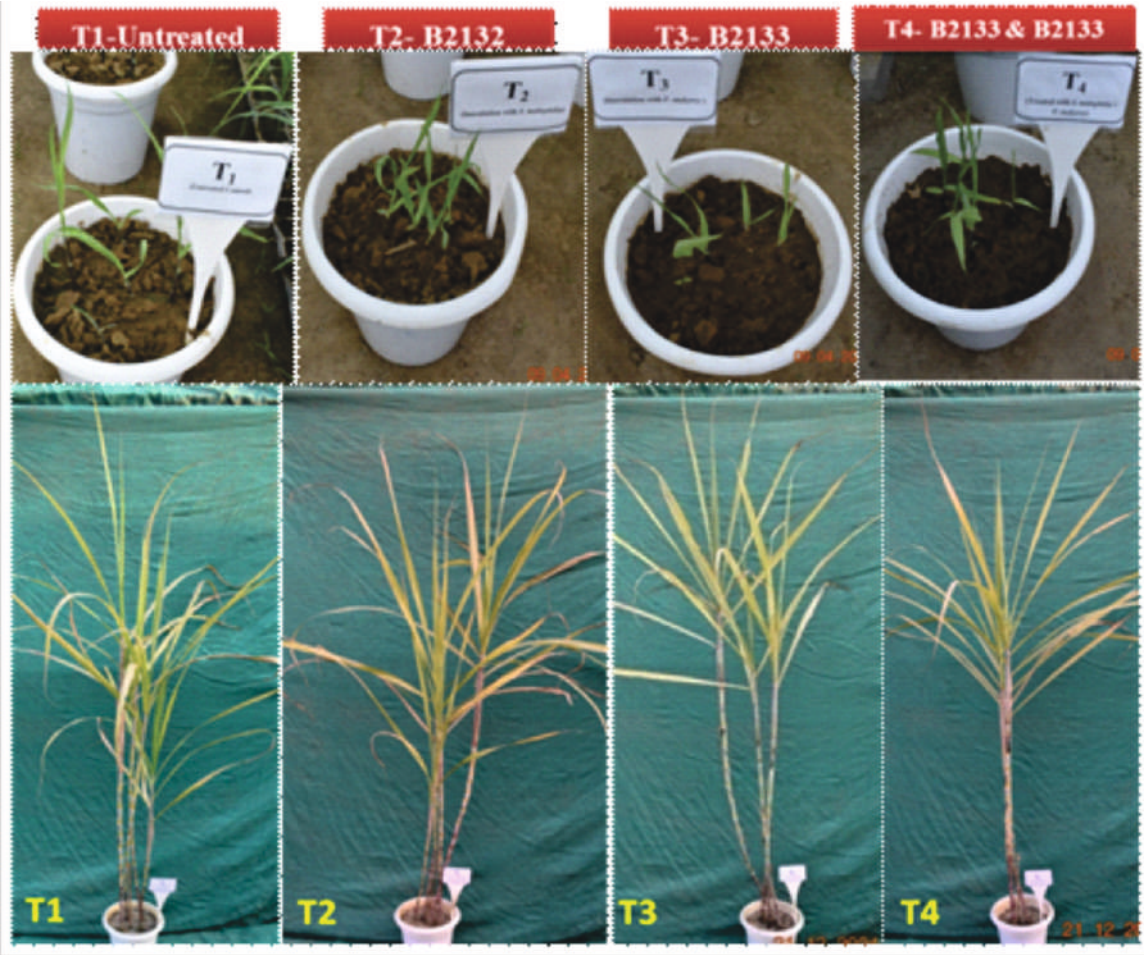


Fig. 4.3. PGP activity of both the bacterial strains *S. maltophilia* B2132 and *P. studzerry* B2133.

B. To evaluate the efficacy of novel strains to confer salt stress tolerance in sugarcane plant

This study was examined the effects of salt on functional characterization and the capability to reduce plant stress by using novel bacterial strains. There were nine treatments viz; T_1- Untreated soil (without salinity), T_2-Treated with *S. maltophilia,* T_3- Treated with salt 4 EC, T_4- Treated with salt 8 EC, T_5- Treated with salt 4 EC + *S. maltophilia,* T_6- Treated with salt 8 EC + *S. Maltophilia,* T_7- Treated with salt 4 EC + *S. studezrry,* T_8- Treated with salt 8 EC + *S. studezrry,* T_9- Treated with salt 4 EC + B2132 + B2133 were taken under salt stress experiment. Preparation of bacterial inoculum and cane setts treatment was performed as per standard protocol. Cane setts were surface sterilized by treating with 70% ethanol followed by 2% sodium hypochlorite (NaOCl) solution for 3 min. The sterilized seeds were thoroughly washed using sterile water to remove all traces of sodium hypochlorite. The surface-sterilized cane setts were kept in the bacterial suspension for 1h. Six kg serilized soil was utilized in each pot and three salt combinations of $ZnSo_4$, NaCl and $CuSo_4$ were mixed with serilized soil to mainitain the salinity. The salt was mixed based on soil weight to achieve the desired concentration i.e. 4 EC and 8 EC. All the pots were arranged in completely randomized block design with three replications in each treatment. Physiochemical characteristics of soil used for plant growth study have been summarized in Table 4.5. The present study demonstrates that use of the inoculation with bacterial strain *S. maltophilia* improves the growth with ionic balance at 4 EC in soil (Table 4.5 and Fig 4.4). The physical and chemical properties of the soil are depicted in Table 4.5. Highest germinations were found 100% in T_5 and T_7, 91.7% in T_2 and T_9 as compared to 83.3% in T_1 (Control). In case of plant heights 169.0 cm, 164.5 cm, 143.38 cm and 143.13 cm were found in T_2, T_5, T_9 and T_1 respectively. Similarly, improvement in total chlorophyll content was found increased in T_2 (*S. maltophilia*) treatments over untreated control. The present study demonstrates that the use of bacterial strain *S. Maltophilia* improves the growth with ionic

Table 4.5. Soil properties of different treatments for EC, pH, organic carbon, macro and micro nutrient contents for salt stress.

Treatments	PH	E.C	Organic C (gm/km)	N kg/ha	P kg/ha	K kg/ha	S (ppm)	Zn (ppm)	Fe (ppm)	Mn (ppm)	Cu (ppm)
T_1	7.02	0.18	0.32	190.21	7.82	324.80	8.07	4.41	7.87	15.94	9.18
T_2	7.50	0.14	0.28	176.02	14.68	138.13	8.07	13.21	12.96	4.65	3.23
T_3	7.28	0.16	0.32	191.43	7.62	619.73	7.83	9.22	13.19	12.22	2.11
T_4	6.96	0.44	0.32	189.95	7.59	627.20	9.03	6.43	19.81	14.71	3.35
T_5	7.16	0.18	0.29	182.49	12.60	306.13	8.23	4.19	14.90	8.80	2.32
T_6	6.99	0.18	0.31	189.54	7.56	433.07	8.20	9.06	21.10	11.81	0.79
T_7	6.98	0.17	0.32	192.43	13.67	448.00	8.43	10.68	20.97	6.87	0.59
T_8	7.09	0.16	0.40	214.50	10.13	451.67	8.83	8.28	19.76	21.10	0.99
T_9	7.22	0.15	0.29	181.49	12.20	261.60	8.07	18.97	16.60	1.50	0.65
Sterilized soil	7.16	0.3	4.37	225.73	7.6	351.58	9.6	1.4	4.11	45.7	1.61

Table 4.6. Different growth parameter and quality data of salt stress treated sugarcane plant in pot condition.

Treatment	Germination (%)	Plant height (cm)	Plant weight (g)	Root weight (g)	Leaf Area (cm)	Fresh wt. (g)	Dry wt. (g)
T_1	83.3	143.13	316.00	201.33	185.18	166.67	56.00
T_2	91.7	169.00	288.33	99.00	194.88	158.67	46.00
T_3	83.3	121.67	267.33	91.67	104.60	94.00	33.33
T_4	50.0	59.71	157.00	64.00	59.17	78.67	27.33
T_5	100.0	164.50	187.00	100.00	105.55	132.00	43.00
T_6	91.7	65.33	99.33	33.33	67.41	65.33	26.67
T_7	100.0	125.83	242.00	174.00	139.53	125.33	43.33
T_8	83.3	95.75	197.00	145.00	108.87	98.00	24.00
T_9	91.7	143.38	186.33	136.67	197.89	99.33	34.00

balance at 4 EC in soil. Hence, the result could be concluded that both the bacteria are not found efficient against salt stress tolerance activity (Table 4.6, 4.7 & Fig 4.4).

Table 4.7. Chlorophyll content and quality data of salt stress treated sugarcane plants in pot condition.

Treatments	Chlorophyll l Content (µ mol/m-2)			Quality data		
	Chlorophyll A	Chlorophyll B	Total Chlor.	Brix	Sucrose	Purity
T_1	12.07	13.75	357.71	20.30	16.69	85.78
T_2	14.08	18.07	434.2	19.68	17.49	85.54
T_3	4.07	5.82	130.09	13.18	11.71	57.28
T_4	3.33	4.06	100.73	7.25	6.38	32.68
T_5	4.33	6.61	142.24	13.95	12.19	58.26
T_6	4.20	6.09	140.92	6.13	5.24	28.49
T_7	4.26	5.32	139.89	13.84	11.80	56.79
T_8	2.44	4.63	104.35	13.17	11.33	57.33
T_9	7.01	9.49	219.76	20.36	17.70	86.61

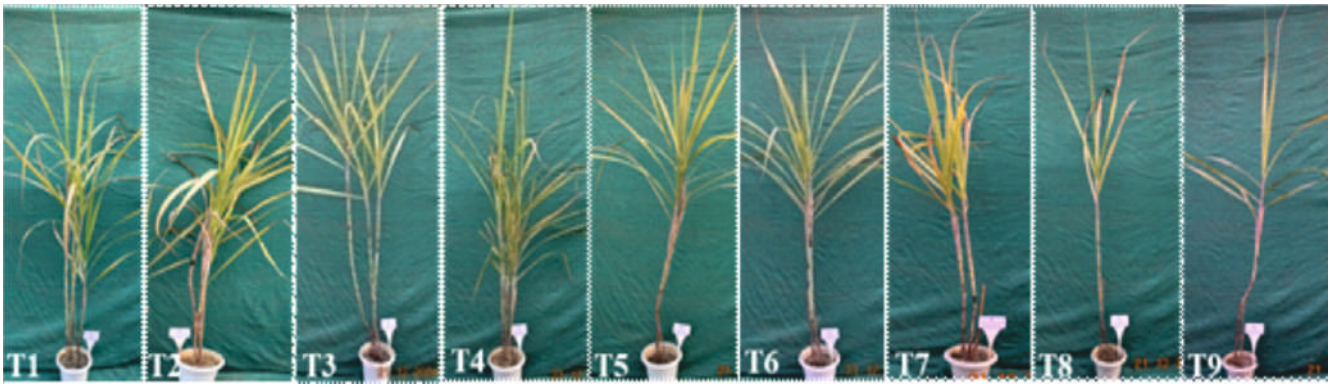


Fig. 4.4. Activity of *S. maltophilia* B2132 and *P studzerry* B2133 on salt stress.

Optimization and standardization of self life period of novel bacterial strain

The study was conducted to formulate and determine the shelf-life of liquid formulation of efficient bacterial strain *S. maltophilia* B2132 in nutrients liquid medium. The glycerol with different concentration from 10 to 50 per cent were used as a cell protectants. The strains used for liquid biofertilizer formulation was *S. maltophilia* B2132. Liquid formulation was taken in 500 ml glass bottles for experimentation. The cell protectants glycerol (10, 20, 30, 40, 50%) was added to the broth during the preparation of media. The prepared media was inoculated with 1.0 ml bacterial strain overnight grown mother culture and incubated in BOD incubator at 28±2 °C. There were a total of six liquid formulations for bacterial strain were used with three variable temperature (-20, 4, 25^0 C). Out of which, six treatments (T_2 to T_6) were prepared using cell protectants (Glycerol) in optimum concentrations. Only nutrient medium was maintained without addition cell protectants in treatment (T_1). All the bacterial strain with broth media and cell protectants were then delivered and each treatment was stored at room temperature (25^{0}C), under deep freezer (-20^{0}C) and 4^{0}C for eleven months with exposure to direct artifical light. Temperature of each storage condition was also monitored for their shelf-life at monthly intervals upto 330 days after storage (DAS) using standard plate count.

The survivability of *S. maltophilia* B2132 at different days of storage is explained in Table 4.8. At sixty days, the highest number of colonies was observed in T_2 (broth + 10% glycerol; 196x10^8 at 25^{0}C, 208x10^8 at 4^{0}C and 200x10^8 cfu/ml at -20^{0}C) followed by T_1 (broth + 0.0 % glycerol: 131x10^8 at 25^{0}C, 166x10^8 at 4^{0}C and 102x10^8 cfu/ml at -20^{0}C) and the lowest number of colonies was observed in T_6(broth + 50% glycerol: 9x10^8 at 25^{0}C, 11x10^8 at 4^{0}C and 9x10^8 cfu/ml at -20^{0}C). At 180 days after storage (DAS), the highest number of colonies was observed in T_2 (broth + 10% glycerol; 154x10^8 at 25^{0}C, 205x10^8 at 4^{0}C and 168x10^8 cfu/ml at -20^{0}C) followed T_1 (broth + 0.0 % glycerol: 136x10^8 at 25^{0}C, 142x10^8 at 4^{0}C and 95x10^8 cfu/ml at -20^{0}C) and the lowest colonies were retained in T_3 (broth + 20 % glycerol: 55x10^8 at 25^{0}C, 77x10^8 at 4^{0}C and 47x10^8 cfu/ml

at -20^{0}C). None of the colonies was observed in T_4 (30% Glycerol), T_5 (40% Glycerol), T_6 (50% Glycerol) at 180 and 330 DAS. At 330 days after storage, T_2 (broth + 10% glycerol; 195x10^8 at 4^{0}C) maintained highest number of colonies followed by T_1 (broth + 0.0% glycerol; 112x10^8 cfu/ml at 4^{0}C), while the lowest number of colonies was observed in T_3.

After 60 days, liquid formulation of bacterial strain of *S. maltophilia* B2132 was found alive in all six treatments under 25^{0}C, 4.0^{0}C, -20^{0}C temperature, respectively. After 180 DAS, bacterial culture of *S. maltophilia* was viable only in 0%, 10% and 20% of cell protectants (Glycerol) in liquid formulation of all three respective temperature. After 330 DAS, bacterial culture of *S. maltophilia* B2132 was viable only in 0%, 10% and 20% of cell protectants glycerol liquid formulation of 4^{0}C. Hence, this study clearly highlighted that the combine inoculation of 10% Glycerol was found to be better viability at 04^{0}C and CFU over all the treatment of liquid formulation of B2132 (Table 4.8, 4.9, 4.10 and Fig. 4.5).

Table 4.8. Colony Forming Unit (CFU) at 60 DAS at 1x10^8.

Treatment	Concentration (%)	25^{0}C	4^{0}C	-20^{0}C
T_1	00	131x10^8	166x10^8	102x10^8
T_2	10	196x10^8	208x10^8	200x10^8
T_3	20	88x10^8	92x10^8	77x10^8
T_4	30	32x10^8	64x10^8	35x10^8
T_5	40	18x10^8	10x10^8	22x10^8
T_6	50	9x10^8	11x10^8	9x10^8

Table 4.9. Colony Forming Unit (CFU) at 180 DAS at 1x10^8.

Treatment	Concentration (%)	25^{0}C	4^{0}C	-20^{0}C
T_1	00	136x10^8	142x10^8	95x10^8
T_2	10	154x10^8	205x10^8	168x10^8
T_3	20	55x10^8	77x10^8	47x10^8
T_4	30	-	-	-
T_5	40	-	-	-
T_6	50	-	-	-

Table 4.10. Colony Forming Unit (CFU) at 330 DAS at 1x10^8.

Treatment	Concentration (%)	25^{0}C	4^{0}C	-20^{0}C
T_1	00	-	112x10^8	-
T_2	10	-	195x10^8	-
T_3	20	-	41x10^8	-
T_4	30	-	-	-
T_5	40	-	-	-
T_6	50	-	-	-

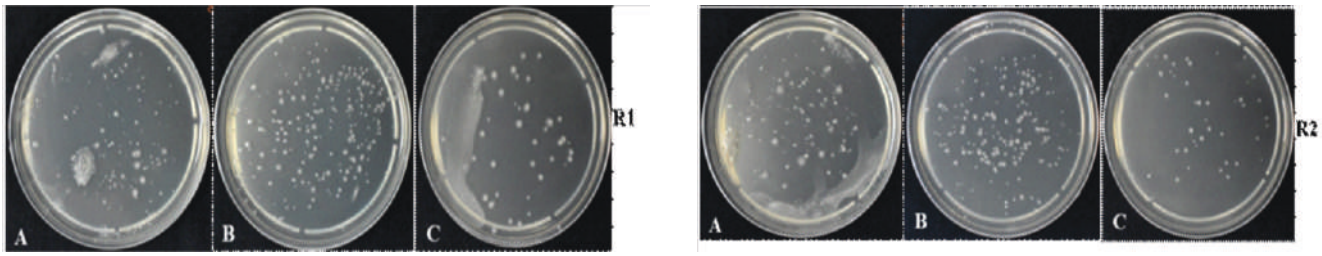


Fig. 4.5. Colony Forming Unit (CFU) at 1x10^8 330 DAS. Detail: A- broth + 0% glycerol at 4^{0}C; B- broth + 10% glycerol at 4^{0}C and C- broth + 20% glycerol at 4^{0}C.

05. AGRONOMY

UPCSR-SRI, Shahjahanpur

Efficacy of planting method and material of sugarcane on cane yield and economics

A field experiment was carried out during autumn season at research farm of Sugarcane Research Institute, Shahjahanpur to find out the effect of planting methods and economics of sugarcane in randomized block design and replicated thrice. The details of the treatments are given as under.

Treatments:

T_1- One budded setts planting @ five buds/ running meter with covering of 5-6 cm soil thickness.

T_2- One budded setts planting @ five buds/ running meter with covering of 1-2 cm soil thickness followed by light irrigation.

T_3- Two budded setts planting @ five buds/ running meter with covering of 1-2 cm soil thickness followed by light irrigation.

T_4- Transplanting of three settlings/running meter raised with STP method on soil, sand and organic manure (1:1:1) mixture.

T_5- Transplanting of three settlings/running meter raised with STP method on bagasse.

T_6- Transplanting of three settlings/running meter raised in tray with soil, sand and organic manure (1:1:1) mixture.

T_7- Transplanting of three settlings/running meter raised in tray with bagasse.

T_8- Transplanting of three settlings/running meter raised in tray with paddy husk.

T_9- Transplanting of three settlings/running meter raised in tray with coco-peat.

T_{10}- Conventional planting with two budded setts planting @ ten buds/running meter.

The soil of the experimental field was low in O.C (0.49%), Phosphorus (9.6Kg/ha) and potassium (145.6 Kg/ha) with pH (6.9). Experimental crop variety CoS 13235 was planted at the row spacing of 135 cm in October and harvested next year in November.

Experiment data (Table 5.1) revealed that raising of one bud setts in tray with coco-pit gave maximum germination (93.07%) followed by raising in tray with bagasse (88.24%). Transplanting of three settlings per running meter raised in tray with coco-pit gave significantly higher no. of shoots (183.33/ha), no of millable canes (120.45/ha) and cane yield (118.98t/ha) followed by transplanting of three settlings per running meter raised in tray with paddy husk than that of conventional planting with two budded setts@ ten buds/running meter.

Agronomical evaluation of newly evolved sugarcane genotypes

This experiment was carried out at research farm of U.P. Council of Sugarcane Research Institute, 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 19231

V_2- CoS 19235

B - Fertility levels

F_1- 100% Recommended NPK

F_2- 100% Recommended NPK + 25% N through organic manure + Biofertilizers (*Azotobacter* + 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 (0.34%) and medium in phosphorus (8.0 kg/ha) and potash (132.16kg/ha) with PH 7.06. The experimental crop were planted in February and harvested in March after 12 months.

Experimental data (Table 5.2) revealed that significantly higher cane yield (94.78 t/ha) was recorded in genotypes CoS 19235 which is at par with CoS 19231 (86.68 t/ha). Regarding fertility levels, 100% recommended dose of NPK + 25%N through organic + bio-fertilizers (*Azotobacter* + PSB) @10kg/ha each gave significantly higher cane yield (103.43 t/ha) than that of 100% recommended dose of NPK (78.03 t/ha). In case of planting methods significantly higher cane

yield (94.23 t/ha) was obtained in 67:134 cm in deep furrow paired row planting as compared to 30:120 cm in trench paired row planting (87.23t/ha)

Evaluation of promising sugarcane varieties under salinity condition

This experiment was carried out at seed multiplication and Research centre Katya-Sadat, Ghazipur to find out the suitable sugarcane varieties for saline soil condition in randomized block design with three replications. Treatment details are as follows.

Treatments:-

(A) Varieties: (V)	**(B) SPMC doses (D)**
V_1- CoS 10239	D_1- 10t/ha
V_2- CoS 16233	D_2- 15t/ha
V_3- CoS 14233	D_3- 20t/ha
V_4- UP 14234	

Note:

(1) Recommended dose of NPK have been applied in each plot.

(2) 30:120 cm paired row planting in trench method was followed.

(3) Initial soil samples taken at least from 10 places in experimental field (up to 0-20 cm depth) and analysed separately for pH, O.C, E.C, Av. N, Av. P and Av. K.

The soil of the experimental field was low in organic carbon (0.46%) and medium in phosphorus (5.1 kg/ha) and potash (228.47 kg/ha) with pH 7.72. The experimental crop were planted in February and harvested in March after 12 months.

Experimental data (Table 5.3) revealed that in salinity condition variety CoS 10239 (mid-late maturing) gave significantly higher cane yield (47.20 t/ha) than that of CoS 16233 (mid-late maturing) (38.20 t/ha). Among SPMC doses 10 t/ha dose proved economically better than 15 and 20 t/ha doses.

Table 5.1: Efficacy of planting method and material on sugarcane yield and quality (2023-25).

Treatments	Germination (%)	Survival (%)	Shoots (000/ha)	NMC (000/ha)	Cane yield (t/ha)	CCS (%)	Net income (Rs/ha)
T_1- One bud sett planting @ 5 buds/running meter with covering of 5 6 cm soil thickness	65.00	-	151.54	102.31	101.70	13.13	196845
T_2- One bud sett planting @ 5 buds/ running meter with covering of 1-2 cm soil thickness followed by light irrigation.	68.75	-	157.79	103.32	103.70	13.19	201645
T_3 - Two bud sett planting @ 5 buds/running meter with covering of 1-2 cm soil thickness followed by light irrigation.	62.92	-	140.05	101.93	101.23	12.78	186728
T_4- Transplanting of three settlings/running meter raised with STP method in soil, sand and organic manure (1:1:1) mixture	84.00 (STP)	83.68	170.52	118.75	107.87	13.18	180085
T_5- Transplanting of three settlings/ running meter raised with STP method raised on bagasse.	85.07 (STP)	80.21	171.14	119.98	114.51	12.33	202755
T_6 - Transplanting of three settlings/running meter raised in tray with soil, sand and organic manure (1:1:1) mixture.	87.86 (In tray)	86.81	168.98	116.97	105.48	12.28	171969
T_7 -Transplanting of three settlings/running meter raised in tray with bagasse.	88.26 (In tray)	87.85	175.46	117.28	106.17	12.28	174339

T_8- Transplanting of three settlings/running meter raised in tray with paddy husk	90.93 (In tray)	87.50	178.86	119.52	116.36	12.30	208819
T_9- Transplanting of three settlings/running meter raised in tray with coco-peat.	93.07 (In tray)	89.24	183.33	120.45	118.98	11.88	217599
T_{10}- Conventional planting with two budded sett @ 10 buds/running meter.	56.88	-	143.05	105.02	99.30	12.45	164429
SE	-	-	6.78	4.09	1.97	0.53	-
CD at 5%	-	-	14.23	8.59	4.14	NS	-

Table 5.2: Agronomical evaluation of newly evolved sugarcane genotypes (2024-25).

Treatments	Germination (%)	Shoots (000/ha)	NMC (000/ha)	Cane yield (t/ha)	CCS (%)
A- Varieties					
V1 - CoS 19231	48.06	139.6	115.8	86.68	12.65
V2– CoS 19235	54.88	162.9	132.5	94.78	12.36
SE	1.04	1.62	2.23	0.33	0.16
CD at 5%	2.22	3.48	4.78	0.71	NS
B – Fertility level					
F1- 100% RDF NPK	50.09	141.0	115.6	78.03	12.57
F2 - 100% RDF NPK+ 25% N through organic manure + Bio -fertilizers (*Azotobacte* r +PSB @ 10 kg/ha each)	52.85	161.5	132.7	103.43	12.44
SE	1.04	1.62	2.23	0.33	0.16
CD at 5%	2.22	3.48	4.78	0.71	NS
C – Planting Method					
S1-67 :134 cm in deep furrow paired row planting	41.75	153.8	125.6	94.23	12.61
S2 – 30:120 cm in trench paired row planting	61.18	148.6	122.8	87.23	12.39
SE	1.04	1.62	2.23	0.33	0.16
CD at 5%	2.22	3.48	NS	0.71	NS

Table 5.3: Evaluation of promising sugarcane varieties under salinity condition (2024-25).

Treatments	Germination (%)		Shoots (000/ha)					NMC (000/ ha)	Cane yield (t/ha)	H.R brix		Net income (Rs/ha)
	30DAP	45DAP	MAY	JUNE	JULY	AUG	SEPT			JAN	MAR	
(A) Varieties:(V)												
V_1- CoS 10239	22.55	29.63	48.7	50.2	51.5	49.5	49.4	44.5	47.2	18.9	21.1	93927
V_2 - CoS 16233	19.74	23.84	46.4	48.5	49.6	47.1	45.7	43.8	38.2	19.4	21.4	56158
V_3- CoS 14233	32.78	38.68	70.0	73.7	69.9	67.3	66.1	61.8	39.5	18.4	20.6	61924
V_4- UP 14234	9.70	13.20	29.9	31.7	35.8	36.9	36.6	34.8	42.5	19.2	21.1	74646

SE	3.48	3.64	5.84	6.28	6.19	6.00	5.98	6.51	3.63	0.48	0.30	-
CD at 5%	7.41	7.76	12.44	13.38	13.19	12.79	12.75	13.23	7.75	NS	0.60	-
(B) SPMC doses(D)												
D_1- 10 t/ha	18.61	23.86	45.2	46.5	47.3	45.7	44.5	41.8	42.7	18.9	20.9	78431
D_2- 15 t/ha	25.85	32.00	56.4	59.2	57.2	54.9	54.9	51.3	41.4	19.5	21.3	69843
D_3- 20 t/ha	19.16	23.16	44.8	47.4	50.7	50.0	46.7	45.6	41.6	18.6	21.0	67630
SE	4.01	4.20	6.74	7.25	7.15	6.93	6.91	5.64	0.70	0.42	0.26	-
CD at 5%	NS	8.96	NS	NS	NS	NS	NS	NS	NS	NS	NS	-

UPCSR- SRS, Muzaffarnagar

Effect of potato and onion transplanting with sugarcane on yield and economics

In order to find out the suitable time of onion transplanting after potato in autumn planted cane for obtaining maximum net returns, this experiment was conducted at research farm of Sugarcane Research Station, Muzaffarnagar during 2023-25 in autumn season. The soil of experimental field was sandy loam with reaction (pH 7.2) neutral having low in organic carbon (0.50%), available phosphorus and medium in available potassium. According to table 5.4, four different time of transplanting of onion after potato were adopted and experiment was laid out in randomized block design with four replications. This experimental crop was planted in trench at 30:120 cm, plot size 6.0 x 6.0 m as per treatment along with an early maturing variety CoS 13235. Experiment was conducted on 10.10.23 and crop harvested on end of December 2024.

The data in table 5.4 revealed that impact of various transplanting date of onion after potato was found significantly on yield attributes and cane yield. Germination was not affected by treatment significantly. In case of potato yield, highest (189.58q/ha) was obtained by treatment T_5-Sugarcane – potato followed by T_2, T_4 and T_1. In onion cases, higher yield was obtained by Treatment- "sugarcane+onion" transplanting in 15thJanuary (163.19q/ha) followed by treatment "sugarcane + potato+onion" transplanting in 15thJanuary (159.72q/ha), 1st and 30th January 154.16q/ha and 150.69q/ha, respectively. Significantly highest tillers (187846/ha), number of millable canes (1276338) and cane yield (110.28 t/ha) were recorded with the treatment 'sugarcane + potato" followed by alone cane. While, potato and onion intercropped treatments, "sugarcane + potato- onion transplanting on 1st January produced higher than 15th and 30th January. In regard to higher net returns, all treatments after potato+ onion transplanting gave higher net return than 'cane+ onion transplanting, cane+ potato and alone cane" treatments and highest (Rs 449986/ha) was obtained by "cane+ potato+ onion transplanting on 1st January followed by 15th and 30th January than other cropping systems.

Agronomical evaluation of new sugarcane genotypes

This experiment was conducted to find out the fertility levels and spacing for newly released sugarcane genotypes 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 genotypes in sub plot. Thus, eight treatments combination in replicated three times in factorial randomized block design. According to treatments (Table 5.5) experiment was conducted on 13.03.24 and crop harvested on 31.03.25.

Results:

Table 5.5 clearly revealed that significantly higher shoots (186806), number of millable canes (143143), cane yield (90.46 ton), ccs yield (11.87 ton/ha) and net profit (Rs 144360) per hectare were obtained by genotype CoS 19235 over CoSe 19231. Trench planted crop at 30:120 cm significantly produced higher shoots (184051), number of millable canes (142685), cane yield (89.86t), ccs yield (12.02 t/ha) and net profit (Rs 140302/per hectare) than deep furrow planting at 67:134 cm spacing. In regards to fertility levels, significantly higher shoots (181181/ha), number of millable canes (141892/ha), cane yield (88.39t/ha), ccs yield (11.76t) and net profit (Rs 143356/per hectare) were obtained 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 of 97.24 t/ha, and net profit (Rs 153287/ha) was recorded by CoS 19235 genotype when its planting was done 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 5.5b, c).

Table 5.4: Effect of potato and onion transplanting on sugarcane yield and economics

Treatments	Ger. (%)	Potato yield q/ha	Onion yield q/ha	Shoots /ha)	NMC (000/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)	%Inc. of top borer	%Inc. of shoot borer
T1- Sugarcane + potato-Onion transplanting on 01st Jan.	70.57	163.61	154.16	181249	121596	105.41	10.82	11.41	333746	469946	1.40	1.10	305	3.16	0.94	1.09
T2- Sugarcane + potato-Onion transplanting on 15th Jan.	70.94	18.55	159.72	180207	120346	103.95	10.77	11.19	352991	424672	1.20	1.05	295	3.12	0.63	1.04
T3- Sugarcane + potato-Onion transplanting on 30th Jan	70.15	186.11	150.69	179096	119791	102.22	10.80	11.04	352126	402872	1.14	0.97	290	3.10	1.48	1.60
T4- Sugarcane – Onion – transplanting on 15th Jan.	70.62	-	163.19	177499	117568	98.61	10.68	10.52	350321	259321	0.74	0.96	288	3.09	1.54	1.81
T5- Sugarcane + potato	70.00	189.58	-	187846	127638	110.20	10.92	12.03	288115	273222	0.94	1.11	312	3.21	2.06	2.13
T6- Sugarcane alone	69.53	-	-	182013	122499	108.12	10.85	11.73	233700	166344	0.71	1.09	307	3.17	1.71	2.32
SE±	1.62	-	-	4375	2263	2.17	0.02	0.23	-	-	-	-	-	-	-	-
CD	NS	-	-	NS	4823	4.63	0.03	0.50	-	-	-	-	-	-	-	-

Table 5.5a: Effect of treatments on yield attributes, cane yield, sugar yield and economics in sugarcane

Treatments	2024-25											
	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
V_1- CoS 19231	66.49	171413	134973	81.56	13.58	11.30	221	2.33	808	170263	131509	0.77
V_2- CoS19235	67.26	186806	143143	90.46	13.13	11.87	236	2.24	764	172259	144360	0.83
SE±	**0.66**	**1864**	**2240**	**3.20**	**0.01**	**0.16**	-	-	-		-	-
CD at 5%	**1.41**	**3999**	**4805**	**6.85**	**0.03**	**0.33**	-	-	-		-	-
F_1- 100% NPK	67.79	177037	136225	83.63	13.38	11.41	225	2.26	778	168115	132514	0.78
F_2- 100%NPK+25kg Nthrough organics + Bio-fertilizer	59.21	181181	141892	88.39	13.13	11.76	232	2.32	794	174406	143356	0.82
SE±	**0.66**	**1864**	2240	3.20	**0.01**	**0.16**	-	-	-		-	-
CD at 5%	**1.41**	**3999**	NS	NS	**0.03**	**NS**	-	-	-		-	-
S_1- 67:134 cm deep in paired	59.21	174167	135431	82.15	13.30	10.89	226	2.28	781	159801	135567	0.84
S_2- 30:120 cm in trenches	74.54	184051	142685	89.86	13.41	12.02	231	2.30	790	182720	140302	0.77
SE±	**0.66**	**1864**	**2240**	**3.20**	**0.01**	**0.16**	-	-	-		-	-
CD	**1.41**	**3999**	**4805**	**6.85**	**0.03**	**0.33**	-	-	-		-	-

Table 5.5b: Interaction effect of variety x spacing x fertility level on Cane yield, CCS yield and CCS% -2024-25

Variety	Treat.	Cane Yield t/ha			CCS%			CCS Yield t/ha		
		S1	S2	Mean	S1	S2	Mean	S1	S2	Mean
V_1- CoS19231	F1	75.63	82.15	**79.07**	13.54	13.65	**13.60**	10.189	11.265	**11.227**
	F2	80.72	87.38	**84.05**	13.50	13.60	**13.55**	10.886	11.874	**11.380**
	Mean	**78.18**	**84.95**	**81.56**	**13.52**	**13.63**	**13.58**	**10.538**	**11.570**	**11.303**
V_2- CoS 19235	F1	84.07	92.33	**88.20**	13.08	13.21	**13.15**	11.00	12.192	**11.596**
	F2	8.21	97.24	**92.73**	13.07	13.15	**13.11**	11.520	12.784	**12.152**
	Mean	**86.14**	**94.79**	**90.47**	**13.08**	**13.18**	**13.13**	**11.260**	**12.488**	**11.874**
		81.17	**89.87**		**13.30**	**13.40**		**10.889**	**12.029**	
SE±/ CD for VxF		**4.52/ NS**			**0.02 / NS**			**0.61/ NS**		
SE±/ CD for FxS		**4.52/ NS**			**0.02/ 0.02**			**0.61/ NS**		
SE±/ CD for SxV		**4.52/ NS**			**0.02/ NS**			**0.61/ NS**		
SE±/ CD forVxFxS		**6.39/ NS**			**0.03/NS**			**0.86/ NS**		

Table 5.5c: -Interaction effect of variety x spacing x fertility level on economics 2024-25

Variety	Treat.	Cost of cultivation Rs/ha			Net profit Rs/ha			B:C		
		S1	S2	Mean	S1	S2	Mean	S1	S2	Mean
V_1- CoS19231	F1	155728	178388	167058	124103	126899	125501	0.79	0.71	0.75
	F2	162193	184743	173468	136471	138563	137517	0.84	0.75	0.80
	Mean	**158960**	**181565**	**170263**	**130287**	**132731**	**131509**	**0.82**	**0.73**	**0.77**
V_2- CoS 19235	F1	157648	180698	169173	136597	142457	139527	0.86	0.78	0.82
	F2	163638	187053	175345	145097	153287	149192	0.88	0.81	0.85
Mean	**Mean**	**160643**	**183875**	**172259**	**140848**	**147872**	**144360**	**0.87**	**0.79**	**0.83**
		159801	**182720**		**135567**	**140301**		**0.85**	**0.76**	

UPCSR- GSSBRI, Seorahi

Agronomical evaluation of new evolved sugarcane genotypes

An experiment was conducted in spring season to find out the fertility levels and planting method for promising sugarcane genotype. The soil of the experimental site was found medium in organic carbon and phosphorus and low in available potash with pH 8.15. Based on the observations taken it was found that germination percent was not significantly affected by the different genotypes, fertility levels and planting methods. Shoot population, NMC and cane yield were found significantly higher in genotype CoSe 19452 (i.e. 145700 ha^{-1} and 114560 ha^{-1} and 106200 ha^{-1} respectively) as compared to CoSe 20452. Application of recommended dose of NPK+25 per cent N through organic manure + biofertilizers produced significantly higher shoot population (144000 ha^{-1}), NMC 109200 ha^{-1} and cane yield 99.24 t ha^{-1} over recommended dose of NPK practice. Effect of plant geometry on NMC was significantly higher in 30:120 cm trench method i.e. 109200 ha^{-1}. CCS per cent was not affected significantly by plant geometry treatments but genotype CoSe 20452 produced significantly higher CCS per cent (9.37) against CoSe 19452 **(Table 5.6).**

Table 5.6: Agronomical evaluation of new sugarcane genotypes

Treatments	Germination (%)	Shoot (000/ha)	NMC (000/ha)	Yield (t/ha)	CCS (%)		CCS (t/ha)
A. Genotypes					10 Month	12 Month	
CoSe 20452	50.32	133.9	98.6	89.76	9.37	12.54	11.24
CoSe 19452	54.66	145.7	114.56	103.2	7.30	11.94	12.30
SE	1.40	1.61	1.06	1.03	0.44	0.21	0.22
CD(P=0.05)	NS	4.90	3.20	3.12	1.33	NS	0.67
B. Fertility levels							
100 % RDF	51.14	135.6	104.1	93.69	8.51	12.13	11.49
100 % RDF+25 % O. M.	53.84	144.0	109.2	99.24	8.01	12.17	12.05
SE	1.40	1.61	1.06	1.03	0.44	0.21	0.22
CD(P=0.05)	NS	4.90	3.20	3.12	NS	NS	NS
C. Planting methods							
67:134 cm	50.98	133.3	100.7	92.88	8.67	12.42	11.50
30:120 cm	54.45	146.3	112.5	100.1	7.83	12.06	12.01
SE	1.40	1.61	1.06	1.03	0.44	0.21	0.22
CD(P=0.05)	NS	4.90	3.20	3.12	NS	NS	NS

Feasibility of mechanical planting in sugarcane cultivation

The soil of the experimental plot was medium in organic carbon, low in available phosphorus and potash with pH 7.90. An experiment was conducted in randomized block design with four replications in autumn season. It was consist of six treatments i.e. T_1- Mechanical planting in paired row at 165 (45:120) cm with automatic trench planter, T_2- Mechanical planting in paired row at 150 (30:120) cm with automatic trench planter, T_3- Mechanical planting in paired row at 187 (67:120) cm with automatic deep furrow planter, T_4- Mechanical planting in paired row at 201 (67:134) cm with automatic deep furrow planter, T_5- Manual planting in paired row in trench at 150 (30:120) cm spacing and T_6- Conventional planting at 90 cm row spacing. Germination percent was found significantly higher in manual trench planting (51.09) as compared to other planting methods except mechanical trench planting methods. Manual planting in paired row in trench at 150 (30:120) cm spacing produced significantly higher shoot population (151120 ha^{-1}), number of millable cane (120600 ha^{-1}) and cane yield (113.9 t ha^{-1}) over other planting methods except T_1 and T_2. Commercial cane sugar percent was not significantly affected by different treatments **(Table 5.7)**.

Manual paired row trench planting

Automatic deep furrow planter

Automatic trench planter

Table- 5.7: Response of mechanical planting on sugarcane productivity

Treatments	Germination (%)			Shoot (000/ha)	NMC (000/ha)	Cane Yield (t/ha)	CCS (%)	CCS (t/ha)
	20 DAP	40 DAP	60 DAP					
T_1	6.20	29.58	47.94	140.6	118.5	110.3	11.04	12.18
T_2	8.04	28.81	47.85	145.4	116.5	108.8	11.57	12.60
T_3	6.86	23.75	44.25	123.8	102.1	92.24	11.17	10.22
T_4	6.21	27.14	44.13	115.1	97.00	87.61	11.03	9.66
T_5	8.15	29.24	51.09	151.2	120.6	113.9	11.27	12.86
T_6	6.30	21.92	43.25	134.6	103.7	77.39	10.82	8.41
SE	**0.48**	**1.36**	**1.26**	**3.53**	**2.79**	**4.06**	**0.34**	**0.53**
CD(P=0.05)	**1.45**	**4.12**	**3.38**	**10.62**	**8.45**	**12.35**	**NS**	**1.61**

Results:

CoSe 19452 produced significantly 14.9 percent higher cane yield (103.17 t/ha), as compared to CoSe 20452 (89.76 t/ha). CoSe 20452 genotype produced significantly higher sugar percent when recorded at 10 months. The recommended dose of NPK + 25%N through organic manure + biofertilizers and trench planting method (30:120 cm plant) gave better results in both genotypes i.e. CoSe 20452 and CoSe 19452.

Mechanical planting in paired row at 165 (45:120) cm with automatic trench planter (T_1) and mechanical planting in paired row at 150 (30:120) cm with automatic trench planter (T_2) were produced sugarcane yield (118.05 and 116.5 t/ha) at par with manual planting in paired row in trench at 150 (30:120) cm spacing (113.9 t/ha).

06. SOIL CHEMISTRY

UPCSR- SRI, Shahjahanpur

Soil survey, testing, fertility mapping and fertilizers recommendation

Under the regular feature programme during the year 2024-25, the work was undertaken on the soil survey, testing, fertility-mapping and fertilizer recommendation in the Mirjapur and Kalan (Future Foods, Jaipur), Dhanoura chini mill, Amroha zone, Dalmia Chini Mill, Nigohi (Shahjahanpur) and Belrayan Chini Mill, Kheri. They provided 552 representative furrow depth soil samples which were collected in the central U.P. zone. Samples were processed and analyzed for major nutrients. Analytical results showed that most of the soils were found deficient in nitrogen and phosphorous while low to medium in potash. The nutrients index percent of Mirjapur and Kalan soil samples were calculated. The nutrients index % for Organic carbon and Phosphorus was low while Potash was recorded medium i.e. 1.33, 1.450 and 1.877 respectively. On the basis of results, fertilizer recommendations were given and fertility map has been prepared. Apart from this, soil samples were obtained from other circle of sugar mill zone of central and western Uttar Pradesh for testing and fertilizer recommendation to maintained the sugarcane standard.

Major Nutrients-

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

The fertilizer recommendation through soil health card and fertility map was given to person concerned.

Soil testing and fertilizer recommendation

A total 2416 soil samples and plants samples were analyzed for major nutrient and micronutrients under soil testing programme. About 552 soil samples were received from farmers/ cane growers from different villages and sugar mill zones of central and western Uttar Pradesh as well as 1864 soil samples were received from different departments and centers of U.P. Council of Sugarcane Research, Shahjahanpur. After analysis of soil samples, nutrient status and fertilizer recommendations were given to person concerned through soil health card.

Among all soil samples 26 soil samples were received from Seed Multiplication Center, Katya Sadat (Gazipur) for the analysis. This center is situated in Eastern UP which soil samples were found alkaline in nature. Soil testing results showed that pH ranged from 8.41-8.63 with a mean value of 8.55, poor in organic carbon percent 0.36-0.56 with mean value 0.49, low in phosphorus (6.8-9.5 with mean value 7.7 kg/ha) and medium to high in potash with mean value 214.52 Maximum adequacy was observed in Mn and Fe micronutrients groups. Fertilizer recommendation were also prepared on the basis of above result and given to person concerned.

Table 6.1: Soil testing and fertilizer recommendation

S. N.	Name of the sugar mill zones	Soil samples collected	Soil samples analyzed	Prepared Recommendations
1.	Future Foods Jaipur (Mirjapur & Kalan, Shahjahanpur)	176	176	176
2.	Dalmia Chini Mill, Nigohi, Shahjahanpur	20	20	20
3.	Belrayan Chini Mill, Kheri	27	27	27
4.	Research Farm, Shahjahanpur	142	142	142
5.	SMC Katya Sadat, Gazipur	26	26	26
6.	Departments of SRI UPCSR, Shahjahanpur	1456	1456	1456
7.	Plant samples from GSSBRI Seorahi, Kushinagar	240	240	240
8.	Farmers/ cane growers of central U.P.	329	329	329
	Total	**2416**	**2416**	**2416**

Nutrient status and fertilizer recommendation for spring and autumn plantation at research farm, Shahjahanpur

Total 71 soil samples were collected from different plots of U.P. Council of Sugarcane Research farm, Shahjahanpur before spring and autumn planting seasons. Soil samples were processed and analyzed for fertility status. Results showed that the pH ranged from 6.62 to 7.65 with a mean value of 7.09, EC (dsm^{-1}) ranged from 0.123 to 0.223 with a mean value of 0.169, Organic carbon percent ranged from 0.29 to 0.620 with a mean value 0.379, available phosphorus (kg/ha) ranged from 7.0 to 22.3 with a mean value of 9.22 and available potash (kg/ha) ranged from 78.4 to 212.8 with a mean value of 125.53. Most of the soil samples were deficient in Zinc and Manganese as per rating of critical limit in respect of micro-nutrients. Available sulphur (ppm) ranged from 6.95 to 12.10 with a mean value of 8.35 ppm. It indicates that most of the soil samples were poor in nitrogen, phosphorous and sulphur whereas potash was found medium while zinc and manganese were found near to critical limit. The plot wise major and micro nutrients fertilizer recommendations were prepared as per results for respective crop and given to the farm superintendent.

Table 6.2: Nutrient status of different plots in autumn planting season at UPCSR farm, Shahjahanpur

Plots no.	pH	EC (dsm-1)	OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)	Zn (ppm)	Fe (ppm)	Mn (ppm)	Cu (ppm)	S (ppm)
C1N	6.92	0.172	0.495	243.63	8.9	112.0	2.502	12.05	1.16	1.438	9.8
C2N	7.49	0.182	0.33	194.42	11.1	101.92	2.582	15.308	0.988	0.916	8.3
J-1	6.95	0.173	0.42	221.2	7.8	136.56	6.47	9.29	1.718	2.042	9.5
M5S	7.42	0.167	0.321	191.73	7.8	114.56	4.734	12.92	2.298	1.46	8.5
N1N	6.92	0.155	0.495	243.6	8.4	115.2	4.554	17.552	3.358	1.566	9.7
N2N	7.47	0.165	0.367	205.45	9.2	110.16	6.874	4.782	1.01	1.09	7.8
N3N	7.65	0.201	0.345	198.89	12.3	112.20	5.126	11.104	3.838	0.826	8.3
N4N	7.43	0.173	0.425	222.75	8.4	117.42	4.042	7.974	2.122	0.826	8.7
H3	6.93	0.165	0.465	234.68	12.4	118.64	1.06	22.38	1.54	1.038	8.8
H6	7.24	0.145	0.345	198.8	13.5	114.24	1.542	15.274	1.136	0.932	9.4
G6	7.20	0.176	0.395	213.8	9.5	116.48	6.272	14.11	1.186	1.09	9.8
M5N	7.32	0.172	0.345	198.8	8.4	117.29	1.15	8.35	1.97	0.72	8.2
K6-7N	6.94	0.160	0.375	207.84	7.3	112.0	2.332	6.584	0.972	1.38	8.6
K6-7S	6.78	0.143	0.355	201.87	7.1	110.88	2.712	10.732	0.904	1.38	8.4
B3	7.54	0.140	0.30	185.47	8.9	115.36	3.052	9.284	0.436	1.234	7.5
B4	6.79	0.165	0.495	243.63	9.0	90.72	3.89	12.674	0.436	0.918	9.5
D1	7.59	0.223	0.620	280.91	9.4	120.96	3.34	17.976	0.988	1.148	12.1
C4	7.50	0.155	0.45	230.2	9.7	125.44	3.446	8.132	0.822	1.582	9.0
C3N	7.50	0.175	0.30	185.47	9.7	110.88	1.638	9.086	0.27	0.424	7.9
E1	7.44	0.168	0.375	207.84	11.5	89.0	1.494	10.502	0.73	0.104	8.2
E2	7.48	0.178	0.30	185.47	11.7	109.64	1.22	11.852	0.972	0.394	7.8
E3	6.82	0.150	0.465	234.68	9.6	112.2	1.206	13.234	1.13	0.828	7.4
F1	7.54	0.211	0.36	203.36	10.8	113.12	1.586	9.58	0.866	0.714	8.3
C2S	7.47	0.195	0.48	239.15	9.0	92.0	1.272	10.534	0.806	0.452	9.6
J7	7.25	0.144	0.345	198.89	7.4	97.44	6.054	13.672	3.662	3.10	7.2
D3S	6.80	0.175	0.42	221.2	7.1	156.58	5.608	7.162	0.732	1.672	9.0
N5S	7.55	0.184	0.30	176.52	14.3	113.35	3.922	9.226	3.636	0.878	6.9
D3N	6.84	0.178	0.375	207.84	11.3	123.5	4.072	11.356	0.682	1.038	7.8
M4S	7.45	0.160	0.465	234.68	9.2	109.91	2.506	14.486	2.652	1.196	8.8

Table 6.3: Nutrient status of different plots in spring planting season at UPCSR farm, Shahjahanpur

Plots no.	pH	EC (dsm-1)	OC (%)	N (kg/ha)	P (kg/ha)	K (kg/ha)	Zn (ppm)	Fe (ppm)	Mn (ppm)	Cu (ppm)	S (ppm)
A3N	6.85	0.177	0.38	209.33	8.2	123.2	1.772	17.484	0.606	1.72	8.4
A3S	6.90	0.185	0.36	203.36	8.7	89.6	2.038	20.0	0.542	2.11	8.2
D2N	7.05	0.195	0.33	195.42	8.5	156.8	2.38	12.81	0.476	0.817	7.1
D2S	6.92	0.160	0.295	183.98	7.2	112.0	1.72	17.896	0.864	1.654	6.95
N1N	6.71	0.186	0.30	187.47	10.8	123.2	2.248	16.298	0.154	0.548	7.3
N2N	6.80	0.155	0.31	188.45	7.0	112.0	3.174	11.162	0.412	0.808	7.5
A2	7.02	0.177	0.37	206.35	7.7	123.2	3.572	6.488	1.418	0.817	8.3
G3	7.01	0.190	0.33	195.42	7.9	112.0	2.804	4.152	0.838	0.817	7.8
N1S (Cane)	6.89	0.167	0.495	243.63	9.1	89.6	3.148	1.814	1.288	1.068	9.5
N1S (Wheat)	6.95	0.178	0.327	193.52	10.8	112.0	3.148	4.976	0.902	1.004	8.0
N2S (Cane)	7.12	0.173	0.324	192.63	7.1	78.4	3.254	5.25	0.838	1.524	8.4
N2S (Wheat)	6.88	0.145	0.336	196.21	7.5	112.8	3.724	1.172	0.838	0.482	8.9
N3N	6.62	0.180	0.36	203.36	7.9	123.2	3.042	5.664	1.288	0.612	8.3
N3S	6.95	0.165	0.42	221.26	7.8	78.4	4.708	9.238	0.966	0.548	8.5
N4N	6.81	0.177	0.316	190.24	8.1	123.0	4.604	11.57	1.868	0.352	8.7
N4S	6.96	0.182	0.29	182.49	8.3	78.4	5.556	14.87	1.546	0.872	7.3
C2	7.06	0.198	0.379	209.03	7.6	145.6	3.386	11.57	1.096	0.808	9.2
B3	7.09	0.173	0.39	213.31	7.7	201.6	1.11	3.210	0.108	0.904	8.2
B4	6.99	0.164	0.44	227.22	8.7	190.4	1.666	9.650	0.91	0.868	8.8
E1	7.09	0.177	0.41	218.28	7.5	156.8	0.982	5.272	0.91	0.724	7.9
E2	6.66	0.188	0.40	215.29	8.6	156.8	1.774	7.236	6.166	1.736	8.2
F1	7.04	0.167	0.33	194.42	8.8	112.0	1.998	14.350	0.642	1.374	7.5
G5	7.03	0.195	0.36	203.36	9.0	134.4	1.164	5.122	0.744	1.23	7.4
J5	6.79	0.155	0.38	209.33	8.3	100.8	1.132	10.908	1.38	0.76	7.8
M5N	7.02	0.140	0.33	194.42	8.4	168.0	1.484	4.166	1.714	0.868	8.0
M4S	6.95	0.177	034	197.40	8.0	123.2	2.33	5.626	1.278	0.94	8.2
M5SS	6.99	0.188	0.46	233.19	9.1	156.8	1.58	4.166	0.174	0.976	7.8
J7	6.95	0.140	0.35	200.38	22.3	212.8	1.826	8.996	1.614	0.76	9.5
H3	7.12	0.156	0.32	169.4	9.3	145.6	0.864	17.500	0.342	1.048	8.2
K6-7N	6.91	0.187	0.36	203.36	9.0	134.4	0.48	5.474	1.38	1.94	7.8
K6-7S	7.20	0.145	0.39	212.31	8.9	123.2	0.168	2.858	0.944	0.868	7.7
C3N	7.36	0.132	0.56	263.01	8.7	145.6	0.64	5.524	1.246	0.688	11.8
D1	7.04	0.152	0.39	212.31	8.0	212.8	0.928	4.616	0.844	1.158	8.8
D3N	7.27	0.183	0.41	218.28	12.0	156.8	0.544	5.172	1.144	0.976	7.2
D3S	7.27	0.171	0.29	182.49	10.8	212.8	1.346	1.398	0.408	1.122	8.4
H5	7.25	0.177	0.47	236.17	8.7	134.4	0.864	5.272	0.61	1.048	7.9
C2S	7.43	0.123	0.32	169.4	7.9	123.2	1.132	15.034	1.446	1.736	7.7
A1	7.15	0.137	0.38	209.33	10.8	112.0	1.056	4.870	0.944	1.374	7.2
J6	7.10	0.148	0.37	206.35	8.8	134.4	1.12	7.236	0.274	0.976	8.2
C1S	7.07	0.165	0.37	206.35	9.0	112.0	0.992	6.178	1.178	1.266	7.4
G1N	7.26	0.153	0.33	194.42	7.9	123.2	0.891	4.870	1.078	1.482	7.1
C2	7.06	0.198	0.379	209.03	7.6	145.6	3.386	11.57	1.096	0.808	9.2
Total	**504.81**	**12.031**	**26.979**	**14813.73**	**654.7**	**8912.65**	**181.993**	**685.854**	**87.534**	**76.577**	**593.05**
Av.	**7.11**	**0.169**	**0.37**	**208.6**	**9.221**	**125.5**	**2.563**	**9.65**	**1.232**	**1.078**	**16.47**

Effect of Fasal Amrit (Organic hydrogel) in sugarcane cultivation (paid experiment).

Field experiment was conducted during the year 2024-25 in spring planting season at the farm of U.P. Council of Sugarcane Research, Shahjahanpur in RBD design with three replications. The experimental soil had pH 7.02, EC 0.185 (dsm^{-1}), organic carbon percent 0.45, available Phosphorus 7.7 kg/ha,

available potash 152.32 kg/ha, Zinc 2.972 ppm, Iron 7.17 ppm, Manganese 0.169 ppm, Copper 1.82 ppm and Sulphur 9.5 ppm. The treatments comprised: -

T_1- 0kg/ha hydrogel + 100%RDF

T_2- 12kg/ha hydrogel + 100%RDF

T_3- 14kg/ha hydrogel + 100%RDF

T_4- 16kg/ha hydrogel + 100%RDF

T_5- 18kg/ha hydrogel + 100%RDF

T_6- 12kg/ha hydrogel + 80%RDF

T_7- 14kg/ha hydrogel + 80%RDF

T_8- 16kg/ha hydrogel + 80%RDF

T_9- 18kg/ha hydrogel + 80%RDF

Results revealed that application of organic Hydrogel retained soil moisture longer days in compared to control the sucrose percent was regarded higher (6.68%) at 10th months and (4.25%) at 12th month while cane yield (6.30%) in the T_3 (14kg/ha hydrogel + 100% RDF) comparison to control T_1 (Table 6.1).

Experimental results (pooled data of two years, 2023-24 and 2024-25) also revealed that the application of hydrogel 14kg/ha hydrogel + 100 % RDF as (T_3) increased sucrose percent at 10th and 12th month (4.89, 4.88%) of crop age while cane yield increase up to (5.92%) in comparison to control T_1- 0kg/ha hydrogel + 100%RDF. Data significantly proved 10th and 12th month sucrose% & yield with compared to control (Table 6.2).

Bio efficacy of Sai Power Plus (Liquid Fermented Organic Manure) on growth, yield and sugar content in sugarcane.

Field experiment was conducted during the year 2024-26 in autumn planting season at the farm of U.P. Council of Sugarcane Research, Shahjahanpur in RBD design with three replications. The experimental soil had pH 7.34, EC 0.145 (dsm^{-1}), organic carbon percent 0.48, available Phosphorus 9.4 kg/ha, available potash 139.44 kg/ha, Zinc 2.16 ppm, Iron 11.17 ppm, Manganese 0.56 ppm, Copper 0.85 ppm and Sulphur 9.23 ppm,. The treatments comprised:-

Treatments-

T_1- Control (100% N P K (RDF)*)

T_2- 50% N P K + 2 Foliar spray @ 1ml/ lit at 30 and 60 DAP

T_3- 50% N P K + 2 Foliar spray @ 2ml/ lit at 30 and 60 DAP

T_4- 75% N P K + 2 Foliar spray @ 1ml/ lit at 30 and 60 DAP

T_5- 75% N P K + 2 Foliar spray @ 2ml/ lit at 30 and 60 DAP

T_6- 50% N P K + basal application @ 1ml/lit at planting time + 1foliar spray1ml/lit.

T_7- 50% N P K + basal application @ 2ml/lit at planting time

T_8- 75% N P K + basal application @ 1ml/lit at planting time

T_9- 75% N P K + basal application @ 2ml/lit at planting time

*RDF = N-180Kg/ha, P-80Kg/ha, K-60 Kg/ha

Till April 2025 only germination and number of shoots data had taken. Results revealed that by the application of 'Sai power plus' 53.40% higher germination percent achieved in treatment T_7- (50% N P K + basal application @ 2ml/lit at planting time) and No. of shoots were 16.10% higher in treatment T_6- (50% N P K + basal application @ 1ml/lit at planting time + 1foliar spray1ml/lit) with the comparison to control (T_1).

Fig 6.1 Organic Carbon analysis by Titration method

Fig 6.2 Potassium analysis by Flame Photometer

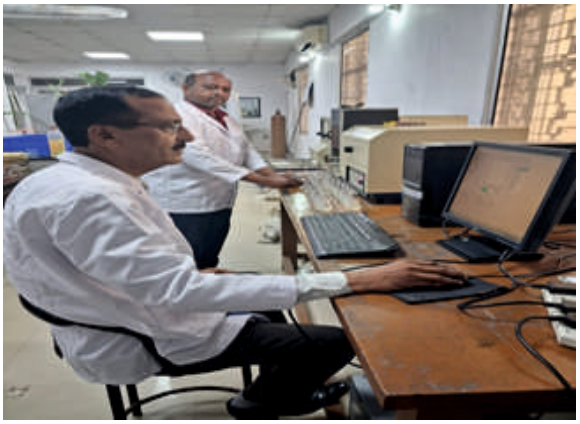


Fig 6.3 Micronutrient analysis by AAS

UPCSR- SRS, Muzaffarnagar

Soil Testing

Total numbers of 1845 soil samples were received from different sugar mill zones and analysis of 1845 soil samples was done. The nutrient index percentage of organic carbon (1.49) low in nitrogen & phosphorus (1.74) and medium in Potash (1.79) was found. The pH ranged between 6.50-8.10 and E.C. ranged between 0.09-0.28 ds/m^{-1}. The fertilizer recommendation were made and given to the concerned cane growers of different sugar mill zones.

Effect of sources of nitrogen (PMT 2023-24)

Study is 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 a monoculture rotation of sugar. Seven treatments were followed as (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. All treatments were 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. (184517), number of millable cane/ha. (124848), yield t/ha (87.39) and sucrose percentage (17.05) and (17.12) at 10^{th} and 12^{th} Month crop age were found in treatment FYM+GN cake +Urea significantly. The minimum number of tillers/ha (116348), number of millable cane/ha (107165), yield MT/ha (75.01) and sucrose percentage (16.29) & (16.60) at 10^{th} and 12^{th} month crop age were recorded in the treatment of control (No manure).

Table 6.4: Nutrition requirements of sugarcane (Source of nitrogen) PMT (2024-25)

Sr. No.	Treatment 135 kg N/ha	Germination %	Tiller/ ha	NMC/ ha	Yield MT/ha	Suc.% Oct.	Suc. % Dec.
1	Control (No manure)	42.60	116348	107165	75.01	16.29	16.60
2	FYM @135 kg N/ha	42.78	118502	112275	78.19	16.49	16.62
3	G.N.Cake@135 kg N/ha	42.70	122670	115380	79.82	16.74	16.80
4	Urea @ 135 kg N/ha	41.92	152696	116425	81.94	16.88	16.89
5	FYM+Urea@67.5kg N/ha	43.89	157482	118730	84.70	16.90	17.01
6	G.N. cake +Urea @ 67.5 kg N/ha	44.75	158687	120841	85.74	16.96	17.07
7	FYM+ GN cake +Urea @ 45 kg N/ha	46.70	184517	124848	87.39	17.05	17.12
	C.D.	Nil	9768	2114	2018	0.069	0.064

UPCSR- GSSBRI, Seorahi

The effect of different sources and doses of potassium on sugarcane.

An experiment was conducted to detect the impact of soil test-based fertilizer recommendation on yield and quality of sugarcane in a randomized block design (RBD) with three replications. There were seven treatments as under.

Treatments: -

T_1- 0 kg K_2O (Control)

T_2- 45 Kg K_2O/ha through MOP (60 % Potash)

T_3- 60 Kg K_2O/ha through MOP (60 % Potash)

T_4- 75 Kg K_2O/ ha through MOP (60 % Potash)

T_5- 45 Kg K_2O/ha through Natural potash (14.5 % Potash)

T_6- 60 Kg K_2O/ha through Natural potash (14.5 % Potash)

T_7-75 Kg K_2O/ ha through Natural potash (14.5 % Potash

Table 6.5: Effect of different sources and doses of potassium on sugarcane.

Treatments	Germination (%)	Shoots (000/ha)	NMC (000/ha)	Sucrose (%)	Yield (Mt/ha)
T_1	41.62	162.7	106.2	14.11	70.20
T_2	42.65	166.0	114.1	15.42	77.89
T_3	43.21	171.5	117.4	15.48	82.83
T_4	45.32	186.0	125.3	16.50	88.63

T_5	43.52	172.8	119.3	15.85	82.46
T_6	44.26	182.9	121.5	15.98	86.16
T_7	44.33	184.6	123.9	16.12	86.78
S. E	0.29	38.83	17.96	0.44	16.38
C.D	0.88	NS	NS	1.35	NS

Soil test F.R. as Murate of potash (MOP 60% potash) and 75% K2O/ha through Natural potash (14.5%) treatment produced significantly higher cane yield (88.63t/ha) treatments. Germination and juice quality were not affected significantly by different fertilizer application treatments.

Table 6.6: Soil status at research farm, Seorahi

Contents	Range		Average
pH	7.64	8.32	7.98
E.C (dsm^{-1})	0.11	0.42	0.27
O.C (%)	0.287	0.698	0.492 (Low)
P (kg/ha)	10.23	23.1 5	16.69 (Low)
K (kg/ha)	43.74	164.02	103.88 (Low)

According to pH most of the soils of research farm were found alkaline in nature. The status of organic carbon, phosphorus and potash was low.

Soil analysis: -

During 2024-25 a total of 248 soil samples were collected from G.S.S.B.R.I. Seorahi farm and analyzed for N, P, K, pH, E.C and Bulk density. In addition, Total 127 Soil samples, received from the fields of Kushinagar farmers were analyzed for N, P, K, EC and pH. Total 1807 farmers samples from received from sugar mills were analyzed for major and minor elements.

S. No.	Samples	No. of Samples	Type of nutrients analyzed
1.	G.S.S.B.R.I. Seorahi farm Different Divisions	248	Major and Minor
2.	Triveni sugar mill	1807	Major and Minor
3.	Farmers	127	Major
4.	Bulk density (g/cm^3)	17	-
Total		**2199**	**-**

Juice analysis: During 2024-25 A total of **1062** samples of juice and **163** samples of bagasse pol were analyzed.

S. No.	Name	No. of Samples
1.	Juice	1062
2.	Bagasse	163
Total		**1225**

07. SUGAR CHEMISTRY

UPCSR-SRI, Shahjahanpur

Juice analysis programme

Juice samples from C2 generation crops, released through various breeding division programs, were analysed. Quality assessment was also conducted on juice from experimental plots across disciplines during cane harvesting to identify any quality differences due to different treatments or experiments. A total of **5193** cane juice samples were analyzed for ^{0}Brix, sucrose content, purity coefficient, pol% in cane, and fiber % in cane. While **3001** samples were assessed for ^{0}Brix, pol%, and purity% in cane, **1096** cane samples were analysed for pol% in cane and fiber% in cane (Table 7.1). The findings were disseminated to relevant departments for further analysis and review (Table 7.1).

Table 7.1: Juice samples analysed during the year 2024-25 from different divisions

Name of the Section	^{0}Brix, Pol% & Purity%	Pol % in cane	Fiber % cane	Total
Agronomy	390	-	-	390
Bio-Chemistry	42	-	-	42
Bio-Technology	31	-	-	31
Breeding	1779	964	964	3707
Entomology	202	-	-	202
Plant Pathology	157	-	-	157
Plant Physiology	198	-	-	198
Soil Chemistry	54	-	-	54
Sugar Chemistry	148	132	132	412
Total	**3001**	**1096**	**1096**	**5193**

Screening of elite sugarcane varieties for sustainable sugar recovery

To identify superior sugarcane clones with high sucrose content suitable for commercial cultivation, twelve elite varieties—comprising six early-maturing and six mid-late maturing genotypes—were evaluated for their juice quality and fiber content. The early-maturing varieties included Co 15023, Co 0118, CoS 17231, CoS 16233, Co 0238, and CoS 13235, while the mid-late maturing group consisted of CoS 767, CoS 09232, CoS 08279, CoS 17234, CoS 10239, and CoS 14233. These varieties were assessed in ratoon crops harvested from October to February. Key parameters evaluated were sucrose percentage in juice, juice purity (pol percentage in cane), and fiber content. Results consistently indicated that early-maturing varieties outperformed mid-late ones in terms of sucrose accumulation and juice purity.

In October, the sucrose content in early-maturing varieties ranged from 13.94% (CoS 16233) to 16.17% (Co 15023), steadily increasing to peak values of 19.06% (CoS 16233) to 19.87% (Co 15023) by February. In comparison, mid-late maturing varieties recorded lower sucrose levels, starting from 12.26% (CoS 08279) to 14.80% (CoS 09232) in October, rising to a maximum of 16.73% (CoS 17234) to 18.56% (CoS 10239) by February. A similar trend was observed in pol percentage, with early varieties maintaining higher purity levels across the harvesting window. Fiber content in early-maturing varieties ranged from 12.58% (Co 15023) to 13.02% (CoS 16233) in October, increasing to 14.76% (Co 0238) to 15.12% (CoS 16233) by February. Mid-late varieties, on the other hand, showed fiber content ranging from 13.07% (CoS 17234) to 13.25% (CoS 767) in October, rising to 15.32% (CoS 14233) to 15.49% (CoS 08279) in February.

These findings highlight the agronomic and industrial importance of integrating both early and

mid-late maturing varieties into cultivation schedules. Strategic varietal selection, coupled with well-planned harvesting timelines, can significantly enhance sustainable sugar recovery across the crushing season (Table 7.2).

Table 7.2: Varietal evaluation for sustainable sugar recovery 2024-25 (Ratoon)

S. No.	Varieties	Months				
		October	November	December	January	February
Sucrose % in juice						
Early maturing						
1	Co 15023	16.17	18.22	18.67	19.08	19.87
2	Co 0118	15.29	18.13	18.62	19.01	19.63
3	CoS 17231	15.05	16.59	18.08	18.70	19.82
4	CoS 16233	13.94	17.30	17.66	18.56	19.06
5	Co 0238	15.24	18.10	18.56	18.98	19.49
6	CoS 13235	15.10	17.98	18.48	18.65	19.19
Mid-late maturing						
7	CoS 767	14.71	19.98	17.34	17.80	18.46
8	CoS 09232	14.80	16.62	17.27	17.88	18.53
9	CoS 08279	12.26	15.39	17.10	17.44	18.07
10	CoS 17234	12.73	13.36	15.50	16.14	16.73
11	CoS 10239	14.10	16.93	17.34	17.95	18.56
12	CoS 14233	14.22	15.36	16.55	17.22	17.63
Pol % in cane						
Early maturing						
1	Co 15023	12.04	12.93	13.25	14.20	14.68
2	Co 0118	11.46	12.83	13.22	14.10	14.47
3	CoS 17231	11.30	11.61	12.84	13.82	14.62
4	CoS 16233	10.46	12.26	12.49	13.70	14.02
5	Co 0238	11.43	12.80	13.18	14.06	14.37
6	CoS 13235	11.33	12.79	13.10	13.80	14.17
Mid-late maturing						
7	CoS 767	11.03	12.06	12.30	13.15	13.62
8	CoS 09232	11.10	11.80	12.26	13.21	13.68
9	CoS 08279	9.20	10.92	12.10	12.91	13.33
10	CoS 17234	9.55	9.46	10.95	11.90	12.35
11	CoS 10239	10.57	12.02	12.31	13.25	13.70
12	CoS 14233	10.65	10.90	11.70	12.71	13.01
Fiber% in cane						
Early maturing						
1	Co 15023	12.58	13.05	13.42	14.36	14.99
2	Co 0118	12.72	13.11	13.50	14.40	14.89
3	CoS 17231	12.78	13.21	13.58	14.70	15.04

4	CoS 16233	13.02	13.27	13.62	14.57	15.12
5	Co 0238	12.70	13.00	13.47	14.39	14.76
6	CoS 13235	12.68	13.04	13.49	14.42	14.91
Mid-late maturing						
7	CoS 767	13.25	13.48	13.70	14.96	15.42
8	CoS 09232	13.20	13.36	13.62	14.90	15.37
9	CoS 08279	13.15	13.32	13.66	14.78	15.49
10	CoS 17234	13.07	13.30	13.74	14.67	15.42
11	CoS 10239	13.22	13.45	13.80	14.92	15.48
12	CoS 14233	13.19	13.38	13.71	14.77	15.32

Assessment of post-harvest quality deterioration in promising sugarcane varieties under sub-tropical conditions

This study aimed to evaluate the post-harvest quality deterioration, primarily the decline in cane weight and sucrose content, of selected sugarcane cultivars, to identify varieties best suited for extended crushing schedules in the sugar industry. Four elite varieties, **CoLk 14201, CoS 13235, CoS 09232, and CoSe 13452**, were assessed for up to 240 hours after harvest under two storage conditions:

(i) **Open field (T_1)** and (ii) **Covered with a thick layer of sugarcane trash (T_2)**.

Results revealed a marked decline in cane weight under both conditions, with significantly greater losses observed during the high-temperature period (April) compared to the low-temperature period (January). Weight loss ranged from **4.58% to 8.09%** in January and **16.28% to 22.48%** in April. The **maximum weight loss** occurred in **CoSe 13452** under T1 conditions—**8.09%** in January and **22.48%** in April—while the **minimum losses** were recorded in **CoLk 14201, 4.58%** in January and **16.28%** in April Similarly, sucrose content also declined over time. Sucrose losses ranged from **1.52 to 2.16 units** during low-temperature storage and **2.16 to 3.17 units** in high temperatures. The **maximum sucrose loss** was observed in **CoS 09232** (2.16 units) during January and in **CoSe 13452** (3.17 units) during April, both under T1 conditions. The **least sucrose deterioration** was found in **CoS 13235** (1.52 units), closely followed by **CoLk 14201** (1.53 units) in January, and **CoLk 14201** (2.16 units) in April.

This evaluation provides critical insights into the varietal differences in post-harvest deterioration. The findings can be instrumental in developing **variety-specific harvest scheduling**, ensuring optimal cane quality from early to late crushing periods. Such strategic planning will enhance farmer returns and support the **sustainable operation of sugar factories** throughout the crushing season.

Testing of sugar recovery in different sugar mills, 2024-25

Under this program, ten sugar mills *viz*; **(1).** The Ganga Kisan Sahkari Chini Mills Ltd., Morna, (Muzaffarnagar) **(2).** The Kisan Sahkari Chini Mills Ltd., Tilhar, (Shahjahanpur), **(3).** Parle Biscuits Pvt. Ltd., Unit-Paresendi (Bahraich), **(4).** Kisan Sahkari Chini Mills Ltd., Sampurnanagar, (Kheri), **(5).** Kisan Sahkari Chini Mills Ltd., Snehroad, Najibabad, (Bijnor), **(6)** Dwarikesh Sugar Ind. Ltd., Dwarikesh Nagar, (Bijnor), **(7).** The Ganga Kisan Sahkari Chini Mills Ltd., Morna, (Muzaffarnagar), **(8).** Tikaula Sugar Mills Ltd., Tikaula, (Muzaffarnagar), **(9).** The Kisan Sahkari Chini Mills Ltd., Anoopshahr, (Bulandshahr), and **(10).** Triveni Engineering & Industries Ltd., Sugar Unit-Sabitgarh, (Bulandshahr) for their sugar recovery. The program was aimed at the quality assessment of major varieties under cultivation from farmer fields. 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 intervals, 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 7.3).

Table 7.3: Testing of sugar recovery and losses in different sugar mills (2024-25)

S. N.	Name of Factory	Date of Testing	Fresh Cane (Pol % in cane)	Yard Cane (Pol % in cane)	Fiberized Cane (Pol % in cane)	Manufacturing Losses %				
						Total Loss by Scientific Analysis	Recovery Analyzed by Scientist	Loss Shown by Sugar Mills	Recovery Shown by Sugar Mills	Difference in Recovery
1	The Ganga Kisan Sahkari Chini Mills Ltd., Morna, (Muzaffarnagar)	21.11.2024	12.85	12.26	11.86	2.41	9.45	1.86	9.10	0.35
2	The Kisan Sahkari Chini Mills Ltd., Tilhar, (Shahjahanpur)	10.12.2024	13.15	12.65	12.30	2.62	9.68	2.19	9.00	0.68
3	Parle Biscuits Pvt. Ltd.,Unit-Paresendi (Bahraich)	23,24.12.2024	13.58	13.14	-	7.48	5.66	3.87	5.51	0.15
4	Kisan Sahkari Chini Mills Ltd., Sampurnanagar, (Kheri)	02,03.01.2025	13.02	12.52	12.22	2.32	9.90	2.09	9.40	0.50
5	Kisan Sahkari Chini Mills Ltd., Snehroad, Najibabad, (Bijnor)	14.01.2025	13.85	13.35	-	2.08	11.57	1.73	11.22	0.35
6	Dwarikesh Sugar Ind. Ltd., Dwarikesh Nagar, (Bijnor)	15.01.2025	14.45	14.10	-	6.88	7.22	6.66	5.92	1.30
7	The Ganga Kisan Sahkari Chini Mills Ltd., Morna, (Muzaffarnagar)	15.01.2025	13.36	13.18	-	2.02	11.16	1.84	9.45	1.71
8	Tikaula Sugar Mills Ltd., Tikaula, (Muzaffarnagar)	16.01.2025	13.72	13.49	-	2.07	11.42	1.89	9.75	1.67
9	The Kisan Sahkari Chini Mills Ltd., Anoopshahr, (Bulandshahr)	17.01.2025	13.30	13.05	-	2.20	10.85	1.98	9.52	1.33
10	Triveni Engineering & Industries Ltd., Sugar Unit-Sabitgarh, (Bulandshahr)	17.01.2025	13.35	13.13	-	2.03	11.10	1.84	10.80	0.30

08. GUR CHEMISTRY

UPCSR-SRI, Shahjahanpur

Varietal screening for jaggery production

Juice quality is a critical determinant of jaggery quality, as factors influencing juice composition directly impact the characteristics of the final product. Research has consistently demonstrated that, irrespective of the boiling and clarification methods used, the chemical properties of cane juice, such as sucrose content, purity, and invert sugar levels, play a pivotal role in defining jaggery quality. To identify the most suitable sugarcane varieties for high-quality jaggery production, a study was conducted at the U.P. Council of Sugarcane Research, Shahjahanpur, using ten sugarcane varieties: CoLk 14201, CoS 18231, CoS 17231, CoS 13235, Co 0238, CoS 767, CoS 16233, CoS 10239, CoS 96275, and CoS 16232. Among these, Co 0238, CoS 13235, CoS 18231, CoLk 14201, and CoS 16233 emerged as the most promising for jaggery production, recording higher gur yield, higher gur percentage on cane, and greater gur percentage on juice basis compared to the other varieties. Furthermore, varieties such as CoS 18231, CoS 13235, Co 0238, CoS 767, and CoS 96275 demonstrated superior jaggery quality in terms of higher pol percentage, lower invert sugar and ash content, and better colour and texture. These findings suggest that these elite varieties hold considerable potential for large-scale, commercial production of high-quality jaggery, thereby supporting value addition and enhanced income opportunities for cane growers (Table 8.1).

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

S. No.	Varieties	Cane Yield t/ha	Gur Yield t/ha	Gur % in Cane	Gur % in Juice	Pol % in Gur	RS mg/ml	Colour Reading
1	CoLk 14201	95.9	10.4	10.8	19.1	77.2	4.3	125
2	CoS 18231	90.2	10.5	11.6	20.1	81.2	3.9	128
3	CoS 17231	86.6	9.9	11.4	20.0	80.0	3.4	126
4	CoS 13235	97.4	11.0	11.3	19.8	83.0	3.3	120
5	Co 0238	102.1	12.2	11.9	20.3	78.6	4.9	135
6	CoS 767	78.8	8.5	10.8	19.6	74.8	2.6	123
7	CoS 16233	82.7	9.3	11.2	19.9	78.0	3.7	130
8	CoS 10239	80.3	8.6	10.6	19.4	81.4	5.9	128
9	CoS 96275	79.2	8.0	10.1	18.3	80.4	3.8	122
10	CoS 16232	79.8	8.5	10.7	19.5	77.2	4.8	132

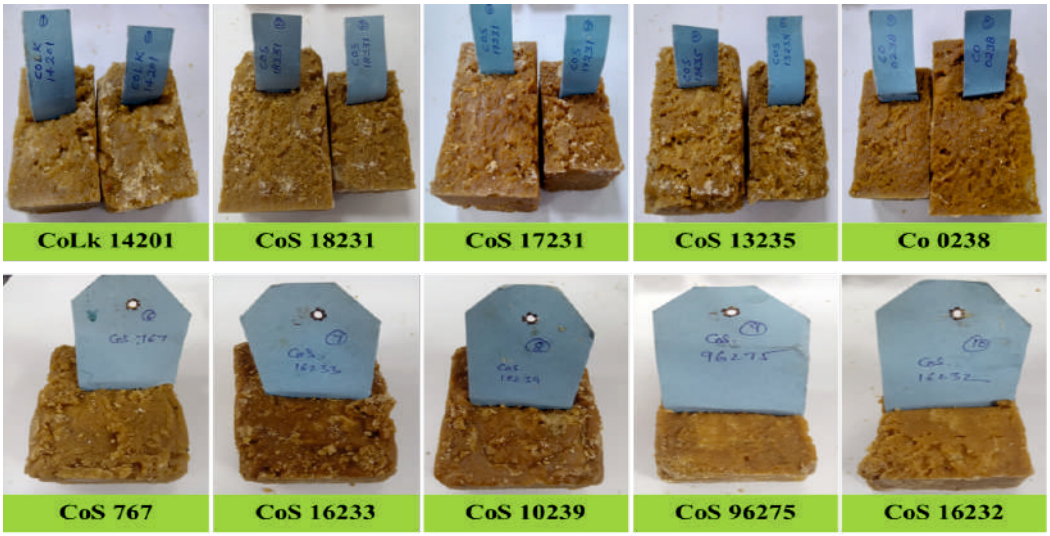


Figure 8.1: Jaggery prepared from different sugarcane varieties

To find out the effect of biotic and abiotic stresses on the physico-biochemical qualities of jaggery

The analysis of various quality attributes of jaggery across different treatments reveals notable variations. Notably, the red rot treatment exhibits the lowest Pol% jaggery at 65.2%, suggesting a negative impact on its purity. Additionally, it shows the highest Colour Reading at 180, indicating a significant effect on jaggery colour. Conversely, the Pokkha boeng and Drought conditions display the lowest color readings. Red rot and Salinity water logging conditions demonstrate higher RS values, suggesting elevated levels of reducing sugars in jaggery under these conditions. Pokkha boeng exhibits the highest Ash% content, while red rot has the lowest at 1.87%. Moreover, Red rot conditions have the highest moisture%, potentially posing challenges in molding. Mineral contents such as Zn, Fe, Mn, and Cu vary across treatments, with Salinity water logging showing higher Fe and Cu content, and Rain-fed conditions presenting lower values for Zn, Fe, and Mn. Considering these findings, particularly the adverse effects observed in the red rot treatment, it is imperative to assess the implications for jaggery's quality and suitability for various applications, including marketability and nutritional value.

Table 8.2. Effect of biotic and abiotic stresses on the physico-biochemical qualities of jaggery

S. No.	Treatments	Pol% Jaggery	Purity %	Colour reading	RS mg/ml	Ash %	Moisture % jaggery	NR Value
1	Control	78.2	83.1	135	5.20	1.94	3.75	66.21
2	Red rot	65.2	72.2	180	12.62	1.87	10.20	46.04
3	Pokkha boeng	72.0	74.6	120	4.58	1.98	2.45	60.49
4	Salinity water logging	77.0	82.8	150	8.33	1.94	3.35	61.88
5	Rain-fed conditions	71.8	79.9	140	7.89	1.96	4.75	57.05
6	Drought conditions	71.4	76.5	125	4.89	1.97	3.20	59.65

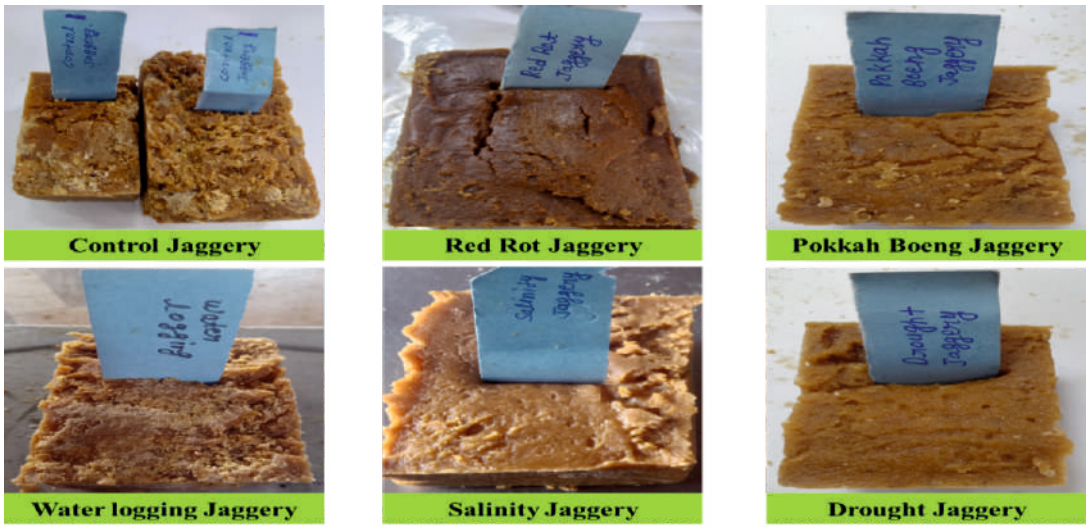


Figure 8.2: Jaggery prepared from biotic stress-affected sugarcane

Allelopathic effect of lemon grass *(Cymbopogon citrates)* on quality attributes of jaggery

The study suggests that while the sugarcane yield was minimally impacted by the intercropping with lemon grass, there were discernible effects on the quality attributes of jaggery. Specifically, jaggery produced from sugarcane grown without lemon grass exhibited slightly better characteristics, such as pol% jaggery, moisture%, and NR value. However, the jaggery from sugarcane intercropped with lemon grass displayed enhanced mineral content, including iron, manganese, copper, and zinc. Therefore, the presence of lemon grass in intercropping seems to influence the mineral composition positively, potentially contributing to the nutritional profile of jaggery. The study emphasizes the need for a balanced evaluation of both yield and quality parameters when considering intercropping practices in sugarcane cultivation.

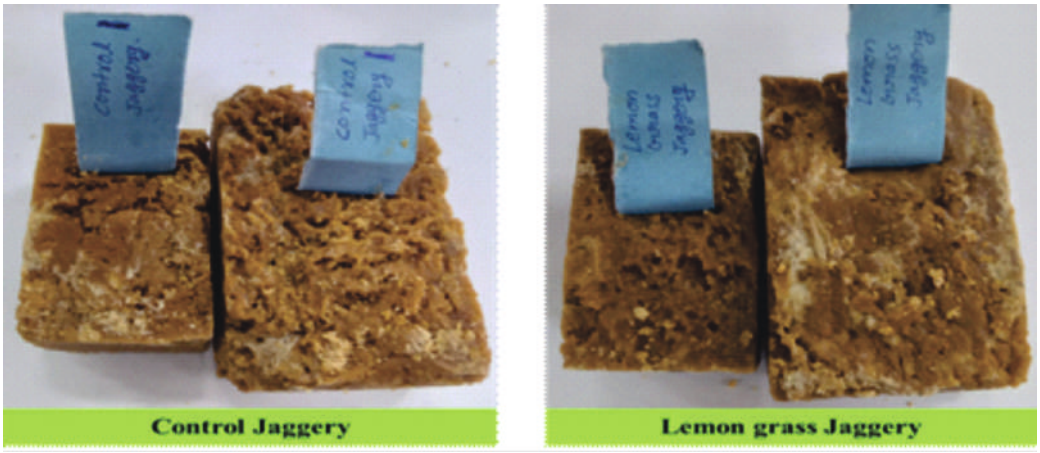


Figure 8.3: Jaggery prepared from lemon grass sugarcane

UPCSR- SRS, Muzaffarnagar

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 8 sugarcane variety viz; Co 0238, CoS 13235, CoS 15233, CoS 16233, CoS 17231, CoS 18231, CoLk 14201 and Co 15023 in randomized block design with three replications in spring season. The crop was planted on 13.03.24 and harvested on 30-03-25. All varieties were raised with all recommended practices and jaggery/ gur sample manufactured on 14-15 Feb,2025. In this experiment, highest cane yield was obtained from Co 0238 (85.38t/ha) followed by CoS 13235 (83.34t/ha), CoS 18231 (80.92t/ha), CoLk 14201(79.24 t/ha) and CoS 15233 (78.90 t/ha). As regards to gur % in cane, the sugarcane variety Co 0238 produced higher (12.50) followed by CoS 13235 (12.03), Co 15023 (11.80) and CoS 16233 (11.16). In respect of gur yield ton per hectare, highest was obtained in Co 0238 (10.67) followed by CoS 13235 (10.02), CoLk 14201 (8.74), CoS 18231 (8.60) and CoS 17231 (8.42) (Table 8.4)

Table 8.4: Effect of different sugarcane variety on jaggery/ gur yield

2024-25						
S.N.	**Varieties**	**Cane Yield (t/ha)**	**CCS (%)**	**Gur % in cane**	**Gur % in juice**	**Gur yield (t/ha)**
1	Co 0238	85.38	13.20	12.50	19.43	10.67
2	CoS 13235	83.34	13.05	12.03	18.95	10.02
3	CoS 15233	78.90	12.80	10.52	16.80	8.30
4	CoS 16233	65.75	13.11	11.16	17.72	7.33
5	CoS 17231	77.83	12.91	10.83	17.65	8.42
6	CoS 18231	80.92	12.85	10.63	18.65	8.60
7	CoLk 14201	79.24	13.03	11.03	17.71	8.74
8	Co 15023	68.11	13.30	11.80	18.48	8.03
	SE±	2.79	-	-	-	-
	CD	5.93	-	-	-	-

09. BIOCHEMISTRY

UPCSR- SRI, 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 20 promising sugarcane varieties *viz.* CoJ 64, CoS 767, Co 0238, CoS 13235, CoLk 14201, UP 14234, CoS 15233, CoS 15453, CoLk 16202, CoS 17231, CoS 17232, CoS 18231, CoS 18232, CoS 18233, CoS 19231, CoS 20231, CoS 20232, CoS 21233, CoS 22232 and CoS 22233 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) in leaf, leaf sheath and whole cane as well as Nitrate reductase activities (NRA) by standard predefined procedures.

In case of macronutrients studies the analytical results showed that, among 20 varieties higher N, P and K contents were found in variety CoS 13235, CoLk 14201, CoS 15233, CoS 15453, CoLk 16202, CoS 18231, CoS 19231, CoS 20231 and CoS 22232. The highest nitrogen content in plant was recorded in CoLk 14201 (1.5%) followed by CoS 13235 (1.4%) while lowest in CoS 767 (0.99%). The Phosphorus content was more in whole plant in comparison to leaf and sheath and highest content was recorded 0.56% in CoS 13235 followed by CoLk 14201 (0.55%) while lowest 0.28% in CoS 20232. Maximum Potassium (K) content was observed in CoLk 14201 and CoS 20232 (3.74%) fallowed by CoS 20231 whereas minimum in CoJ 64 (0.14%). 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 22.31 ppm to 74.86 ppm in all the parts of sugarcane. However, the average Zn content was found maximum in CoS 13235 (74.86 mg/kg) and CoJ 64 (64.88 mg/kg) while minimum in CoS 767. Iron content in leaf was found maximum in Co 0238 and CoS 20231, CoS 22232 and CoLk 16202 while minimum in CoS 21233 variety. Average Cu content was maximum in CoS 0238, CoS 15453 and CoS 22232 while minimum in CoJ 64 and CoS 20231. Average Mn content was found maximum in CoS 22233, CoS 22232 and UP 1434 while minimum in CoS 20232 variety. 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 13235 (2.68 µm/gm/hr) followed by CoS 18231 (2.68 µm/gm/hr) while it was lowest in UP 14234 (1.69 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.

It was concluded that among 20 varieties higher N, P and K contents were found in variety CoS 13235, CoLk 14201, CoS 15233, CoS 15453, CoLk 16202, CoS 18231, CoS 19231, CoS 20231 and CoS 22232, it may be one of the factor for higher yield. While higher micronutrient contents (Zn, Cu and Mn) were observed in Co 0238, CoS 13235, UP 1434, CoS 15453, CoS 18232, CoS 16233, CoS 22232 and CoS 22233 variety in comparison to other varieties, therefore the inclusion of these nutrients is may be required as fertilizer recommendation for higher sugar and cane yield. 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 micronutrient fertilizer of zinc, manganese and copper in soil may increase the cane yield as well as sucrose content.

Effect of micronutrients application on tissue culture raised plants and their biochemical characterization

To find out the effect of micronutrients namely Zn, Cu and Mn on qualitative and quantitative parameters of sugarcane on tissue culture raised plants a field experiment was conducted in spring planting season 2024-25. Tissue culture raised plantlets of a promising sugarcane variety CoS 17231developed by UPCSR, Shahjahanpur were taken for this analysis. $ZnSO_4$, $CuSO_4$ and $MnSO_4$ were used as micronutrient fertilizer for the basal application. Seven treatment combinations *viz.* T_1- NPK (Control), T_2- NPK+Zn, T_3- NPK+Mn, T_4- NPK+Cu, T_5- NPK+Zn+Mn, T_6- NPK+Zn+Cu and T_7- (NPK+Zn+Mn+Cu) along with three replicates made for RBD analysis. The effect of

Zn, Cu and Mn alone and combined on biochemical activities associated with growth and sucrose accumulation of sugarcane i.e. Sucrose Phosphate Synthase, Sucrose Phosphate Synthase, Acid Invertase, Neutral Invertase, Nitrate Reductase activities, total protein and Chlorophyll contents were analysed 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.

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 8.48% by application of Zn and Mn along with RDF. The same trends were observed in case of Sucrose Synthase (SuSy) activity in all varieties which were increased up to 9.75% by application of Zn and Mn along with RDF while Acid Invertase and Neutral Invertase activity increased 13.01% and 11.58% significantly by application of Zn, Mn and Cu along with RDF. Nitrate Reductase (NR) activity increased up to 10.12% by application of Zn and Mn.

Survival per cent of plantlets increased up to 5.4%, by the application of Zn and Mn along with RDF. By the application of micronutrients along with RDF the higher HR Brix and Sucrose % in juice were recorded in T6 treatment. The highest yield 79.25 Tonn/ha has recorded in T7 treatment (NPK + Zn + Mn + Cu) and yield increased 26.94% with compared to control. 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 second year.

10. PLANT PHYSIOLOGY

UPCSR-SRI, Shahjahanpur

Evaluation of promising sugarcane varieties under soil moisture stress

In this experiment, ten genotypes viz. CoS 19231, CoS 19232 CoS 20231, CoS 20232, CoS 21231, CoS 21232, CoS 22231, CoS 22232 and CoS 17232 with CoS 08279 as a standard were taken for study. For creating moisture stress condition two moisture levels were maintained during pre-monsoon. Under normal moisture condition; five pre-monsoon irrigations were given while under deficient condition only two pre-monsoon irrigations were applied.

During this year, out of above tested varieties, CoS 20231, CoS 22232 and CoS 19231 maintained higher germination %, tillers/ha and number of mill able canes/ha in water stress condition and also higher yield under water stress condition was observed in CoS 20231, CoS 22232 and CoS 19231 along with minimum yield reduction percent (i.e. Below 10 % reduction) which indicates their water stress tolerance character. Sucrose percent in juice was not affected significantly due to moisture stress. (Table 10.1).

A - 1st Irrigation

B - 1st Irrigation

Fig 10.1 A&B Treatmental irrigation for deficient moisture

Table No. 10. 1: Performance of varieties under soil moisture stress.

S.N.	Genotypes	Germination %		Tillers/ha (000)		NMC/ha (000)		Sucrose%		Yield- mt/ha		Red%
		N*	D*	N*	D*	N*	D*	N*	D*	N*	D*	
1	CoS 19231	29.80	28.13	141	103	103	953	19.19	18.16	77.39	68.83	11.00
2	CoS 19232	48.75	41.87	176	112	907	84	17.97	17.91	47.63	39.40	17.27
3	CoS 20231	52.91	51.00	143	129	107	103	17.77	18.31	90.51	82.63	8.70
4	CoS 20232	29.17	28.75	111	986	761	724	18.14	18.00	54.80	47.00	14.24
5	CoS 21231	30.08	31.80	112	100	939	717	18.88	18.49	78.20	59.29	26.25
6	CoS 21232	28.13	28.10	114	100	745	710	18.04	18.04	65.23	50.46	22.64
7	CoS 22231	28.75	28.33	129	625	695	610	18.06	18.76	90.41	78.40	13.28
8	CoS 22232	48.33	40.00	165	140	105	94	18.44	18.29	91.26	82.84	9.23
9	CoS 17232	35.80	38.20	100	902	098	886	19.35	19.24	67.71	50.79	25.00

N* - Normal (5 pre monsoon irrigation), D* - Deficient (2 pre monsoon irrigation),

10	CoS 08279	53.95	53.00	101	944	100	912	19.04	18.38	85.42	75.74	11.33
SE#/CD=Treatment		063/2.72		1689.66/7270.59		19.37/83.36		021/NS		1.46/6.27		
SE#/CD =Variety		2.42/5.08		4821/10130.59		129.94/273.00		0.42/NS		2.04/4.28		
SE#/CD=V X I		2.26/NS		7190/15106.87		213.75/449.09		0.69/NS		2.32/4.88		
SE#/CD =I X		2.38/NS		6289.29/13213.8		183.63/385.81		0.58/NS		2.12/4.45		

Evaluation of varieties under saline soil condition

In this experiment, ten genotypes *viz.*, CoS 08279, UP 14224, CoS 17232, CoS 19231, CoS 19235, CoS 20231, CoS 20232, CoS 21231, CoS 21232, CoS 22231 and CoS 22232 were planted in glazed pots. Experiment was conducted with two EC level i.e. normal in available soil at 0.6 Dsm^{-1} and Salinity level at 8 EC Dsm^{-1} were maintained artificially by mixing calcium chloride, sodium chloride and sodium sulphate in appropriate amounts. The performances of varieties grown in normal and saline soils were compared. During this year out of 10 tested varieties CoS 20231, CoS 22232 and CoS 19231 gave higher tillers/clump, millable canes/clump and cane yield than other varieties grown under saline soil condition. Conclusively, varieties CoS 17232, CoS 22231, CoS 22232 and CoS 19231 were found relatively more tolerant to salinity. Sucrose percent in juice was not affected significantly due to salinity condition (Table 10. 2).

Fig 10.2 Varieties under salinity and normal soil condition

Table 10.2: Evaluation of varieties under saline soil condition

S.N.	Genotypes	Germination %/pot EC 0.6 DSM^{-1}	EC 8 DSM^{-1}	Tillers/ha/pot		NMC/ha/pot		Sucrose%		Yield/pot		Red%
1	CoS 08279	66.66	53.33	13.33	5.66	12.66	6.33	18.53	15.51	**6.40**	**4.63**	**27.60**
2	UP 14234	86.66	40.00	12.33	3.66	10.66	1.66	18.39	17.59	**7.70**	**5.20**	**32.51**
3	CoS 17232	80.00	33.20	12.66	4.66	10.66	4.33	18.02	16.70	**8.66**	**6.00**	**30.71**
4	CoS 19231	86.66	26.66	18.66	3.33	13.66	3.66	19.87	17.44	**6.66**	**4.81**	**27.00**
5	CoS 19235	80.00	20.00	15.66	3.33	11.33	2.00	20.05	18.11	**7.97**	**4.58**	**42.54**
6	CoS 20231	80.00	26.66	12.00	4.00	11.00	4.00	19.92	17.04	**4.78**	**2.74**	**42.64**
7	CoS 20232	73.33	26.66	10.66	4.00	9.66	3.00	19.33	16.25	**6.53**	**3.73**	**42.88**
8	CoS 21231	73.33	20.00	14.66	3.33	10.66	2.00	18.85	15.73	**5.70**	**3.07**	**46.24**
9	CoS 21232	93.33	42.60	14.00	4.00	9.66	2.00	18.65	15.85	**6.00**	**4.04**	**40.22**

N* - Normal (0.6 DSM^{-1}), S* - Saline (8.0 DSM^{-1})

10	CoS 22231	86.66	40.00	10.66	7.00	9.00	6.33	19.17	17.79	**7.30**	**5.24**	**28.17**
11	CoS 22232	80.00	43.20	18.00	11.33	12.66	6.33	19.26	19.26	**7.90**	**4.98**	**36.99**
SE#/CD=Treatment		23.110		20.38		20.22		5.42		8.06		
SE#/CD =Variety		0.16/NS		1.08/2.18		0.88/1.77		0.56/1.13		0.26/0.53		
SE#/CD=V X I		038/0.76		0.46/0.93		037/0.76		0.24/048		0.11/0.22		
SE#/CD =I X V		0.53/NS		1.53/1.078		1.24/2.505		0.80 /NS		0.37/NS		

Evaluation of promising sugarcane genotypes under water logged condition.

The varieties CoS 08279, CoS 96436, CoS 17231, CoS 13231, UP 05125, UP 9530, CoSe 13452, CoLk14201, CoS 10239 and SL146/10 were taken to find out the suitable varieties for water logging condition. Water logged condition was maintained naturally at Gola research farm for approximately 55-60 days in rainy season. Varieties UP 05125, CoS 14233, CoS 10239 and CoLk 14201 maintained higher germination. Varieties UP 05125, CoS 14233, CoS 10239, CoS 17231 and CoLK 14201, CoS 08279, UP 9530, CoSe 96436 and CoS 13231 showed higher shoot population, shoot height and number of millable canes under water logging condition. Leaf area of LTM was higher in CoS 08279, CoS 10239, CoLk 14201, CoS 96436, CoSe 11453 and genotype SL 146/10. Out of above tested varieties CoSe 96436, CoS 08279, CoS 14233, UP 09530 and CoS 13231 gave higher yield under water logging condition.

Studies on physiological and morphological parameters for ratooning ability in sugarcane

To test the efficacy of ratooning ability of new elite promising sugarcane varieties *viz.* CoS 13235, CoS 13231, CoS 17231, CoLk 14201, Co 15023 and Co 0118 in association of plant crop, an experiment was conducted at SRI Shahjahanpur in two cycles of one plant and two ratoon crop each and plant crop was planted in RBD with three replications. All recommended practices were fallowed. The plant sample was made at formative and maturity stage for regarding various morphological and physiological parameters. The total chlorophyll contain (mg/gm leaf $^{-1}$) was higher in CoS 13235 in both formative and maturity stage followed by CoS 17231 and CoS 13231. Plastchron (day/leaf^{-1}) was higher in CoLK 14201 followed by CoS 17231 and CoS 13231 at maturity stage. Maximum leaf area was obtained in Co 0118 followed by CoLK 14201 and Co 15023 at maturity stage. Regarding yield contributing parameter higher germination was observed in CoS 13235 and significant higher tillers, NMC/ ha was regarded in CoS 17231. Maximum sucrose % was obtained in Co15023 at harvest. CoS 13235 gave significantly higher yield among all the varieties. The above data on physiological, morphological and growth parameters recorded in first ratoon of different varieties will be correlate with next cycle of second ratoon crop and it will decide the rationing potential of different varieties.

Table No. 10.3 : Ratooning ability in sugarcane 2024-25 (1st Ratoon)

S. N.	Varieties	Tillers/ha	Leaf area (cm)^2	Chloro phyll mg/g fresh leaf	NMC/ha	Plastroc hrome day-^{1}	Single cane weight (gm)	Sucros e%	Yield-mt/ha	Root Length (in inch)
1	CoS13235	125114	427.64	2.233	118517	0.178	562.50	18.43	72.50	51.6
2	CoLk 14201	155438	365.70	1.711	136341	0.250	564.75	18.48	70.90	50.7
3	CoS 13231	152082	367.94	1.121	139350	0.286	418.75	18.61	68.75	47.5
4	CoS 17231	158795	361.55	1.677	153934	0.343	440.00	18.57	67.25	48.8
5	CoS 15023	100462	412.75	2.035	82869	0.143	405.00	18.32	62.50	46.8
6	Co 0118	101388	431.42	1.959	89582	0.242	611.75	18.20	64.25	41.6
	CV	**1.53**	**2.11**	**9.20**	**12.98**	**32.50**	**2.07**	**3.75**		**1.73**
	SE	**1433.61**	**5.90**	**0.11**	**9909.07**	**0.39**	**7.34**	**0.49**		**0.58**
	CD	**3055.02**	**12.57**	**0.23**	**21116.22**	**0.84**	**15.63**	**NS**		**1.23**

UPCSR- GSSBRI, Seorahi

Study of genotypes/varietal performance of sugarcane varieties under alkaline soil condition

Pot experiment was conducted during 2023-25 with 08 new sugarcane genotypes/varieties *viz.*, CoS 17231, CoS 13235, CoS 13231, UP 05125, CoS 08279, CoS 09232, CoS 10239, and CoSe 13452 with three replications in RBD design. The result indicated that all varieties were affected due to alkaline soil condition.

Leaf area was found maximum in CoSe 13452 (279.06 cm²). Data showed that highest Germination percent was recorded in CoS 13231 (80.00%). Maximum number of tillers (13.33/Pot) and highest NMC (8.66/Pot) were observed in varieties CoS 10239 and UP 05125. Aerial roots were observed in varieties CoS 09232 (7.9 cm/pot) followed by CoS 13231 (6.8 cm/pot). Maximum plant height was recorded in variety CoSe 13452 (263.2 cm.) followed by CoS 10239 (258.3cm.) Hight sucrose percent (18.27%) was obtained in CoS 13235 and CoS 13231 (18.06%). The highest yield was found in CoSe 13452 (04.48 /pot) followed by CoS 17231 (04.29 /pot) and CoS 13235 (03.90/pot).

Table No. 10.4 : Evaluation of varieties under alkaline soil conditions

S. No.	Varieties	Germination (%)	Shoots per pot	Shoots height (cm.)	Leaf area (cm²)	Number of millable cane per pot	Sucrose % (Jan.)	Cane yield per pot (Kg.)
1	CoS 17231	66.67 III	12.00	65.27 III	264.56	7.66	17.48	4.290 II
2	CoS 13235	53.33	8.67	60.12	263.07	6.33	18.27 I	3.900 III
3	CoS 13231	80.00 I	12.67 III	49.73	259.60	7.66	18.06 II	3.010
4	UP 05125	73.33 II	13.33 I	53.26	255.86	8.33 II	17.22	3.820
5	CoSe 13452	60.00	10.67	60.96	279.06 I	8.01 III	17.24	4.480 I
6	CoS 09232	46.66	9.66	64.87	276.23 II	7.33	16.28	3.676
7	CoS 08279	53.33	13.00 II	70.33 I	206.76	8.00	16.92	3.560
8	CoS 10239	46.66	12.00	68.80 II	270.56 III	8.66 I	15.93	3.616
	SE	0.36	0.96	1.15	1.60	1.08	0.09	0.54
	CV %	2.32	4.64	3.24	1.06	2.40	0.27	2.46
	CD	1.12	2.93	3.50	4.85	3.27	0.89	1.63

11. SOIL MICROBIOLOGY

UPCSR- SRI, Shahjahanpur

Soil Microbiology section is involved in producing a quality Bio-products viz: Azotobacter, PSB, Organo decomposer, *Beauveria bassiana & Metarhizium anisopliae* and Ankush, to aware the farmers for improving organic status of soil and management of soil borne fungal diseases, termite, white grub of sugarcane and also the production of Vermi compost. All these products are made and available to the farmers and Sugar mills according to their demand (Table11.1).

Production of Bio-fertilizers, Bio-pesticides (Ankush & *Beauveria bassiana & Metarhizium anisopliae*) and Organo decomposer.

1. To maintain the sustainability of soil fertility and its health along with saving of inorganic fertilizer, a carrier based (powdered) bio-fertilizer i.e. **Azotobacter** and Phosphorus solubilising bacteria **(PSB)** were produced and supplied to the farmers, sugar mills in the amount of 205 and 1400 kg respectively.
2. For quick initial decomposition of organic waste materials in a short duration a powdered based cellulolytic culture inoculant named **"Organo-decomposer"** was produced a quantity of 370 kg and supplied to the farmers and sugar mills.
3. 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 74200 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.
4. For the management of Termite and white grub a carrier-based bio pesticide *Beauveria bassiana & Metarhizium anisopliae* was produced an amount of 885 kg and supplied to the farmers and sugar mills.
5. 1602 kg of all bio products supplied, free of cost to the research institute/centres of UPCSR, Shahjahanpur.

Table: 11.1: Supply of Bio-products (2024-25)

S.N.	Name of the Bio fertilizers / Bio agents	Total production/supply in Kg.	Total income (Rs)
1	Ankush	74200	**Rs** 44,04,850 .00 **(Rs Forty four lakhs four thousands eight hundred fifty) only**
2	Azotobacter	205	
3	PSB	1400	
4	Organo decomposer	370	
5	*B. bassiana & M. anisopliae*	885	
Total		**77060**	

Establishment of liquid bio-fertilizer unit (Manual Production)

Liquid formulation and its storability has been test successfully for 10 months for biofertilizers viz; Azotobacter, PSB, SSB but in bio pesticides regarding *Trichoderma* spp and *Beauveria* and *Metarhizium* formed a thick layer on surface of liquid medium due to which it is not able to dissolve properly in the medium.

12. ENTOMOLOGY

UPCSR-SRI, Shahjahanpur

Varietal behaviour towards insect pests of sugarcane.

State varietal trial I plant, spring: Under SVT I plant, (Spring 2024-25) 10 genotypes / varieties such as CoS 17232, CoS 18232, CoSe 22451, UP 22452, S 45/17, S 161/17, S 01/18, CoLk 19201, CoLk 19202, CoLk 19204 along with 4 standards Co 0238, CoJ 64, CoPant 97222 and CoS 767.

All the varieties showed less susceptible reaction against shoot borer (Cumulative) and top borer at hot weather as well as at the time of harvest, all varieties/genotype including standard also showed less susceptible reaction against root borer, top borer and stalk borer on the basis of infestation index, except all standard, were MS on basis of stalk borer infestation index.

Table 12.1: SVT I plant

S. No	Variety/ Genotype	At hot weather				% incidence borers at harvest time					
		ESB% Incidence		TB % incidence		RB% incidence		TB % incidence		SB % incidence	
		Cumul %	Grade	%incid.	Grade	% incid.	Grade	%incid.	Grade	Infestation Index	Grade
1	CoS 17232	3.03	L.S.	0.39	LS	5.00	L.S.	1.86	L.S.	0.48	LS.
2	CoS 18232	7.96	L.S	1.35	LS	3.33	L.S	2.37	L.S	0.32	LS.
3	CoSe 22451	4.64	L.S	0.74	LS	5.00	L.S	1.80	L.S	0.45	LS.
4	UP 22452	2.88	L.S	1.29	LS	3.33	L.S	1.78	L.S	0.93	LS.
5	S.45/17	11.42	L.S	4.50	LS	3.33	L.S	2.92	L.S	0.24	LS.
6	S.161/17	10.05	L.S	1.95	LS	3.33	L.S	3.28	L.S	0.26	LS.
7	S.01/18	7.11	L.S	1.45	LS	5.00	L.S	3.45	L.S	0.21	LS.
8	CoLk 19201	7.87	L.S	1.21	LS	3.33	L.S	2.34	L.S	0.33	LS.
9	CoLk 19202	9.38	L.S	1.47	LS	5.00	L.S	2.66	L.S	0.31	LS.
10	CoLk 19204	3.47	L.S	0.64	LS	3.33	L.S	1.48	L.S	0.86	LS.
11	CoPant 97222	5.78	L.S	1.46	LS	6.62	L.S	1.61	L.S	2.12	MS.
12	CoS 767	5.96	L.S	1.63	LS	6.72	L.S	1.85	L.S	2.83	MS.
13	CoJ 64	6.03	L.S	1.98	LS	6.62	L.S	1.86	L.S	3.00	MS.
14	Co 0238	6.05	LS	1.63	LS	6.72	LS	2.37	LS	3.83	MS.
	CV	**48.21**	**-**	**113.08**	**-**	**78.73**	**-**	**37.55**	**-**	**26.69**	**-**
	SE	**2.58**	**-**	**1.43**	**-**	**3.06**	**-**	**0.71**	**-**	**0.25**	**-**
	CD	**NS**	**-**	**NS**	**-**	**NS**	**-**	**NS**	**-**	**0.52**	**-**

State varietal trial II Plant: Under SVT II Plant (Spring 2024-25) 08 varieties such as CoS 20231, CoS 20232, CoS 21231, CoS 21232, CoS 21233, UP 21452, S 310/16, S 27/17, with 4 standards such as CoS 767, Co 0238, Co 05011, CoJ 64.

All varieties/genotypes showed less susceptible reaction against Shoot borer (Cumulative basis), also all varieties/genotype including standard showed less susceptible reaction against Top borer at hot weather. At the time of harvest, on root borer basis 03 varieties/genotypes (CoS 21231, CoS 21232 and CoS 21233) including with 03 standard (CoS 767, CoJ 64 and Co 0238) showed moderate susceptible reaction. Based on stalk borer infestation index all varieties/genotypes showed less susceptible reaction except D2 standard (CoJ 64 and Co 0238). All the varieties/genotypes showed less susceptible reaction against top borer.

Table 12.2: SVT II Plant

S. No	Variety/ Genotype	At hot weather				% incidence borers at harvest time					
		ESB% Incidence		TB % incidence		RB% incidence		TB % incidence		SB % incidence	
		Cumul %	Grade	%incid.	Grade	% incid.	Grade	%incid.	Grade	Infestation Index	Grade
1	CoS 20231	3.35	L.S.	0.38	LS	10.67	L.S.	1.86	L.S.	0.48	LS.
2	CoS 20232	5.29	L.S	0.62	LS	10.67	L.S.	2.37	L.S	0.32	LS.
3	CoS 21231	4.21	L.S	0.55	LS	20.00	MS	1.80	L.S	0.45	LS.
4	CoS 21232	5.18	L.S	1.28	LS	24.00	M.S.	1.78	L.S	0.93	LS.
5	CoS 21233	2.85	L.S	0.46	LS	20.00	M.S.	2.92	L.S	0.24	LS.
6	UP 21452	5.48	L.S	0.61	LS	10.67	L.S.	3.28	L.S	0.26	LS.
7	S.310/16	4.05	L.S	0.43	LS	10.67	L.S.	3.45	L.S	0.21	LS.
8	S.27/17	5.17	L.S	1.37	LS	9.33	L.S.	2.34	L.S	0.33	LS.
9	Co 05011	5.80	L.S	1.46	LS	9.33	L.S.	2.66	L.S	0.31	LS.
10	CoS 767	7.99	L.S	2.16	LS	20.00	M.S.	1.48	L.S	0.86	LS.
11	CoJ 64	7.98	L.S	2.52	LS	29.33	M.S.	1.61	L.S	2.12	MS.
12	Co 0238	7.45	L.S	1.86	LS	21.33	M.S.	1.85	L.S	2.83	MS.
	C.V.	**29.20**	**-**	**95.38**	**-**	**52.39**	**-**	**1.86**	**-**	**3.00**	**-**
	SE.	**1.29**	**-**	**0.89**	**-**	**6.99**	**-**	**2.37**	**-**	**3.83**	**-**
	C.D.	**2.67**	**-**	**NS**	**-**	**NS**	**-**	**37.55**	**-**	**26.69**	**-**

Survey and surveillance of sugarcane insect pests (2024-25)

Extensive survey and surveillance work was conducted during pre-monsoon and post monsoon in 32 sugar factories of different districts viz Shahjahanpur, Hardoi, Bareilly, Sitapur, Lakhimpur Kheri, Pilibhit, Moradabad, Biznore, Muzaffar Nagar, Saharanpur, Meerut, Hapur, Bagpat, Bulandshahar*. Shoot borer incidence ranged from 2.0% (Govind Chini Mill, Lakhimpur Kheri) to 8.5%, (Roza sugar works Roza, Shahjahanpur). Top Borer ranged from 3.5% (Uttam sugar mill Ltd Khaikheda, Muzaffarnagar) to 50.0% in (Tikaula sugar mill, Muzaffarnagar). Stalk Borer was received highest at 16.5% in DCM Sugar mill unit Rupapur, Hardoi, while root borer was maximum (30%) at Simbhawali sugar mill Ltd Hapur (Table 12.3). White fly, pyrilla, mites as well as army warm and grass hopper also found in patches and in sporadic forms.

Table 12.3: Survey and surveillance of sugarcane insect pests in central UP.

SI. NO.	Location	Varieties	Name of pest	% Incidence/ population		
				Min.	Max.	Ave.
1	Dalmiya Chini Unit, Nigohi, Shahjahanpur	Co 0238, Co 94184, Co 15023, CoS 13235, CoLk 14201, Co 0118	Shoot borer	1	5	3%
			Top borer	2	10	6%
			Army worm	1	10	5.5/clump
2	Roza Sugar Works, Roza, Shahjahanpur	Co 0238, Co 0118, Co 98014, CoS 13235, CoS 17231, Co 94184	Shoot borer	2	15	8.5%
			Top borer	2	10	6%
			Root borer	1	10	5.5%
			Army worm	2	20	11/clump
			Pyrilla	2	8	5/clump
3	DSCL, Unit Loni, Hardoi	Co 0238, Co 0118, CoLk 98014, CoLk 14201, CoS 13235, CoS 17231, Co 15023	Shoot borer	2	5	3.5%
			Top borer	1	10	5.5%
			Army worm	2	5	3.5/clump
4	Dwarikesh Chini Mill, Faridpur, Bareilly	Co 0238, CoJ 85, Co 15023, CoS 17231, CoLk 98014	Shoot borer	2	10	6%
			Top borer	4	20	12%
			Root borer	1	12	6.5%
			Stalk borer	2	5.0	3.5%
			Army worm	1	5.0	3.0/clump
			Thrips	4	5.0	4.5/leaf
5	Avdh Sugar Eneryge, Hargwon, Sitapur	Co 15023, Co 94184, Co 0238, Co 0118, Co 98014, CoLk 14201, CoLk 16202, CoS 16233, CoS 17231, CoS 13235	Shoot borer	1.5	5.0	3.25%
			Top borer	1	10.0	5.5%
			Army worm	0.5	8.0	4.25/clump
			Mite colony	50	200	125/leaf
6	Bajaj Hind. Ltd., Khambarkhera, Lakhimpur Kheri	CoLk 14201, CoS 8436, Co 0238, Co 15023, Co 0118, CoS17231, CoJ 85	Shoot borer	4	7	5.5%
			Top borer	5	10	7.5%
			Black bug	2	4	3/plant
			Grass hopper	1	3	2/clump
7	Govind Chini Mill, Aira, Lakhimpur Kheri	CoLk 14201, Co 0238, Co 0118, CoS 13231, CoS 13235, CoS 08272	Shoot borer	1	3	2%
			Top borer	3	8	5.5%
			Mite	8	12	10/leaf
			Grass hopper	2	4	3/clump
			Mealy Bug	6	10	8/plant
			Black bug	1	5	3/plant
8	LH Chini mill, Pilibhit	CoLk 14201, CoS 13235, Co 15023	Mealy Bug	2	5	3.5/plant
			Army worm	5	10	7.5/clump
			Thrips	5	7	6/leaf
9	Bajaj Sugar Factory Unit, Gola, Lakhimpur Kheri	Co 0238, Co 0118, Co15023, CoS 13235, CoLk 14201	Shoot borer	5	10	7.5%
			Top borer	10	20	15%
			Army worm	5	10	7.5/clump
10	DCM Sugar, Unit Rupapur, Hardoi	CoLk 14201, Co 0238, Co 15023	Internode borer	5	15	10%
			Root borer	6	14	10%
			Stalk borer	7	25	16.5%
			Grass hopper	2	4	3/clump
			White fly	10	30	20/leaf
			Pyrilla	5	10	7.5/plant

SI. NO.	Location	Varieties	Name of pest	% Incidence/ population		
				Min.	Max.	Ave.
11	Rana Sugar mill Ltd. unit Belwara, Moradabad	Co 0238, Co 0118, CoS 13235	Top borer (4th brood)	10	30	20%
			Stalk borer	5	10	7.5%
			Mite	5	7	6/ leaf
			Mealy Bug	25	30	27.5/plant
			White fly	15	35	25 /leaf
12	Rana Sugar mill Ltd. Bellari, Moradabad	CoLk 14201, Co 0238, Co 0118, CoS 13235,	Top borer	5	10	7.5%
			Stalk borer	10	20	15%
			Army worm	5	10	7.5/clump
			Crown mealy Bug	8	12	10/ plant
			White fly	15	30	22.5/leaf
13	Diwan Sugar, Agwanpur, Moradabad	Co 0238, Co 0118, Co 98014	Stalk borer	2	10	6%
			Crown mealy Bug	8	12	10 /plant
			White fly	6	10	8 /leaf
14	Triveni eng. & Ind. ltd Rani Nangal, Moradabad	Co 0238, Co 0118, Co 98014 CoS 13235, Co 15023	Top borer (4th brood)	15	20	17.5%
			Stalk borer	10	20	15%
			Internode borer	10	25	17.5%%
			Mealy Bug	10	20	15 /plant
			White fly	20	40	30/leaf
15	Avadh Sugar, Seohara, Bijnor	Co 0118,	Top borer	5	8	6.5%
			Crown mealy Bug	1	4.0	2.5/plant
			White fly	8	12	10/leaf
16	Dhanaura chini mill amroha	Co 11015	Root borer	10	20	15%
17	IPL Unit, Rohnakala, Muzaffarnagar	Co 15023, Co 0118, Co 15023, CoS 13235	Top borer	3	7	5%
			Internode borer	4	6	5%
			Root borer	5	15	10%
			Mealy Bug	5	60	32.5/plant
			Black Bug	4	6	5/clump
18	Uttam Sugar, Khaikheda, Muzaffarnagar	Co 15023, Co 0118, Co 15027, CoS 13235	Top borer	2	5	3.5%
			Internode borer	1	2	1.5%
			Root borer	1	20	10.5%
			Mealy Bug	2	60	31/plant
			Black Bug	2	4	3/clump
19	IPL Ltd, Saharanpur	Co 15023, Co 0118, Co 15027, CoS 13235	Top borer	4	8	6%
			Internode borer	4	6	5%
			Root borer	5	10	12.5%
			Mealy Bug	5	50	27.5/plant
			Black Bug	4	10	7/plant
20	Triveni Eng. & Industries Ltd, Deoband, Saharanpur	Co 15023, Co 0118, Co 15027, CoS 13235	Top borer	5	15	10%
			Internode borer	4	8	6%
			Root borer	4	20	12%
			Mealy Bug	5	55	30/leaf
			Black Bug	2	5	3.5/plant

SI. NO.	Location	Varieties	Name of pest	% Incidence/ population		
				Min.	Max.	Ave.
21	Mawana Sugar, Nanglamal, Meerut	CoLk 14201, Co 0238, Co 0118, Co 15023, Co 15027, CoS 13235	Top borer (2nd brood)	10	30	20%
			Stalk borer	5	10	7.5%
			Root borer	2	50	26%
			Mealy Bug	25	30	27.5/plant
22	Nanglamal Sugar, Mawana Sugar Complex, Meerut	CoLk 14201, Co 0238, Co 0118, Co 15023, Co 15027, CoS 13235	Top borer (2nd brood)	8	30	19%
			Stalk borer	5	15	10%
			Root borer	5	45	25%
			Mealy Bug	25	35	30/plant
23	Simbhawali Sugar, Hapur	CoLk 14201, Co 0238, Co 0118, Co 15023, Co 15027, CoS 13235	Top borer (2nd brood)	12	30	21%
			Stalk borer	8	16	12%
			Root borer	4	56	30%
			Mealy Bug	20	40	30/plant
24	Bajaj Sugar, Bijnor	Co 0238	Top borer (4th brood)	5	25	15%
25	Dwarikesh Sugar, Afajalgad, Bijnor	Co 0238	Top borer (4th brood)	10	50	30%
26	Ganga Kishan Sahk. Sugar, Morna, Muzaffarnagar	Co 0238	Top borer (4th brood)	20	30	25%
			Stalk borer	2	5	3.5
			Root borer	10	25	17.5%
27	The Corp. Sugar mill, Ramala, Baghpat	Co 0238	Root borer	2	5	3.5%
28	The Kishan Sahk. Sugar mill, Najibabad, Bijnor	Co 0238	Top borer (4th brood)	5	10	7.5%
			Stalk borer	2	5	3.5%
			Root borer	5	10	7.5%
29	Dwarikesh Sugar, Bundki, Bijnor	Co 0238	Top borer (4th brood)	5	15	10%
			Stalk borer	2	10	12%
			Root borer	5	10	7.5%
30	Tikaula Sugar, Muzaffarnagar	Co 0238	Top borer (4th brood)	20	80	50%
31	The Kishan Sahk., Anupshahr, Bundelkhand	Co 0238	Top borer (4th brood)	20	30	25%
			Stalk borer	10	15	12.%5
			Root borer	10	25	17.5%
32	Triveni Sugar, Savgadh, Bundelkhand	Co 0238	Top borer (4th brood)	10	30	20%
			Stalk borer	5	15	10%%
			Root borer	5	10	7.5%

Impact of ecofriendly products on biotic stress (Spring 2024-25).

A field experiment was conducted with the objective "To study the efficacy of various effective and sustainable alternatives for the management of insect pests in sugarcane" during spring season; the experiment was laid out in a split plot design with 3 replications; two varieties Co 0238 and Co 0118 were taken for study. The experiment consists of five treatments.

In spring season, germination percent was recorded higher in T_1 in Co 0238 and T_4 in Co 0118 followed by chemical control (T_3 & T_5). Highest shoot population, number of millable cane and cane yield were recorded in chemical treated plots such as T_3 & T_5.

Germination was found better with Ghanjeevamrut, Jeevamrut, wherever sugar cane setts were treated with beejamrut. In T3 treatment (Nutrient application through chemical resources and insect pest control through natural resources) insect pest incidence was recorded minimum.

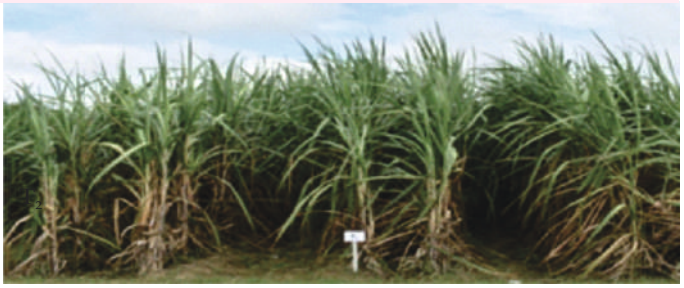
T_1 Nutrient application through natural resources and insect pest disease control through natural.

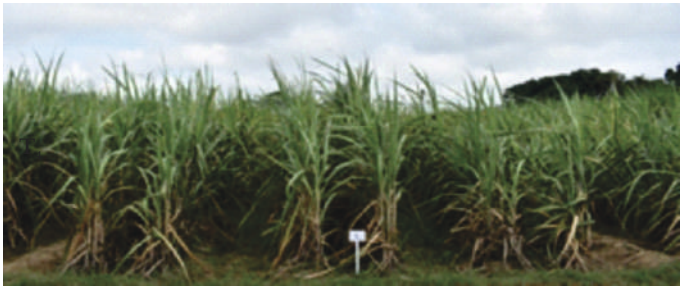
T_2 Nutrient application through natural resources and insect pest/ disease control through bio products.

T_3 Nutrient application through chemical resources insect pest diseases control through natural resources.

T_4 Nutrient application through natural resources insect pest and disease control through chemicals.

T_5 Nutrient application through chemical resources and insect pests, disease control through chemicals.





Co 0238
2024-2025

Table 12.5a: 60 Days germination percent (spring 2024-25).

Varieties /Treatments	T_1	T_2	T_3	T_4	T_5	Mean(S)
V_1 (Co 0238)	40.56	31.48	36.91	36.85	34.63	**36.09**
V_2 (Co 0118)	43.40	44.63	40.93	45.06	42.28	**43.26**
Mean	**41.98**	**38.06**	**38.92**	**40.96**	**38.46**	
Statistical Analysis						
	Factor V	**Factor T**	**Factor (T) at same level of V**		**Factor (T) at different levels of V**	
CV	18.67	10.88	-		-	
CD	NA	NA	NA		NA	
SE	2.706	2.492	3.524		4.154	

Table 12.5b: Shoot population per hectare

Varieties/ Treatments	T_1	T_2	T_3	T_4	T_5	Mean(S)
V_1 (Co 0238)	85107.48	91511.76	101311.08	89659.92	97684.56	**93054.96**
V_2 (Co 0118)	78240.24	74845.20	82484.04	85493.28	88425.36	**81897.62**
Mean	**81673.86**	**83178.48**	**91897.56**	**87576.60**	**93054.96**	
Statistical Analysis						
	Factor V	**Factor T**	**Factor (T) at same level of V**		**Factor (T) at different level of V**	
CV	20.93	8.86	-		-	
CD	NA	NA	NA		NA	
SE	6,685.796	4,474.747	63,28.248		8,759.980	

Table 12.6: NMC 000/ha

Varieties /Treatments	T_1	T_2	T_3	T_4	T_5	Mean(S)
V_1 (Co 0238)	72530.40	69675.48	74690.88	72684.72	78317.40	**73579.78**
V_2 (Co 0118)	72221.76	76311.24	87036.48	79320.48	81172.32	**79212.46**
Mean	**72376.08**	**72993.36**	**80863.68**	**76002.60**	**79744.86**	
Statistical Analysis						
	Factor V	**Factor T**	**Factor (T) at same level of V**		**Factor (T) at different level of V**	
CV	17.21	7.37	-		-	
CD	NA	NA	NA		NA	
SE	4801.768	3249.182	4595.038		6320.480	

Table 12.7: Yield Mt/ha

Varieties /Treatments	T_1	T_2	T_3	T_4	T_5	Mean (S)
V_1 (Co 0238)	64.81	63.81	76.00	76.06	76.93	**70.324**
V_2 (Co 0118)	54.32	47.45	63.11	55.09	66.20	**57.23**
Mean (T)	**59.57**	**55.63**	**69.56**	**62.57**	**71.56**	
Statistical Analysis						
	Factor A	**Factor B**	**Factor (B) at same level of A**		**Factor (A) at different levels of B**	
CV	37.56	13.22	-		-	
CD	NA	10.41	NA		NA	
SE	8.746	4.869	6.886		10.697	

Table 12.8: Juice (Sucrose %)

Varieties /Treatments	T_1	T_2	T_3	T_4	T_5	Mean(S)
V_1 (Co 0238)	18.15	19.21	18.42	18.74	18.86	**18.68**
V_2 (Co 0118)	18.35	18.46	18.99	19.18	17.81	**18.56**
Mean	**18.25**	**18.84**	**18.71**	**18.96**	**18.34**	
Statistical Analysis						
	Factor V	Factor T	Factor (T) at same level of V		Factor (T) at different level of V	
CV	3.73	4.49	-		-	
CD	NA	NA	NA		NA	
SE	0.254	0.482	0.682		0.661	

Table 12.9: Early shoot borer (Cumulative) % incidence

Varieties /Treatments	T_1	T_2	T_3	T_4	T_5	Mean(S)
V_1 (Co 0238)	13.94	11.25	3.93	7.88	5.05	8.41
V_2 (Co 0118)	19.52	16.06	3.45	14.50	3.65	11.43
Mean	16.73	13.66	3.69	11.19	4.35	
Statistical Analysis						
	Factor V	Factor T	Factor (T) at same level of V		Factor (T) at different levels of V	
CV	25.35	22.96	-		-	
CD	NS	2.79	3.94		4.03	
SE	0.92	1.32	1.86		1.90	

Table 12.10: Percent incidence of top borer

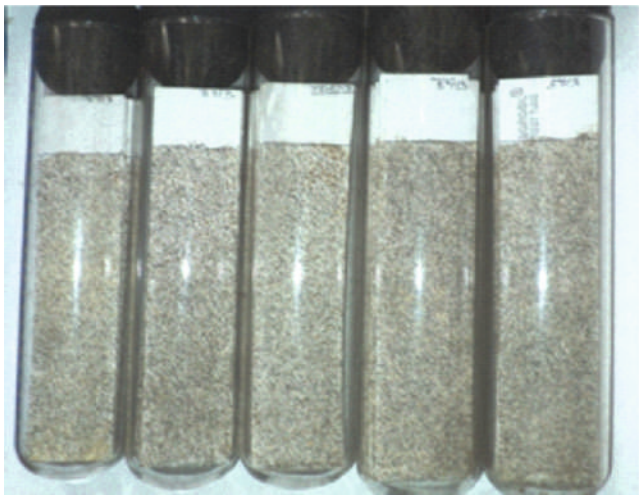
Varieties /Treatments	T_1	T_2	T_3	T_4	T_5	Mean(S)
V_1 (Co 0238)	0.74	0.46	0.00	0.21	0.20	0.32
V_2 (Co 0118)	0.66	0.57	0.11	0.46	0.19	0.40
Mean	0.70	0.51	0.06	0.34	0.20	
Statistical Analysis						
	Factor V	Factor T	Factor (T) at same level of V		Factor (T) at different level of V	
CV	94.39	91.12	-		-	
CD	NS	0.40	NS		NS	
SE	0.12	0.19	0.27		0.27	

Table 12.11: Infestation index of Stalk Borer

Varieties/Treatments	T_1	T_2	T_3	T_4	T_5	Mean(S)
V_1 (Co 0238)	1.36	1.17	0.56	0.90	0.69	0.94
V_2 (Co 0118)	0.48	0.36	0.08	0.22	0.16	0.26
Mean	0.92	0.76	0.32	0.56	0.43	
Statistical Analysis						
	Factor V	Factor T	Factor (T) at same level of V		Factor (T) at different level of V	
CV	118.40	105.69	-		-	
CD	NS	NS	NS		NS	
SE	0.26	0.36	0.52		0.53	

Production of trichocards

The infestation of Top borer control by *Trichogramma japonicum* and other borers except top borer by *Trichogramma chilonies*. Trichocards are being produced and selling to cane growers, sugar factories and also used in research experiment and foundation seed nursery from June to October last week. During 2024-25 (from 1st April 2024 to 31 March 2025) 11946 trichocard has been produced and Rs 3,65,200 revenue generated for UPCSR, Shahjahanpur.



Bio-efficacy of BAL 175 in comparison to standard insecticide for control of early shoot borer, top borer and termites in sugarcane crop (Seedling India Pvt. Ltd).

The experiment was farmed during 2023-24 spring season. This is the second year of the experiment. The sugarcane varieties Co 0118 planted to evaluate the bio-efficacy of photo toxicity and residues analysis of BAL 175 formulation against the Early shoot borer, Top borer and Root borer in sugarcane, there were 9 treatments, such as –

T_1 BAL 175@ 1200ml/ha

T_2 BAL 175@ 1500ml/ha

T_3 BAL 175@ 1800ml/ha

T_4 BAL 175@ 3000ml/ha

T_5 Check 1: Chlorantraniliprole 18.5% SC@ 375 ml/ha

T_6 Check 2: Emmamamectin benzoate 5% SG@ 450 g/ha

T_7 Check 3: Novaluron 10% EC @ 2000 ml/ha

T_8 Check 4: Thiamethoxam 75% W/W SG @ 160 g/ha

T_9 Untreated Check

T_{10} BAL 175 @ 2500ml/ha

Experiment was characterized into RBD with three replications. The trial was performed as per protocol of 2024-25 by soil drenching with 1000-liter water, at planting and 30, 60 and 90 days after planting.

Almost all the doses BAL 175 found good against the ESB, Top borer & Root borer. The treatment T_3 BAL 175 @ 1800 ml/ha was showed maximum controls to Early shoot borer, Top borer and Root borer than other treatments.

Efficacy of Coragen @ 200 g/l SC against major lepidopteran insect pests of sugarcane when applied at planting by drenching over cane sett (FMC India Ltd.)

The experiment was framed during 2023-24. This is second year of this experiment. The experiment was planted sugarcane verities Co 0118 with objective, efficacy of Coragen @ 200 g/l SC based application schedule against ESB, Top borer in sugarcane and inclusion of Coragen 200 g/l SC based schedule POP and to record effect of Coregen@200 g/l SC based application schedule on plant growth and yield parameters. There were 6 treatments –

T_1 Coragen 200 g/l SC @ 375 ml/ha (drenching over cane setts at planting).

T_2 T_1+ Ferterra 0.4% G @ 18.75 kg/ha (dropping in line at the June).

T_3 T_1+ Coragen 200 g/l SC @ 375 ml/ha (in June).

T_4 T_1+Talstar plus 180 g/l SC (1000 ml /ha at DOP), drenching over cane set at planting time.

T_5 Institute (Mechanical control /Biological control/ Fipronil 0.3 GR 20 kg/ha).

T_6 Untreated (Check).

Experiment was characterized into RBD with 3 replications, the experiment was performed as per protocol of 2024-25 as soil drenching and dropping with 1000 liter/ha of water.

Almost all the doses of Chlorantraniliprole 200 g/l SC@ found good against ESB, Top borer, plant growth, yield parameters and the quantitative attributes of plant. The treatment T_3 Coragen 200 g/l SC @ 375 ml/ha drenching at the time of planting + Coragen 200 g/l SC @ 375 ml/ha (in June) was showed better control to Borers than other treatments.

Bio-efficacy of UPF 116 against insect pests of sugarcane (UPL Ltd. Bandra. Product)

The experiment was framed during 2024-25. This is first year of the experiment. The sugarcane varieties Co 0118 planted to evaluate the bio-efficacy of UPF, against the insect pests of sugarcane and target pest is white grub, ESB, Top Borer and cut warm, there were 9 treatments–

T_1 UPF 116 @ 937.5 ml/ha.

T_2 UPF 116 @ 1250 ml/ha.

T_3 UPF 116 @ 1562.5 ml/ha.

T_4 Thiamethoxam 30 FS 1042 ml/ha.

T_5 Azoxystrobin 23% SC 125 ml/ha.

T_6 Thiophanate methyl 70% WP 201 ml/ha.

T_7 Imidacloprid 48% FS 218.75 ml /ha.

T_8 Untreated Check.

T_9 UPF 116 @ 2500 ml/ha (Phytotoxicity).

Experiment was characterized into RBD with three replication. The trial was performed as per protocol of 2023-24 as deep the setts with 400-liter water/ha at 30 minutes. Almost all the doses of UPF 116 good against, ESB and Top borer, the treatment T3 (UPF 116, 1562.5 ml/ha) was showed better control to ESB & Top borer than other treatments.

UPCSR- SRS, Muzaffarnagar

Varietal screening for resistance to major insect pests of sugarcane.

Under State Varietal trials (SVT IInd) nine genotypes such as CoS 20231, CoS 20232, CoS 21231, CoS 21232, CoS 21233, CoSe 21451, S 310/16, S 27/17, UP 21452 along with 4 standards against CoS 767, Co 0238, Co Pant 97222 and CoJ 64 were evaluated against early shoot borer (*Chiloinfuscatellus* snellen), root borer (*Emmalocera depressella* Swinh), top borer (*Scirpophaga excerptalis* Walker) and stalk borer (*Chilo auricilius* Dudgeon) of sugarcane at Muzaffarnagar location. During hot weather the incidence of early shoot borer (ESB) was recorded on 45th, 60th, 90th and 120th days after planting. The cumulative incidence of early shoot borer is minimum 6.82 percent with variety CoSe 21451 and maximum 13.78 percent in Co 0238. The incidence of top borer 2nd brood during hot weather was observed 1.91 percent in variety CoS 21233 and maximum 4.16 percent in variety Co 0238. The incidence of top borer 3rd brood was recorded 3.08 percent in CoS 21233 to 7.18 percent in Co 0238.

Table- 12.12: S V T spring (2024-2025)

S. N.	Varieties	Shoot bore r % incidence			
		45 DAP	60 DAP	90 DAP	120 DAP
1.	CoS 20231	2.59	2.83	4.94	2.00
2.	CoS 20232	2.19	3.15	3.80	2.22
3.	CoS 21231	2.89	2.86	6.11	2.73
4.	CoS 21232	3.06	3.57	4.06	2.22
5.	CoS 21233	2.37	2.77	4.54	1.49
6.	CoSe 21451	3.78	2.69	3.05	2.48
7.	S 310/16	2.39	3.18	5.92	2.51
8.	S 27/17	3.46	2.89	5.26	1.98
9.	UP 21452	2.78	3.42	4.62	2.01
10.	CoS 767	3.78	4.73	6.51	2.61
11.	CoJ 64	4.62	4.99	10.24	3.42
12.	Co 0238	5.37	5.54	7.34	3.71
13.	CoPant 97222	4.44	5.18	6.48	2.57
	CV	**16.1069**	**14.3817**	**18.85 69**	**15.5211**
	SE	**0.5901**	**0.5760**	**1.1511**	**0.4158**
	CD	**1.2859**	**1.2552**	**2.5083**	**0.9060**

Table- 12.13: SVT spring (2024-2025)

S. N.	Varieties	During hot weather				At the time of harvest				
		Shoot borer Cumulative.	Bored Plant/ ha	Top Borer 2nd brood	Top borer 3rd brood	Root borer	Top borer	Stalk Borer on Cane basis	Stalk borer on Internode basis	Infestation index
			% incidence			% incidence				
1.	CoS 20231	8.41	16667	1.93	3.25	4	14	10	0.96	0.17
2.	CoS 20232	8.92	15741	2.37	3.71	4	14	8	1.00	0.18
3.	CoS 21231	10.39	16204	1.99	3.48	8	14	18	1.09	0.06
4.	CoS 21232	8.36	11111	2.20	3.68	6	10	8	1.14	0.07
5.	CoS 21233	8.81	23611	1.91	3.08	8	14	10	1.03	0.12
6.	CoSe 21451	6.82	9722	2.16	3.31	8	12	12	1.03	0.15
7.	S - 310/16	8.92	17593	2.23	3.73	10	18	16	1.63	0.15
8.	S – 27/17	8.73	15278	2.35	3.99	10	12	14	1.16	0.17
9.	UP 21452	9.31	16204	2.07	3.54	12	12	14	1.04	0.14
10.	CoS 767	11.56	22685	3.32	5.02	10	18	20	1.26	0.21
11.	Coj 64	13.77	21296	3.54	6.30	10	22	22	1.97	0.31
12.	Co 0238	13.78	26852	4.16	7.18	16	24	26	1.95	0.41
13.	Co Pant 97222	11.45	22685	3.27	5.13	10	20	18	1.52	0.23
	CV =			**15.8616**	**14.2534**	**41.7013**	**15.5426**	**26.0145**	**9.1651**	
	SE =			**0.4453**	**0.6616**	**3.7210**	**2.4389**	**3.9223**	**0.1184**	
	CD =			**0.9703**	**1.4417**	**Nil**	**5.3146**	**8.5467**	**0.2580**	

Survey and surveillance of sugarcane insect pests (2024-25)

Survey and surveillance of sugarcane insect pests during hot weather / pre monsoon in 10 sugar factories zones as well as SRS, Muzaffarnagar was done to identify major insect pest, however in post mansoon only 8 sugar factories were surveyed. During hot weather the infestation of shoot borer was low (2.0 - 6.0 %), top borer from 2.0 to 20.0% and pyrilla was recorded with low to moderate susceptible (4.0-8.0/leaf) at IPL unit Rohana kalan (MZN). The details are given in table 12.14 and table 12.15.

Table 12.14: Survey and surveillance of sugarcane insect pest in western U.P. (2024-25) (Pre monsoon)

S.N.	Varieties	Location	Name of Pest	% incidence/population		
				Mini.	Max.	Ave.
1.	Co 0118 (Ratoon)	IPL Unit Rohana kalan, (Muzaffarnager)	Top borer % incidence Pyrilla / leaf (intensity) Black bug / Plant (intensity) Armyworm / clump (intensity) Grass hoper / leaf (intensity)	2.0 5.0 10.0 2.0 2.0	10.0 8.0 15.0 3.0 4.0	6.0 6.5 12.5 2.5 3.0
2.	Co 0238 (Ratoon) Co 0118 (Autumn) CoS 13235 (Ratoon)	The Ganga Kisan copp. Sugar mill Morna (Muzaffarnagar)	Top borer % incidence Black bug / Plant (intensity) Army worm / clump (intensity) Grasshopper / Plant (intensity)	2.0 4.0 2.0 4.0	7.0 10.0 3.0 6.0	4.5 7.0 2.5 5.0
3.	Co 0118 (Plant) Co 0238 (II Ratoon) Co 15023 (Ratoon) Co 0118 (Ratoon)	BHL Unit Kinoni (Meerut)	Early shoot borer % incidence Top borer % incidence Pyrilla / leaf (intensity) Black bug / Plant (intensity) Armyworm / clump (intensity)	2.0 4.0 4.0 10.0 2.0	4.0 5.0 5.0 12.0 3.0	3.0 4.5 4.5 11.0 2.5
4.	Co 0118 (Plant) Co 0238 (Ratoon) Co 15023 (Plant) CoS 13235 (Plant)	Uttam Sugar mill Khaikheri (Muzaffarnagar)	Top borer % incidence Army worm/ Plant (intensity) Grasshopper / Plant (intensity)	2.0 1.0 4.0	20.0 3.0 6.0	11.0 2.0 5.0
5.	Co 0118 (Ratoon) Co 0238 (Ratoon) CoLk 14201 (Plant) CoS 13235 (Plant)	BHL Unit Bhaisana (Muzaffarnagar)	Top borer % incidence Black bug / Plant (intensity) Armyworm / clump (intensity) Thrips / Leaf (intensity)	2.0 5.0 5.0 5.0	10.0 7.0 7.0 25.0	6.0 6.0 6.0 15.0
6	Co 0118 (Plant) Co 0238 (Ratoon) Co15023 (Ratoon)	Uttam Sugar Mill Shermau (Saharanpur)	Top borer % incidence Armyworm / clump (intensity) Grass hoper / leaf (intensity) Stalk borer % incidence	2.0 2.0 2.0 20.0	12.0 3.0 6.0 25.0	7.0 2.5 4.0 22.5
7	Co 0238 (Ratoon) Co 0238 (Plant)	IPL Unit Sakoti Tanda (Meerut)	Top borer % incidence Armyworm / clump (intensity) Grass hoper / leaf (intensity) Thrips / Leaf (intensity)	2.0 2.0 3.0 50.0	12.0 3.0 8.0 70.0	7.0 2.5 5.5 60.0
8	Co 0238 (Ratoon) Co 0238 (Plant)	The Kisan Cop. mill Nazibabaad (Bijnor)	Top borer % incidence Pink worm / Plant (intensity)	2.0 15.0	10.0 25.0	6.0 20.0
9	Co 0118(Plant) Co 0238 (Ratoon) Co 0235 (Plant)	The Kisan Cop. mill Sarsawa (Saharanpur)	Top borer % incidence Black bug / Plant (intensity) Armyworm / clump (intensity) Grass hoper / leaf (intensity) Stalk borer % incidence	4.0 4.0 2.0 2.0 2.0	8.0 12.0 4.0 6.0 4.0	6.0 8.0 3.0 4.0 3.0
10	Co 0118 (Plant) Co 0238 (Plant) Co 0238 (Ratoon) CoS 13235 (Plant)	BHL Unit Bilai (Bijnor)	Top borer % incidence Pink worm / Plant (intensity) Thrips / Plant (intensity)	2.0 40.0 80.0	3.0 50.0 90.0	2.5 45.0 85.0

Table 12.15: Survey and surveillance of sugarcane insect pests in western U.P. (2024-25) (Post monsoon)

S.N	Varieties	Location	Name of Pest	% incidence / population		
				Mini.	Max.	Ave.
1.	Co 0118 (Ratoon) Co 0238 (Ratoon) Co 15023 (Plant)	The Kisan Corp. Morna, (Muzaffarnagar)	Top borer % incidence Pyrilla / leaf (intensity) Black bug / clump (intensity) Mealy bug / clump (intensity)	8.0 10.0 10.0 5.0	40.0 20.0 20.0 20.0	24.0 15.0 15.0 12.5
2.	Co 0118 (Ratoon) Co 15023 (Ratoon) CoS 13235 (Ratoon)	Uttam Sugar Mill, khaikheri (Muzaffarnagar)	Top borer % incidence Pyrilla / leaf (intensity) Shoot borer % incidence Root borer % incidence	4.0 4.0 4.0 5.0	10.0 12.0 6.0 20.0	7.0 8.0 5.0 12.5
3.	Co 0238 (Ratoon)	Dwarikesh Sugar Mill Afzalgarh (Bijnor)	Top borer % incidence	8.0	20.0	14.0
4.	Co 0238 (Ratoon)	Dwarikesh Sugar Mill Bundki (Bijnor)	Top borer % incidence White flies / leaf (intensity)	10.0 100.0	20.0 150.0	15.00 125.0
5.	Co 0238 (Ratoon) Co 0118 (Plant) CoS 13235 (Plant) CoS 17235 (Plant)	IPL Unit Sakoti, Tanda (Meerut)	Top borer % incidence Pyrilla / leaf (intensity) Stalk borer % incidence Root borer % incidence White / leaf (intensity)	5.0 8.0 5.0 2.0 40.0	20.0 35.0 15.0 10.0 300.0	12.5 21.5 10.0 6.0 170.0
6.	Co 0238 (Raton) Co 15023 (Plant) Co 5011 (Plant)	Chandanpur Sugar Mill, (Amroha)	Top borer % incidence Pyrilla / leaf (intensity) Root borer % incidence White fly / leaf (intensity)	5.0 5.0 4.0 50.0	30.0 15.0 6.0 60.0	17.5 10.0 5.0 55.0
7.	Co 0238 (Ratoon) Co 0118 (Plant) CoS 13235	BHL Unit Bilai (Bijnor)	Top borer % incidence Pyrilla / leaf (intensity) Root borer % incidence White / leaf (intensity)	4.0 4.0 2.0 10.0	20.0 15.0 3.0 20.0	12.0 9.5 2.5 15.0
8.	Co 0238 CoS 13235	The Kisan Cop. Mill Sarsawa (Saharanpur)	Top borer % incidence Pyrilla / leaf (intensity) Stalk borer % incidence Root borer % incidence Mealy bug / clump (intensity)	2.0 20.0 5.0 1.0 20.0	40.0 25.0 20.0 6.0 60.0	21.0 22.50 12.50 3.5 40.0

Production of bio- pesticide and trichocard:

Production of trichocard - Trichogramma spp. is an important egg parasitoid of lepidopterous pests with effective to control the sugarcane ESB, top borer, stem borer, root borer and gurudaspur borer. *Trichogramma chilonis* are being used to control ESB, root borer and gurdaspur borer. The infestation of top borer controls by *Trichogramma japonicum* as bio-control technique. Trichocards of both the species are being produced and supplied of cane growers and sugar mills. The total of 873 trichocards has been produced and Rs. 43650.00 revenue has been generated at Muzaffarnagar canter.

Production of bio-agents (Ankush), organo decomposer and joint product (*Beauveria bassiana and Metarhizium anisopliae*)- To manage the soil born fungal disease like red rot, pineapple, root rot and wilt disease of sugarcane through a Bio -agent "Ankush" was produced (17141 kg) and supplied to the farmers, sugar mills and cane societies.

UPCSR- GSSBRI, Seorahi

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

Spring planting:

State varietal trial I plant- Twelve genotypes *viz*. CoLk 19201, CoLk 19202, CoLk 19204, CoS 17232, CoS 18232, CoSe 22451, UP 22452, S 45/17, S 155/17, S 161/17, S168/17 and S1/18 including five standards *viz*. Co 0238, CoJ 64, CoLk 94184, CoS 767 and CoPant 97222 were planted in RBD with three replications. In hot weather conditions all the genotypes including standards showed less susceptible behaviour to shoot borer in the ranged from 2.36% in CoLk 19202 to 5.07% in S161/17.

At harvest, the infestation of top borer was found less in all the genotypes under testing including standards. It was found 2.81% in CoS 767 and 6.90% in Co 0238 (standards). Similarly, stalk borer infestation was also found less in all the genotypes including standards. Infestation index for stalk borer ranged from 0.20 CoLk 19202 to 0.69 Co 0238 (standards) (Table 12.16a).

State varietal trial II plant: Nine genotypes *viz*. CoS 20231, CoS 20232, CoS 21231, CoS 21232, CoS 21233, CoSe 21451, UP 21432, S310/16, S27/17 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 the incidence ranged from 2.80% in CoS21232 to 4.95% in CoPant 97222.

At harvest, the infestation of top borer was found less in all the genotypes under testing including standards. It was found3.77% in UP 21432 and 7.20 % in Co 0238 (standards). Similarly, stalk borer infestation was also found less in all the genotypes including standards. Infestation index for stalk borer ranged from 0.11 CoS 20231 to 0.28 Co 0238 (standards) **(Table 12.16b).**

Survey and surveillance of sugarcane insect-pests

Survey was made in Twenty-two different sugar factory zones *viz*., Seorahi, Ramkola, Dhadha, Pratappur, Khadda, Siswabajar, Sathiyav, Goshi, Pipraech, Munderwa, Babhanan, Manakapur, Balrampur, Tulshipur, Utraula, Rudhauali, Kunuderkhi, Maijapur, Rauzagaw, Haderghar, Akbarpur and Mausudha for key insect–pests of sugarcane. During hot weather, the incidence of Shoot borer was low and ranged from 2.50% in Seorahi factory zone to 6.00% in Ramkola factory zone. top borer 2nd brood was low and ranged from 2.50% in Partappur factory zone to 8.00% in Siswabajar factory zone. Regarding the sucking pest i.e. thrips population/leaf was low. It was ranged from (7.00 / leaf) in Seorahi factory zones to (12.50/ leaf) in Rauzagavn factory zone. Low to moderately incidence of mealy bug was observed having range 5.00 / Plant Seorahi factory zone to 23.00 / Plant Rauzagawn and Mausudha Factory Zone. Mite population / leaf was ranged from (15.00 / leaf) in Babhanan factory zones to (32.50/ leaf) in Ramkola factory zone. The incidence of top borer at harvest was recorded low t0 moderately all surveyed factory zone. The minimum (5.50%) incidence of top borer was recorded around Khadda and Siswabajar factory zone while maximum (21.00%) around Akbarpur factory zone. The infestation of Stalk borer on cane basis was observed in all surveyed factory zone. It ranged from (4.00%) around Khadda and (19.00%) around Mausudha factory zone. The incidence of White fly (Nymph & puperia) 2.5 cm^2 was observed highly susceptible and ranged from 7.00% in Mankapur factory zone to 17.50% in Pipraich, Rauzagaw and Mausudha factory zone. The incidence of root borer at harvest was recorded low in all surveyed factory zone. The minimum (5.00%) incidence of root borer was recorded around Munderwa factory zone while maximum (12.50%) around Tulsipur factory zone (Table 12.17).

Table 12.16a: Varietal screening for the resistance to major insect-pest of sugarcane SVT 1st plant -2024-25

S.N.	Genotype/Varieties	%incidence at hot weather		%incidence at harvest	
		Shoot borer	Top borer	Top borer	Stalk borer Infestation index
1	CoLk 19201	3.05	3.03	5.37	0.33
2	CoLk 19202	2.36	2.98	3.94	0.20
3	CoLk 19204	2.67	3.55	3.99	0.26
4	CoS 17232	3.50	3.62	3.30	0.26
5	CoS 18232	4.18	5.57	6.53	0.31
6	CoSe 22451	2.98	4.16	4.72	0.28
7	UP 22452	4.58	3.31	4.48	0.38
8	S 45/17	2.67	3.76	5.34	0.28
9	S 155/17	4.40	4.47	3.79	0.36
10	S 161/17	5.07	3.63	4.33	0.40
11	S 16817	3.76	4.50	3.81	0.24
12	S 1/18	4.80	3.97	7.69	0.39
13	Co 0238	4.47	6.08	6.90	0.69
14	CoJ 64	4.08	5.71	5.44	0.39
15	CoLk 94184	2.45	3.69	3.46	0.37
16	CoS 767	2.40	4.13	2.81	0.26
17	CoSe 95422	3.19	4.48	4.75	0.38

Table 12.16b: State varietal trial 2nd Plant 2024-25

S.N.	Genotype/Varieties	%incidence at hot weather		%incidence at harvest	
		Shoot borer	Top borer	Top borer	Stalk borer Infestation index
1	CoS 20231	3.75	2.77	5.00	0.11
2	CoS 20232	3.76	3.40	4.26	0.17
3	CoS 21231	4.88	2.71	4.80	0.30
4	CoS 21232	2.80	1.92	3.91	0.18
5	CoS 21233	3.09	2.17	4.12	0.23
6	CoSe 21451	3.37	2.98	6.01	0.23
7	UP 21432	3.70	1.85	3.77	0.25
8	S 310/16	3.68	2.41	4.91	0.15
9	S 27/17	3.07	1.44	4.29	0.15
10	Co 0238	3.92	4.25	7.20	0.28
11	CoJ 64	4.93	2.04	5.03	0.23
12	CoLk 94184	4.51	3.65	6.78	0.17
13	CoS 767	3.31	3.03	4.42	0.14
14	CoPant 97222	4.95	1.85	6.06	0.23

Table-12.17 Survey and surveillance of sugarcane insect-pests in the area 2024-25

Variety	Name of Pest	%Incidence/population		
		Min.	Max.	Aver.
(1) Seorahi				
Co 0238, 0118, 98014, CoS 08272, CoLk 94184, CoSe 13452, CoS13235	Shoot borer	02	03	2.50
	Top Borer 2nd brood	02	05	3.50
	Thrips/Leaf	04	10	7.00
	Mealy bugs/plant	03	07	5.00
	Mite	20	40	30.00
	Top borer at harvest	05	10	7.50
	Stalk borer at harvest	05	11	8.00
	White fiy (nymph& puperia) 2.5 cm	05	20	12.50
(2) Ramkola				
Co 0238, 0118, 98014, CoS 08272, CoLk 94184, CoP 9301, CoSe 08452,	Shoot borer	02	10	6.00
	Top Borer 2nd brood	03	12	7.50
	Thrips/Leaf	08	10	9.00
	Mealy bugs/plant	02	20	11.00
	Mite	20	45	32.50
	Top borer at harvest	07	10	8.50
	Stalk borer at harvest	08	10	9.00
	White fiy (nymph& puperia) 2.5 cm	08	20	14.00
	Root borer	05	10	7.50
(3) Dhadha				
Co 0238, CoLk 14201, 0118, Co 15023, CoS 13235, CoSe 08452	Shoot borer	02	08	5.00
	Top Borer 2nd brood	02	10	6.00
	Thrips/Leaf	06	15	10.50
	Mealy bugs/plant	03	15	9.00
	Mite	15	35	25.00
	Top borer at harvest	02	10	6.00
	Stalk borer at harvest	05	09	7.00
	White fiy (nymph& puperia) 2.5 cm	04	20	12.00
(4) Pratappur				
Co 0238, 0118, 98014, CoS 08272, CoLk 94184, CoP 9301, CoSe 08452	Shoot borer	02	05	3.50
	Top Borer 2nd brood	02	03	2.50
	Thrips/Leaf	-	-	-
	Mealy bugs/plant	-	-	-
	Top borer at harvest	03	08	5.50
	Stalk borer at harvest	05	08	6.50
	White fiy (nymph& puperia) 2.5 cm	08	10	9.00
(5)Khadda				
Co 0238, 0118, 98014, CoS 13235, CoLk 94184, CoP 9301	Shoot borer	02	05	3.50
	Top Borer 2nd brood	03	08	5.50
	Thrips/Leaf	05	12	8.50
	Mealy bugs/plant	04	12	8.00
	Mite	20	30	25.00
	Top borer at harvest	03	10	6.50
	Stalk borer at harvest	03	05	4.00
	White fiy (nymph& puperia) 2.5 cm	04	15	9.50

(6) Siswabajar				
Co 0238, 0118, 98014, CoS 13235, CoLk 94184, CoP 9301, CoSe 08452,	Shoot borer	03	05	4.00
	Top Borer 2nd brood	06	10	8.00
	Thrips/Leaf	08	14	11.00
	Mealy bugs/plant	05	09	7.00
	Top borer at harvest	05	06	5.50
	Stalk borer at harvest	02	10	6.00
	White fiy (nymph& puperia) 2.5 cm	04	15	9.50
(7)Sathiyav				
Co 0238, 0118,98014, CoS 8436, 767, UP 39, 91269, CoLk 94184	Shoot borer	-	-	-
	Top Borer 2nd brood	02	12	7.00
	Thrips/Leaf	-	-	-
	Mealy bugs/plant	-	-	-
	Top borer at harvest	-	-	-
	Stalk borer at harvest	-	-	-
	White fiy (nymph& puperia) 2.5 cm	-	-	-
	Root borer	-	-	-
(8) Ghoshi				
Co 0238, 0118, 98014, CoSe 01434, 92423 CoLk 94184, Cose 08452	Shoot borer	-	-	-
	Top Borer 2nd brood	02	10	6.00
	Thrips/Leaf	-	-	-
	Mealy bugs/plant	-	-	-
	Top borer at harvest	02	10	6.00
	Stalk borer at harvest	05	10	7.50
	White fiy (nymph& puperia) 2.5 cm	04	10	7.00
(9) Pipraich				
Co 0238, 0118, 98014, CoS 08272 CoLk 94184, CoP 9301, CoSe 08452	Shoot boer	02	05	3.50
	Top Borer 2nd brood	03	06	4.50
	Thrips/Leaf	-	-	-
	Mealy bugs/plant	-	-	-
	Mite	10	35	22.50
	Top borer at harvest	05	10	7.50
	Stalk borer at harvest	08	10	9.00
	White fiy (nymph& puperia) 2.5 cm	10	25	17.50
(10) Munderwa				
Co 0238, 0118, 98014, CoS 08272 CoLk 94184, CoS 08279, CoSe 08452	Shoot borer	02	04	3.00
	Top Borer 2nd brood	02	08	5.00
	Thrips/Leaf	-	-	-
	Mealy bugs/plant	-	-	-
	Mite	15	25	20.00
	Top borer at harvest	05	12	8.50
	Stalk borer at harvest	06	15	10.50
	White fiy (nymph& puperia) 2.5 cm	05	15	10.00
	Root borer	02	08	5.00

(11) Babhanan				
Co 0238, 98014, 0118 and CoSe 08452 CoLk 14201	Top Borer 2nd brood	02	08	5.00
	Thrips/Leaf	03	25	14.00
	Mite	05	25	15.00
	Top borer at harvest	05	10	7.50
	Stalk borer at harvest	05	15	10.00
	White fiy (nymph& puperia) 2.5 cm	07	12	9.50
	Root borer	02	10	6.0
(12) Mankapur				
Co 0238, CoLk 94184, 0118 CoS 13235, CoLk 14201	Top Borer 2nd brood	02	10	5.00
	Thrips/Leaf	08	20	14.00
	Mealy bugs/plant	-	-	
	Mite	20	38	29.00
	Top borer at harvest	05	10	7.50
	Stalk borer at harvest	10	15	12.50
	White fiy (nymph& puperia) 2.5 cm	04	10	7.00
(13) Balrampur				
Co 0238, CoLk 14201, 0118, Co 15023, CoS 13235, CoLk 14201	Top Borer 2nd brood	03	10	6.50
	Thrips/Leaf	-	-	-
	Mealy bugs/plant	06	15	-
	Top borer at harvest	06	12	9.00
	Stalk borer at harvest	11	15	13.00
	White fiy (nymph& puperia) 2.5 cm	06	12	9.00
	Root borer	05	15	10.00
(14) Tulshipur				
Co 0238, 0118, 98014, CoLk 14201, CoS 08272, CoLk 94184, CoS 08279	Top Borer 2nd brood	02	05	3.50
	Thrips/Leaf	-	-	-
	Mealy bugs/plant	-	-	-
	Top borer at harvest	07	15	11.00
	Stalk borer at harvest	05	20	12.50
	White fiy (nymph& puperia) 2.5 cm	08	15	11.50
	Root borer	10	15	12.50
(15) Utraula				
Co 0238, 0118, CoS 08272 CoLk 94184, CoS 13235,	Top Borer 2nd brood	02	08	5.00
	Thrips/Leaf	08	18	13.00
	Mealy bugs/plant	03	15	9.00
	Mite	18	30	19.00
	Top borer at harvest	10	15	12.50
	Stalk borer at harvest	08	15	11.50
	White fiy (nymph & puperia) 2.5 cm	05	12	8.5
(16) Rudhauli				
Co 0238, 0118, CoS 08272 CoLk 94184	Top Borer 2nd brood	02	08	5.00
	Thrips/Leaf	-	-	-
	Mealy bugs/plant	08	15	11.50
	Top borer at harvest	05	10	7.50
	Stalk borer at harvest	08	12	10.00
	White fiy (nymph & puperia) 2.5 cm	06	10	8.00

(17) Kunuderkhi				
Co 0238, CoLk 14201, 0118, Co 15023, CoS 13235	Top Borer 2nd brood	02	10	6.00
	Thrips/Leaf	-	-	-
	Mealy bugs/plant	08	15	11.50
	Top borer at harvest	05	10	7.50
	Stalk borer at harvest	08	12	10.00
	White fiy (nymph& puperia) 2.5 cm	10	20	15.00
(18) Maizapur				
Co 0238, CoLk 14201, 0118, Co 15023, CoS 13235	Top Borer 2nd brood	02	04	3.00
	Thrips/Leaf	05	12	8.50
	Mealy bugs/plant	06	18	12.00
	Top borer at harvest	05	10	12.50
	Stalk borer at harvest	05	15	10.00
	White fiy (nymph & puperia) 2.5 cm	07	10	8.50
(19) Rauzagawn				
Co 0238, CoLk 14201, 0118, Co 15023, CoS 13235	Top Borer 2nd brood	02	08	5.00
	Thrips/Leaf	05	20	12.50
	Mealy bugs/plant	06	18	12.00
	Top borer at harvest	10	28	19.00
	Stalk borer at harvest	10	18	14.00
	White fiy (nymph & puperia) 2.5 cm	10	25	17.50
(20) Haidargarh				
Co 0238, CoLk 14201, 0118, Co 15023, CoS 13235	Top Borer 2nd brood	02	08	5.00
	Thrips/Leaf	-	-	
	Mealy bugs/plant	18	28	23.00
	Top borer at harvest	08	15	11.50
	Stalk borer at harvest	10	20	15.00
	White fiy (nymph & puperia) 2.5 cm	10	18	14.00
(21) Mausudha				
Co 0238, CoLk 14201, 0118, Co 15023, CoS 13235	Top Borer 2nd brood	02	05	3.50
	Thrips/Leaf	-	-	-
	Mealy bugs/plant	18	28	23.00
	Top borer at harvest	08	12	10.00
	Stalk borer at harvest	18	20	19.00
	White fiy (nymph & puperia) 2.5 cm	10	25	17.50
(22) Akbarpur				
Co 0238, CoLk 14201, 0118, CoS 13235	Top Borer 2nd brood	02	10	6.00
	Thrips/Leaf	05	18	11.50
	Mealy bugs/plant	15	25	20.00
	Top borer at harvest	12	30	21.00
	Stalk borer at harvest	10	18	14.00
	White fiy (nymph & puperia) 2.5 cm	07	10	8.50

13. PLANT PATHOLOGY

UPCSR-SRI, Shahjahanpur

Survey of sugarcane diseases in Uttar Pradesh

Intensive surveys were conducted in thirty-two sugar mill areas under fifteen districts in Central and Western part of UP during the season. Severe incidences of red rot recorded up to 100% in Co 0238 in Raninangal, Belari and Belwara sugar mill areas of Muradabad district of western UP (Fig 13.1). In central UP incidence of red rot gradually reduced due to replacement of Co 0238 in almost all the sugar mill areas except 95% incidence observed in Rupapur mill area. Occurrence of red rot in Co 0238, Co 0118, CoPk 05191, CoS 8436, Co 11015 and CoPb 95 was observed in various sugar mill areas. Red rot infection through aerial movement was also notice on Co 0238 in September month after heavy rain fall. In addition, the cane varieties such as Co 0238, Co 0118, CoH 119, Co 98014, CoLk 94184, CoLk 14201, CoS 13235, Co 15023, Co 15027, CoS 8436, Co 11015 recorded wilt incidences up to 95 per cent (Table 13.1).

The yellowing of sugarcane fields in the command area of various sugar mills was investigated in Western Uttar Pradesh. The various sugarcane varieties were found affected by either root borer, or wilt or both in the following varieties i.e., Co 0118, Co 15023, Co 11015, Co 15027, CoS 13235, CoLk 14201 and Co 0238. Independent incidences of wilt and root borer along with coincidental occurrence of both were observed. The incidences of root borer observed in both wilt affected and healthy clumps of canes. Hence, a direct association of root borer with wilt disease of sugarcane is a misconception and if occur it was coincidental (Table 13.1).

The incidence of whip smut was recorded from 0.5 to 10 per cent in varieties namely Co 0238, CoLk 19201, CoS 13235, Co 0118 and Co 15023 in Rupapur, Aira, Hargaon, Nigohi, Loni, Puranpur and Gola sugar mill areas. The incidence of pokkah boeng was recorded from 1 to 55 per cent on Co 0238, Co 0118, Co 15023, Co 98014, CoH 119, CoS 13231, CoLk 14201, CoJ 85, CoS 13235, CoLk 16202 and Co 15023 at various sugar factory areas. Severe incidence was noticed in Belari (Muradabad) mill area. Yellow leaf were more common with 60 per cent incidence across the varieties and mosaic also to be found in different districts. The incidence of GSD was recorded up to 1-5 per cent in Co 0238, CoLk 14201, Co 15023, Co 0118 and CoS 13235 from various sugar mill areas. Incidence of some minor diseases of sugarcane like leaf binding, leaf fleck, red stripe/top rot, leaf scald and banded sclerotial were also found in traces on different sugarcane varieties in various sugar mill areas. Stem Gall (Physiological disorder) was also observed up to 10 per cent in several genotypes/varieties due to irregular application of 2, 4 D.

Table 13.1: Survey of naturally occurring sugarcane diseases in central and western UP.

Name of area surveyed	Disease incidence (%)	Varieties affected
Red rot		
Seohara (Bijnor)	5-40	Co 0238
Hargaon (Sitapur)	1	Co 0238
	4-20	CoS 8436
Raninangal (Moradabad)	15-80	Co 0238
	1-100	Co 0238
	25-40	CoPb 95, Co 11015
Belwara (Moradabad)	10-100	Co 0238
	Stray	Co 0118
Belari (Moradabad)	1-100	Co 0238
Agwanpur (Moradabad)	1-100	Co 0238
Rupapur (Hardoi)	0-95	Co 0238
Morna (Muzaffarnagar)	10-90	Co 0238
Bilai (Bijnor)	10-30	Co 0238
Aira (Lakhmpur Kheri)	4-5	CoPk 05191, Co 0238
Dhampur (Bijnor)	5-95	Co 0238

Afzalgarh (Bijnor)	5-80	Co 0238
Pooranpur (Pilibhit)	5-30	CoS 8436, Co 0238
Najibabad (Bijnor)	1-80	Co 0238
Bundaki (M. Nagar)	5-5	Co 0238
Wilt		
SRI (Shahjahanpur)	2-5	Co 0238, CoS 13235, CoS 17231, CoLk 14201
Aira (Lakhmpur Kheri)	80-95	Co 0238, CoH 119, Co 98014, CoLk 94184, CoLk 14201
Puranpur (Pilibhit)	2-15	Co 0238, Co 98014, Co 15023, Co 0118, CoS 13235, CoS 8436, CoS 13231
Rupapur (Hardoi)	0-15	Co 0238
Rani Nagal (Moradabad)	10-20	Co 0118, CoS 13235
Dhanaura (Amroha)	5-30	Co 11015 (Yellowing)
Rohankalan (Muzaffarnagar)	10-50	Co 0118 (Yellowing)
Khaikhedi (Muzaffarnagar)	20	Co 15027(Yellowing)
Titawi (Muzaffarnagar)	40-50	Co 15023 (Yellowing)
Deoband (Saharanpur)	20-40	Co 15023 (Yellowing)
Mawana, Naglamal, Simbhawali, Shamli	5-50	Co 0238, Co 15023, Co 0118, Co 15027, Co 11015, CoS 17231 (Yellowing)
Belwara (Moradabad)	50-60	CoS 13235, CoLk 14201, Co 0238
Agwanpur (Moradabad)	1-30	Co 0238, Co 0118
Najibabad (Bijnor), Bundaki,	1-5	Co 0238, Co 0118
Anoopshahar	5-10	Co 0238, Co 0118

Fig 13.1: Complete foliage drying of variety Co 0238 in Rani Nangal and Belwars area of Moradabad district.

Collection and maintenance of pathogenic isolates of sugarcane diseases

The twenty new isolates (R 2401 to R 2420) of *C. falcatum* were collected and isolated from variety Co 0238, CoS 8436 (Hargaon and Puranpur), Co 11015, CoPb 95 (Raninangal), Co 98014 and CoJ 85 of different sugar factory areas. Out of 20 isolates of *C. falcatum,* fourteen isolates were isolated from variety Co 0238 and other isolates were isolated from different cane varieties namely, CoS 8436 (Two isolate), Co 11015 (One isolate), CoPb 95 (One isolate), Co 98014 (One isolate) and CoJ 85 (One isolates) of different sugar factory areas. The twenty new isolates along with 8 designated pathotypes namely CF 01, CF 02, CF 03, CF 07, CF 08, CF 09, CF 11, CF 13 were cultured and maintained in laboratory for further experimental study.

Characterization and identification of pathotypes/ races of red rot pathogen

Eight designated pathotypes and 18 new isolates including fifteen isolates of Cf0238, one isolate of Cf08279, Cf11015 and Cf13231 were examined for their pathogenic variability on 20 host differentials (Co 419, Co 975, Co 997, Co 1148, Co 7717, Co 62399, CoC 671, CoJ 64, CoS 767, CoS 8436, BO 91, Baragua, Kakhai SES 594, Co 7805, Co 86002, Co 86032, CoSe 95422, CoV 92102 and Co 0238). Disease intensity was assessed on the basis of resistant (R), intermediate (X) and susceptible (S) reaction. The differentials viz, CoS 8436, CoSe 95422, BO 91 and SES 594 exhibited universal resistant behaviour to all the 18 isolates and designated pathotypes. All the 15 isolates of Cf0238 exhibited almost virulent behaviour on host differentials such as Co 62399, CoC 671, Co 86032, Co 7805 and Co 0238. The isolates Cf 11015, Cf 08289 and Cf 13231 exhibited almost similar trends to virulent reference pathotypes CF 13 on the host differentials. The designated pathotypes such as CF 07, CF 08 and CF 09 showed same virulent pathogenic behaviour with CoJ 64 and CoS 767, which was contrast to all the 18 isolates along with CF13. All the 18 isolates exhibited a similar pathogenic pattern to CF 13 while designated pathotypes CF 07, CF 08 and CF 09 exhibited the contrast pathogenic behaviour on same differentials *viz*, Co 62399, CoC 671, Co 86032, Co 7805, Co 0238. The red rot development on differential hosts indicated that all the new 18 isolates exhibited more or less similar reactions to reference pathotypes CF13 on all the host differentials.

Evaluation of genotypes/varieties for resistance to red rot

The promising elite genotypes along with standard varieties were evaluated against two red rot standard pathotypes i.e. CF 08 and CF 13 in state varietal trials, preliminary varietal trial and second-generation trial by plug method and nodal cotton swab (NCS) method of inoculation. Inoculation was done in second week of August, 2024 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). Red rot susceptible standard Co 0238 and CoJ 64 were used accordingly.

State varietal trial (SVT) I plant: A total of thirteen genotypes and three standards Co 0238, CoJ 64 and CoS 767 were evaluated against red rot pathotypes CF 08 and CF 13 separately by plug and NCS method. Nine genotypes viz; CoS 17232, CoS 18232, CoLk 19201, CoLk 19202, CoS 21231, S. 45/17, S. 155/17, S. 168/17 and S. 01/18 exhibited moderately resistant (MR) to CF 08 and CF 13 by plug and Resistant (R) to both the pathotypes by NCS methods. Other genotypes i.e. CoLk 19204, S. 161/17, UP 21451 and UP 21452 exhibited MR and R to CF 08 by plug and NCS methods, respectively. While CoLk 19204, UP 21452 were graded as MS by plug and R by NCS to CF 13 and S. 161/17, UP 21451 exhibited HS to CF 13 by plug and S by NCS method. Susceptible standard Co 0238 and CoJ 64 expressed HS reaction to CF 13 and CF 08, respectively (Fig 13.2).

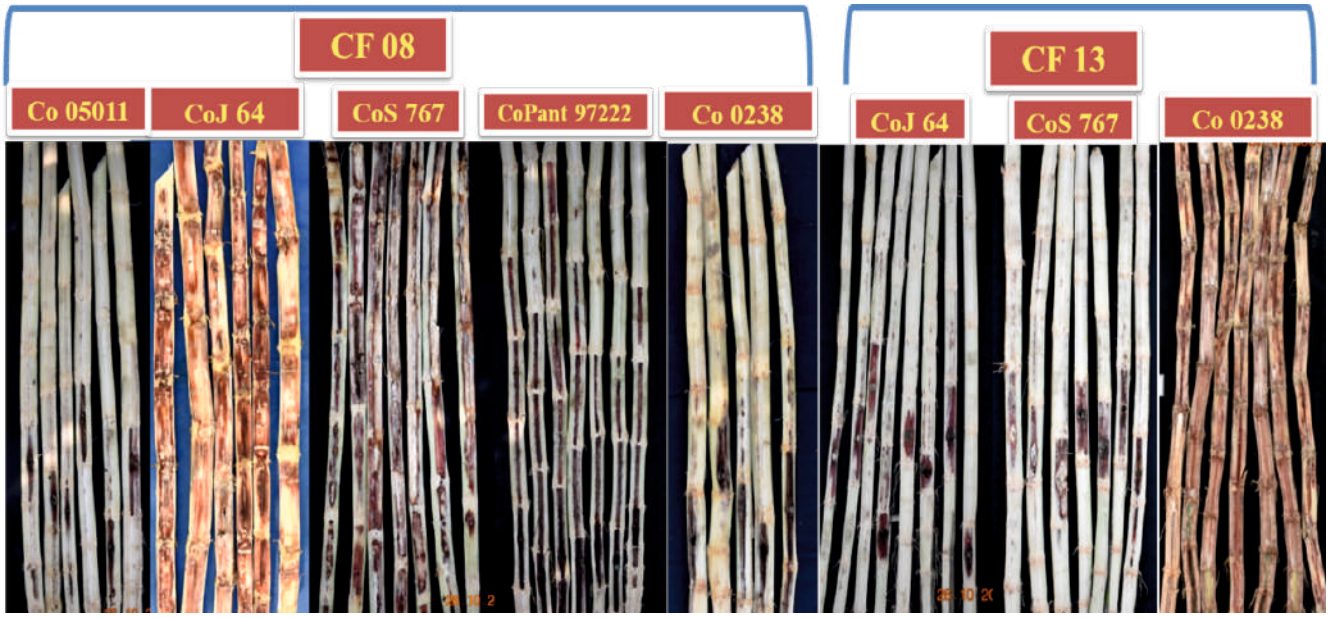


Fig 13.2. Red rot disease behaviour of standard varieties.

State varietal trial (SVT) II Plant: A total of eight genotypes along with 4 standards were evaluated against CF 08 and CF 13 separately by plug and NCS method. All the genotypes namely CoS 20231, CoS 20232, CoS 21231, CoS 21232, CoS 21233, S. 310/16, S. 27/17 and UP 21452 were identified as MR and R to both the pathotypes (CF 08 and CF 13) by plug and NCS method of inoculations. Susceptible standard Co 0238 and CoJ 64 expressed HS reaction to CF 13 and CF 08, respectively (Fig 13.2).

Preliminary varietal trial (PVT) : A total of Fifty-nine elite genotypes along with two standards were tested to red rot using two pathotypes CF 08 and CF 13 separately by plug and NCS method of inoculation. Red rot susceptible CoJ 64 and Co 0238 were found dry (HS) to CF 08 and CF 13 pathotypes, respectively.

Pathotype CF 08: Out of 59 genotypes, 01 genotypes namely S. 153/19 were found resistant (R) and forty-seven genotypes viz, S. 21/19, S. 22/19, S. 58/19, S. 86/19, S.120/19, S. 122/19, S. 144/19, S. 147/19, S. 211/19, S. 215/19, S. 236/19, S. 303/19, S. 313/19, S. 323/19, S. 431/19, S. 452/19, S. 461/19, S. 467/19, S. 488/19, S. 510/19, S. 11/20, S. 16/20, S. 18/20, S. 23/20, S. 24/20, S. 25/20, S. 27/20, S. 32/20, S. 38/20, S. 40/20, S. 49/20, S. 50/20, S. 55/20, S. 60/20, S. 63/20, S. 73/20, S. 75/20, S. 78/20, S. 87/20, S. 89/20, S. 97/20, S. 102/20, S. 103/20, S. 131/20, S. 143/20, S. 159/20 and S. 163/20 were identified moderately resistant (MR) by plug and R by NCS method. Six genotypes such as S. 145/19, S. 229/19, S. 422/19, S. 429/19, S. 62/20 and S. 96/20 were evaluated MS by plug and R by NCS method. Five genotypes such as S. 100/20, S. 105/20, S. 138/20, S. 154/19, S. 169/19 were screened S/HS by plug and S by NCS method.

Pathotype CF 13: Out of 59 genotypes, thirty nine genotypes such as S. 22/19, S. 58/19, S. 86/19, S.120/19, S. 144/19, S. 145/19, S. 211/19, S. 215/19, S. 313/19, S. 323/19, S. 422/19, S. 431/19, S. 467/19, S. 488/19, S. 11/20, S. 16/20, S. 18/20, S. 24/20, S. 25/20, S. 27/20, S. 32/20, S. 38/20, S. 40/20, S. 49/20, S. 50/20, S. 55/20, S. 60/20, S. 63/20, S. 73/20, S. 75/20, S. 87/20, S. 89/20, S. 97/20, S. 103/20, S. 131/20, S. 138/20, S. 143/20, S. 159/20 and S. 163/20 were evaluated MR by plug and R by NCS method. Eight genotypes such as S. 122/19, S. 153/19, S. 154/19, S. 169/19, S. 461/19, S. 510/19, S. 23/20 and S. 105/20 were recorded MS by plug and R by NCS method. Ten genotypes such as S. 100/20, S. 102/20, S. 96/20, S. 78/20, S. 62/20, S. 452/19, S. 429/19, S. 229/19, S. 147/19, S. 21/19 were found S/HS by plug and S by NCS method. Two genotypes such as S. 236/19 and S. 303/19 were not germinated.

C_2 generation : Forty-nine newly developed progenies were examined against red rot resistance by using two standard pathotypes namely CF 08 and CF 13 by plug and NCS method of inoculation. Red rot susceptible standard CoJ 64 expressed HS reaction to CF 08 and Co 0238 as HS to CF 13 pathotypes. The results are as follow:

Pathotype CF 08: Out of 49 genotypes, 38 progenies such as S. 02/21, S. 04/21, S. 07/21, S. 10/21, S. 19/21, S. 20/21, S. 25/21, S. 27/21, S. 34/21, S. 36/21, S. 37/21, S. 39/21, S. 40/21, S. 41/21, S. 44/21, S. 46/21, S. 47/21, S. 48/21, S. 50/21, S. 51/21, S. 52/21, S. 54/21, S. 58/21, S. 59/21, S. 60/21, S. 62/21, S. 63/21, S. 64/21, S. 66/21, S. 68/21, S. 69/21, S. 70/21, S. 71/21, S. 72/21, S. 75/21, S. 78/21, S. 79/21 and S. 80/21, were screened as R/MR by plug and R by NCS method. Six progenies such as S.

24/21, S. 30/21, S. 45/21, S. 56/21, S. 67/21 and S. 74/21 were screened as MS by plug and R/S by NCS method. The 04 progenies i.e. S. 73/21, S. 53/21, S. 26/21, S. 01/21 were screened as HS by plug and S by NCS Method of inoculation. One genotype S. 13/21 was not germinated.

Pathotype CF 13: Out of 49 genotypes, 20 genotypes viz; S. 01/21, S. 04/21, S. 07/21, S. 10/21, S. 13/21, S. 19/21, S. 20/21, S. 27/21, S. 36/21, S. 37/21, S. 39/21, S. 40/21, S. 51/21, S. 52/21, S. 53/21, S. 56/21, S. 60/21, S. 66/21, S. 73/21 and S. 75/21 were showed R/MR reaction by plug and R by NCS method. Fifteen genotypes namely S. 24/21, S. 25/21, S. 26/21, S. 30/21, S. 44/21, S. 46/21, S. 47/21, S. 48/21, S. 50/21, S. 63/21, S. 64/21, S. 72/21, S. 74/21, S. 79/21 and S. 80/21 were shown MS reaction by plug and R/S by NCS method. The 13 genotypes such as S. 34/21, S. 41/21, S. 45/21, S. 54/21, S. 58/21, S. 59/21, S. 62/21, S. 67/21, S. 68/21, S. 69/21, S. 70/21, S. 71/21 and S. 78/21 were showed S/HS reaction by plug method and S by NCS method of inoculation. One genotypes S. 173/20 was not germinated.

Evaluation of genotypes/varieties for resistance to smut

State varietal trial (SVT) I plant: Smut resistance data was evaluated among thirteen genotypes. The variety Co 1158 was used as susceptible check to smut. Ten out of 13 genotypes such as CoS 17232, CoS 18232, CoLk 19201, S. 45/17, S. 155/17, S. 161/17, S. 168/17, S. 01/18, UP 21451 and UP 21452 were identified R against smut. One genotypes namely CoLk 19204 were evaluated MS and CoLk 19202, CoS 21231 were observed S against smut.

State varietal trial (SVT) II plant: A total of 08 genotypes were tested for smut resistance and among them seven genotypes viz, CoS 20232, CoS 21231, CoS 21232, CoS 21233, S. 310/16, S. 27/17 and UP 21452 were identified as R against smut. One genotype i.e. CoS 20231 was HS against smut.

Preliminary varietal trial (PVT): A total of 59 genotypes and four standards were evaluated against smut. Forty-nine genotypes were evaluated as R/MR. Three as MS and 7 as S/HS to smut. The smut evaluation work would be further repeated next year.

C_2 generation: Total 49 progenies were were evaluated against smut. The thirty-three genotypes were found R, nine as MS, and seven as S/HS against smut. This data would be repeated further in next year.

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*, bacterial rot (BR), leaf flack and leaf binding were inspected during season. Twelve genotypes along with 4 standards were studied against natural incidence under SVT (I^{st} Plant). Under this trial wilt disease with maximum 30% incidence was noticed in S. 168/17 and 20% in CoS 17232 and maximum incidence of PB disease was observed in CoS 17232 with 18.3% in natural condition. Additionally, incidence of the PBD was observed to be 1.2-14.3% in all other varieties, and the incidence of bacterial rot disease was observed 6.4 per cent in the varieties CoSe 22451. Minor diseases namely BS, PB, SCMV and BR were noticed with various incidence levels.

In SVT (II Plant), eight genotypes and 4 standards were assessed for various diseases under natural condition. The incidence of wilt was examined 25% on CoS 21233. Pokkah boeng was ranged from 1 (CoS 21233) to 10.5 per cent (CoS 20231) incidence. *SCMV* observed 5 per cent on CoS 21232 and BR found 2.5% on CoS 20232. Under SVT (Ratoon), incidence of wilt observed 30% on CoS 21233. Smut was noticed 3.8% on CoS 20231. Minor diseases like GSD, PB, *SCMV* and bacterial rot were also assessed in ratoon trial. Under PVT, 41 genotypes were assessed, wilt was recorded 40 per cent on S. 153/19, and a wide range of PB disease varied from 1 to 14.6 per cent. The range of *SCMV*, banded sclerotial, GSD, banded chlorosis and bacterial rot disease was also found on different genotypes.

Bio-control activity of *Stenotrophomonas maltophilia* strain B2132 and *Pseudomonas studzerry* B2133 against red rot of sugarcane

An experiment was conducted to evaluate the efficacy of novel bacterial strains *Stenotrophomonas maltophilia* B2132 and *Psedomonas studzerry* B2133 on red rot management under field conditions. The sorghum grain with red rot inoculum of CF 13 (150 g of grain inoculum/ 20 ft row) was applied in different six treatments at the time of planting. The susceptible variety Co 0238 was used for planting. The experiment was conducted in split plot design with three replications. The treatments were characterized into two split plot such as main plot (S_1 - Bacterial strain, B2132 and S_2 - Bacterial strain, B2133) and sub-plot (Treatments). The efficacy of five different bacterial treatments *viz;* T_1; Bud soaking in bacterial suspension for 1 hr, T_2; Bud soaking in bacterial suspension for 24 hrs, T_3; Drenching of bacterial suspension over cane set at planting and 7 Days interval till germinating stage, T_4; Bud treated in bacterial suspension with sett

treatment device, T_5; Bacterial suspension alone (15 min), T_6; *Trichoderma* treated alone (15 min) were conducted with untreated control (T_7) were tested individually against red rot in natural condition.

The results indicated that, new bacterial strain B2132 soaking in 24 hrs and *Trichoderma* were effective against red rot followed by other treatments. Good germination was found in bacterial treated plot (T_2) and high shoot population were also recorded in (T_3 and T_4) as compared to untreated plot (T_7). Primary and secondary incidence of red rot was found low in T_5, T_6 and T_2 treatments with B 2132 as compared to control (T_7) 13.07 per cent. Soaking of bud either 1 h or 24 hrs were recorded good to prevent primary incidence of red rot and also enhance the germination, and all other quantitative parameters. Overall, bacterial strain B2132 was recorded effective against red rot and also to enhance the growth, which offers not only a disease control but also improves yield of sugarcane crop (Table 13.2-13.5).

Table 13.2: Two-way table of germination per cent data

Treatment	T_1	T_2	T_3	T_4	T_5	T_6	T_7	Mean (B)
B 2132	50.46	69.68	54.63	60.88	59.72	61.34	22.92	54.23
B 2133	53.47	69.91	63.19	64.35	67.59	56.94	31.94	58.19
Mean (T)	51.96	69.79	58.91	62.61	63.65	59.14	27.43	-

Table 13.3: Primary incidence of red rot data of seven treatments of both the bacterial.

Treatment	T_1	T_2	T_3	T_4	T_5	T_6	T_7	Mean (B)
B 2132	1.04	0.67	1.09	1.18	0.55	0.55	13.01	2.58
B 2133	0.95	1.44	1.77	1.05	0.58	0.47	9.91	2.31
Mean (T)	0.995	1.055	1.43	1.115	0.565	0.51	11.46	

Table 13.4: Secondary incidence of red rot data of seven treatments of both the bacterial.

Treatment	T_1	T_2	T_3	T_4	T_5	T_6	T_7	Mean (B)
B 2132	2.37	2.09	4.23	1.95	2.02	1.50	12.43	3.80
B 2133	2.15	2.26	4.26	3.51	2.12	1.91	12.04	4.03
Mean (T)	2.26	2.175	4.245	2.73	2.07	1.705	12.235	-

Table 13.5: Secondary incidence of red rot data of seven treatments of both the bacterial.

Treatment	T_1	T_2	T_3	T_4	T_5	T_6	T_7	Mean (B)
B 2132	88.27	94.14	83.64	85.49	91.05	99.69	62.35	86.38
B 2133	97.22	81.79	74.38	87.04	85.80	97.22	61.42	83.55
Mean (T)	92.75	87.96	79.01	86.26	88.43	98.46	61.88	-

Raising of single bud settling by using red rot infected sugarcane bagasse

An experiment was conducted to evaluate the impact of different treatments of red rot infected sugarcane bagasse on raising the single bud settling in poly-tray under glass house conditions. The susceptible variety Co 0238 (CF 13) was used for planting. The red rot inoculum of CF 13 was applied in all the 10 treatments except healthy bagasse at the time of planting. There were ten treatments such as T_1- Bagasse of healthy canes (untreated); T_2- Bagasse of healthy canes (treated) at 100^{0}C for two hours; T_3- Bagasse of red rot infected cane (untreated); T_4- Bagasse of red rot infected cane (treated) at 100^{0}C for two hours; T_5- Bagasse+*C. falcatum* suspension + treated with carbendazim; T_6- Bagasse + *C. falcatum* suspension + TPM (Thiophanate methyl); T_7- Bagasse + *C. falcatum* suspension + *Trichoderma* culture; T_8- Bagasse + *C. falcatum* suspension + eye buds treated with TPM in STD; T_9- Bagasse + *C. falcatum* suspension + B2132 and T_{10}- Bagasse + *C. falcatum* suspension +B2133 were characterized into randomized block design with three replications. Sugarcane bagasse was collected and prepared from institute's sugarcane

crusher machine, and healthy (T_2) and infected bagasse (T_4) were oven-dried for 2hrs at 100^{0}C, pulverized, cleaned, and then retained at normal temperature for further use. The rest bagasse were treated with respective fungicides except untreated central.

Highest germination was recorded 77.33, 56.22 and 64.44 per cent with carbendazim (T_5), TPM (T_6) and STD with TPM (T_8), respectively. Red rot free settlings were recorded in treatments such as Carbendazim and STD with TPM while meager 1.23 per cent incidence was observed in TPM (T_6) treated bagasse and buds. Maximum plant survival was recorded 100 per cent in both the treatments such as sett treatment device with TPM (T_8) and carbendazim (T_5) followed by 98.77 per cent (T_6) with TPM. The untreated control (T_3) exhibited 47.63 per cent plant survival. Hence, the treatment of buds with Carbendazim, TPM and STD with TPM exhibited good results to prevent primary incidence of red rot from infected bagasse and also enhance the germination with all other quantitative traits. All the growth-related data are depicted in Table 13.6 and Fig 13.3 & 13.4.

Table 13.6: Germination, red rot incidence and growth-related data of all the treated settling in ploy tray under glass house condition.

Sl. No.	Treatments	Mean germination (%)	Red rot incidence (%)	Actual Plant Survival (%)	Shoot Diameter (mm)	Leaf Area (cm^2)	Shoot Height (cm)	Plant Height (cm)
1	T_1	52.44	9.33	90.67	2.65	39.48	12.57	58.53
2	T_2	45.33	2.78	97.22	2.67	47.72	12.20	60.47
3	T_3	41.11	52.37	47.63	2.40	39.01	11.07	53.80
4	T_4	36.22	26.26	73.74	2.13	21.89	9.12	35.50
5	T_5	77.33	0.00	100.00	5.47	81.42	14.02	81.87
6	T_6	56.22	1.23	98.77	4.50	73.30	16.45	80.23
7	T_7	13.78	41.67	58.33	1.73	30.27	7.08	37.90
8	T_8	64.44	0.00	100.00	4.83	75.30	21.20	93.43
9	T_9	31.78	61.35	38.65	2.23	32.39	8.61	45.83
10	T_{10}	25.78	67.78	32.22	1.36	26.37	7.52	38.47
11	CD	-	-	-	0.54	-	3.03	5.28
12	SE (m)	-	-	-	0.18	-	1.01	5.10
13	CV	-	-	-	0.25	-	1.43	7.22

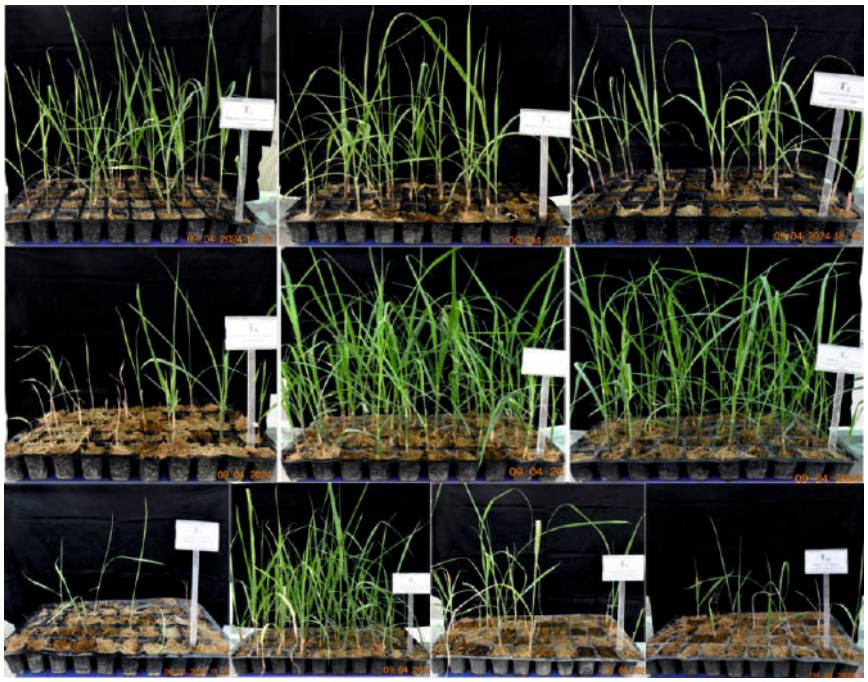


Fig 13.3: Efficacy of different treatments on sugarcane bagasse and settings

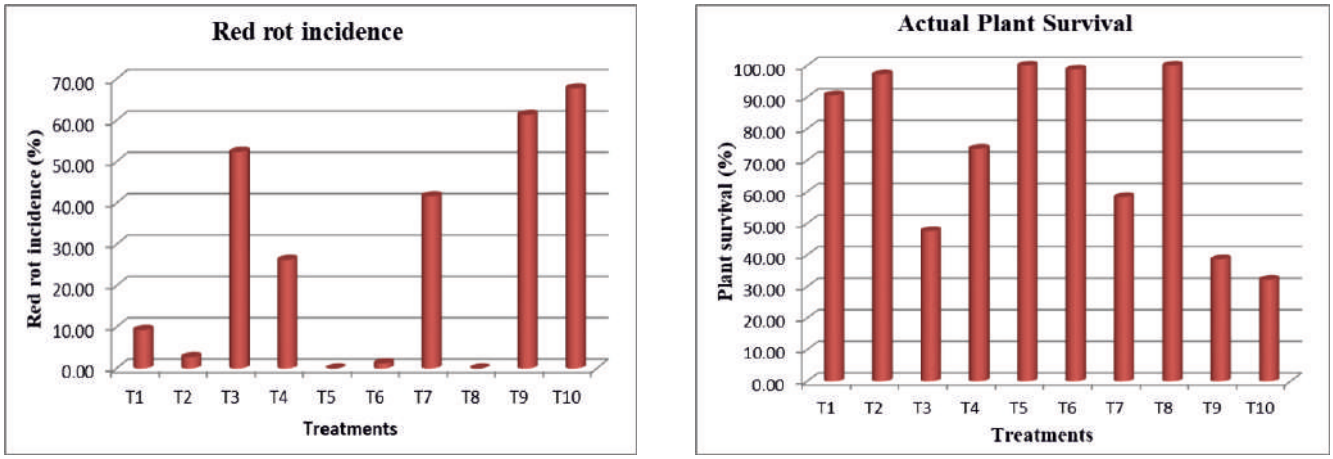


Fig 13.4: Red rot incidence and plant survival in different treatments in sugarcane bagasse.

Assessment of losses in sugarcane due to pokkah boeng disease (PB).

The quantitative and qualitative losses in pokkah boeng (PB) infected sugarcane plant was assessed during the year. Stage wise losses were carried out in infected plant and compare with healthy plant of same varieties. Pokkah boeng was favoured by warm, moist condition with typical symptoms develop during the monsoon season which coincides with rapid and vigorous growth phase of the crop. Additionally, summer showers with cloudy weather also favour disease development.

PB symptoms were characterized into three stages namely chlorotic phases, acute/top rot and knife cut phase. Cholorotic and acute/top-rot phases of the disease were recorded in the affected clones from 4 to 6 months after planting. Typical twisted top with varying levels of leaf deformities was tagged with label for losses study on all susceptible varieties. The observations on yield contributing parameters were studied in PB infected and healthy plants of eleven sugarcane genotypes/varieties. The phenotypic traits like number of green leaves, leave length (cm), number of internodes, length of internodes (cm), diameter of internodes (cm), stalk height (cm), cane weight (Kg) brix, sucrose and purity of both infected and healthy canes of each variety were recorded in three replications and quantitative and qualitative losses was calculated at the time of harvesting.

Three sugarcane varieties namely Co 0238, CoS 08279, CoS 8436 showed very less reduction in almost all yield contributing parameters due to chlorotic stage of PB. In current findings, most of the chlorotic symptoms of PB infected canes recovered automatically with weather condition from the symptoms till maturity stage. Once chlorotic stage shifted to top rot stage, affected all the varieties were showed death of entire emerging leaves and formed a whip-like dried spindle. The susceptible varieties viz; Co 21012, Co 21013, CoLk 21201, CoLk 21202, CoPb 21181, CoPb 21181, Co 15027 and Co 419 showed top rot phase, it was never recovered from the damage of growing point. Top rot infected varieties showed death of emerging leaves inside the crown and formed a whip-like dried spindle and bud sprouting was observed in most of the top rot affected canes. All the yield parameters were exhibited 100 per cent losses in top rot phase. The symptom of knife-cut stage was observed in association with the acute phase of the disease. Very less reduction in yield parameters were recorded in knife cut stage (Table 13.7). The reduction in quality traits such as brix, sucrose and purity coefficient found also to be reduced by the incidence of PB (Fig 13.5).

Table 13.7: Assessment of quantitative losses (%) in Chlorotic, Top rot stage and Knife cut stages of PB in sugarcane varieties.

Sl. No.	Varieties	NGL	LL (cm)	INT	INTL (cm)	Diameter (cm)	SH (cm)	CW (Kg)
Chlorotic stage								
1	Co 0238	11.82	0.77	-6.58	-18.26	6.33	23.86	13.53
2	CoS 08279	-19.88	2.26	-10.83	-21.30	-2.45	67.57	-1.67
3	CoS 8436	23.86	-0.52	1.10	-15.79	9.39	82.08	3.89
8	CoPb 21181	14.29	0.00	5.88	-40.74	6.33	23.86	-19.64

Top rot stage								
1	CoPb 21181	100	100	19.44	12.5	100	23.86	36.51
2	Co 15027	100	100	34.54	1.30	21.88	67.57	51.24
3	Co 21012	100	100	63.01	-59.06	100	82.08	84.06
4	Co 21013	100	100	100	100	100	100	100
5	CoLk 21201	100	100	100	100	100	100	100
6	CoLk 21202	100	100	100	100	100	100	100
7	Co 419	100	100	100	100	100	100	100
Knife cut								
1	CoS 08279	6.67	0.8	-77.78	-18.51	10.26	-14.49	-26.33
2	Co 21013	20	0.73	-45.45	-57.14	16.67	48.28	77.23
3	CoLk 21202	-60	1.40	-57.89	-13.04	-22.22	-4.69	-20.40

Abbreviation : NGL : No. of Green Leaves, LL: Leaf Length, INT : Number of internode, INTL : Internode length, SH : Stalk height, CW : Cane weight

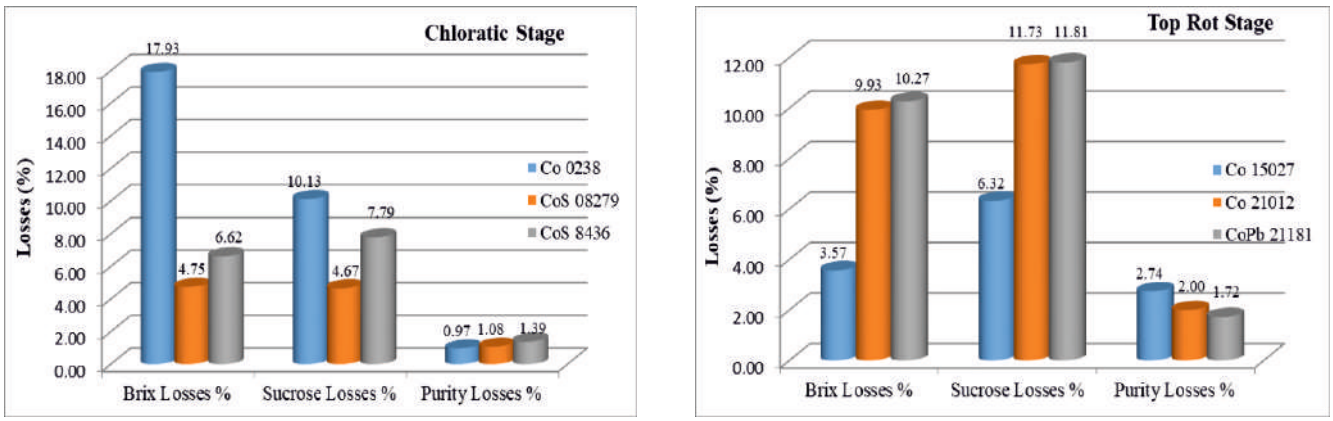


Fig 13.5: Losses in qualitative traits (Brix, Sucrose%)

Management of PB

The eleven treatments with fungicides viz; T_1-Copperoxychloride 50% WP (0.05%), T_2-Copperoxychloride 50% WP (0.1%), T_3-Copperoxychloride 50% WP (0.2%), T_4-Carbendazim 50% WP (0.05%), T_5-Thiophanate Methyl 70% WP (0.05%), T_6-Isoprothiolane 40% EC (0.05%), T_7-Carboxin 17.5% + Thiram 17.5% FF (0.05, 0.1%), T_8-Carboxin 17.5% + Thiram 17.5% FF (0.1%), T_9-Azoxystrobin 11% + Tebuconazole 18.3% SC (0.1%), T_{10}-Azoxystrobin 2.5% + Thiophanate Methyl 11.25 + Thaimethoxam 25% FS (0.05%), T_{11}-Azoxystrobin 7.1% + Propiconazole 11.9% SE (0.1%), T_{12}-*Trichoderma harzianum* (1x 10_7), T_{13}-T. viride, T_{14}-*Strenotophomonas maltophilia* B2132 (1x 10_8) were carried out for the management of PB. The treatments such as T_1, T_2, T_4, T_6, T_8, T_{10}, T_{13} exhibited 100 per cent recovery in chlorotic stage of PB. Rest of the treatments were found suitable to manage PB from 50 to 91.67 per cent at chlorotic stage (Table 13.8 and Fig 13.6). There was no any management in PB at acute/top rot stage.

Table 13.8: Management of PB of tagged plant

Sl. No.	Treatment	No of plant	Average Leaf/plant	Average Infected leaf/plant	Disease incidence (%)	Emerging new leaves	Infected leaf (Per leaf)	Disease Reduction (%)
1	T_1	4	8.0	3.25	40.55	2.75	0	100
2	T_2	4	8.25	3.25	38.7	3.25	0	100
3	T_3	4	8.00	3.25	40.20	3.50	0.50	83.33
4	T_4	4	7.25	2.50	35.25	2.75	0.00	100
5	T_5	4	7.75	3.00	39.20	3.00	0.25	91.67
6	T_6	4	7.75	4.0	51.35	3.75	0	100
7	T_7	4	7.25	2.00	27.40	2.75	0.50	83.33

8	T_8	4	7.75	3.0	39.9	3.5	0	100
9	T_9	4	8.0	4.0	50.02	3.0	0.67	58.33
10	T_{10}	4	8.0	4.0	50.37	3.0	0	100
11	T_{11}	4	7.75	4.25	54.45	1.75	0	50
12	T_{12}	4	6.75	3.25	48.77	3	0.25	91.66
13	T_{13}	4	7.75	3.25	41.52	3	0	100
14	T_{14}	4	8.25	3.75	44.97	2.75	0.5	83.33

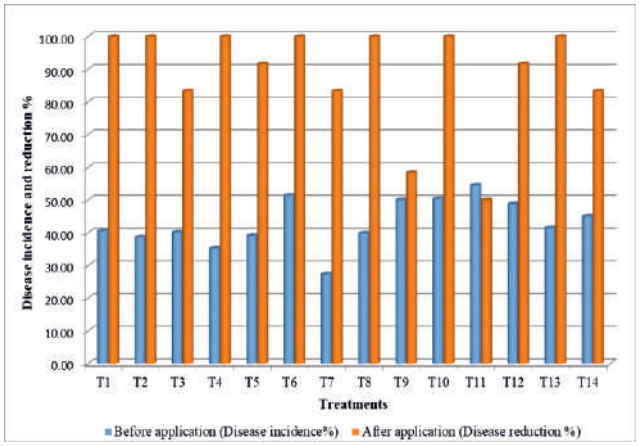


Fig 13.6: Recovery percentage of PB affected plant using various fungicides.

Effect of fungicidal treatment on whole seed cane to facilitate mechanical planting for quality seed production of sugarcane

An experiment entitled "Effect of fungicidal treatment on whole seed cane to facilitate mechanical planting for quality seed production of sugarcane" was conducted with variety CoS 13235 during 2024-25 seasons at Plant Pathology block. There were eight treatments such as T_1- Planting without seed treatment (Check); T_2- Hot water treatment of two budded setts with 0.1% Propiconazole for two hrs (Control); T_3- Soaking of 2 budded setts with 0.1% Propiconazole for 30 min; T_4- Soaking of 2 budded setts with 0.1% Propiconazole for 1 hr; T_5- Soaking of whole seed cane with 0.1% Propiconazole for 30 m; T_6 - Soaking of whole seed cane with 0.1% Propiconazole for 1 hr; T_7 - Spraying of 0.1% Propiconazole after setts placement in furrows and T_8 -Spraying of 0.1% Propiconazole two month after planting were characterized into randomized block design with three replications. The method of inoculation consists of steeping of setts (Two budded and whole seed cane) for 30 minutes in teliospores suspension. The results revealed that the primary incidence of smut was recorded zero per cent in treatment T_2, T_3 and T_4 of two budded seed cane while $T_5$and $T_6$with whole seed cane was recorded 2.06 and 5.88 per cent (June) incidence, respectively. The treatments T_1 (Untreated control) and T_8 exhibited maximum incidence i.e. 45.53 per cent and 42.82 per cent, respectively. Hence, two budded seed cane could be used as a planting material followed by whole seed cane with proper treatments of Propiconazole (0.1%) for the management of smut (Table 13.9).

Table 13.9: Per cent mean incidences of smut at different months

Treatments	April	May	June	July	August	Sep.	October	Mean
T_1	5.23	42.56	45.53	48.79	43.11	40.61	35.84	37.38
T_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T_3	0.00	0.00	0.00	0.00	0.00	1.39	3.20	0.66
T_4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
T_5	0.00	0.00	2.06	2.06	4.18	3.35	3.45	2.16
T_6	0.00	0.00	5.88	3.92	1.23	1.33	2.38	2.11
T_7	0.00	1.23	7.30	1.23	1.45	0.00	0.00	1.60
T_8	2.01	42.82	38.64	32.14	27.74	26.41	22.09	27.41
C.V.	90.30	55.9	59.12	44.61	52.45	43.37	56.37	-
S.E.	0.67	4.95	6.00	4.01	4.16	2.67	3.89	-
C.D.	1.43	10.62	12.89	8.61	8.92	5.72	8.35	-

Evaluation of sugarcane varieties CoPb 95 and Co 11015 for red rot resistance

Two sugarcane varieties such as CoPb 95 and Co 11015 were tested against two pathotypes i.e. CF 08 and CF 13 for their red rot resistance. The variety CoPb 95 was evaluated HS to both pathotypes i.e. CF 08 and CF 13 while Co 11015 was rated as MR to CF 08 and HS to CF 13 by plug method of inoculation as well as nodal method of inoculation. Hence, these two varieties could not propagate among cane growers in Uttar Pradesh (Fig 13.7).

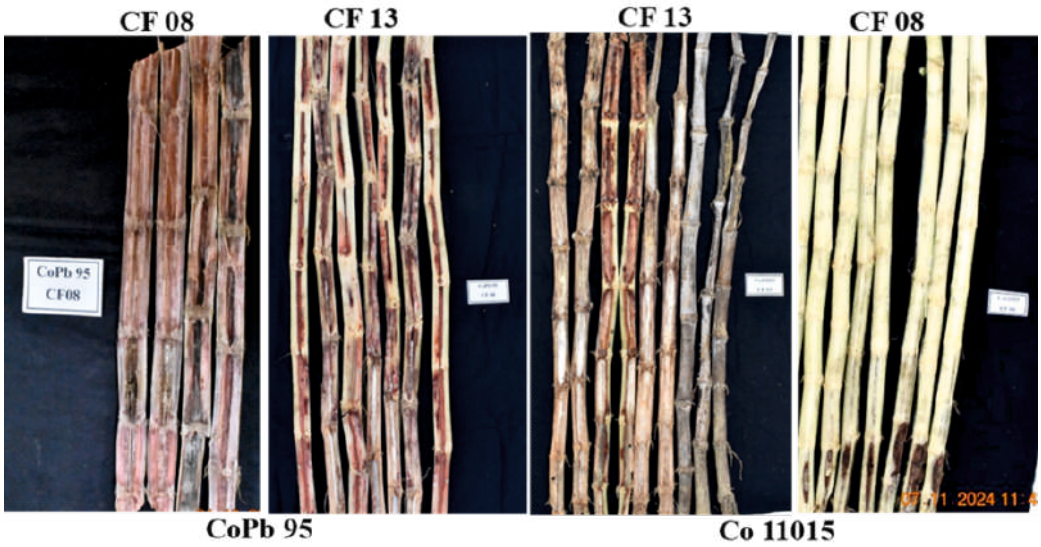


Fig 13.7: Red rot resistance of CoPb 95 and Co 11015 against CF 08 and CF 13.

UPCSR- SRS, Muzaffarnagar

Survey of Sugarcane disease in Western U.P.

Periodic observations were recorded in pre monsoon, monsson and post monsoon to collect the information of different diseases incidence on sugarcane cultivars. The survey was conducted in fifteen sugar factory zone of western U.P. The Co 0238 was dominant cultivars and covered more then 60-100% area of westen Uttar Pradesh. The incidence of red rot in eastern part of western U.P. (Bijnor, Seohara, Afzalgharh, Dhampur, Bundki, Dhanora, Amroha, Sambhal and Moradabad districts) of different factory zone (Plot wise surveyed area) in lowland area was recorded upto 60-100% on variety Co 0238. A wide range of red rot incidence was recorded on Co 0238 mentioned in Table-13.10. The incidence of smut diseases was recorded 2-4% on Co 0238 at Deoband (Saharanpur) factory area. Wilt disease was also observed on Co 0238 at Kinoni (Meerut) sugar factory area. The severe incidence of Pokkah boeng disease was recorded in late planting crop of Co 0238. Bacterial rot was observed stray to 20% in Titawi (Muzaffarnagar) factory area on CoS 13235. YLD was also recorded in CoS 8436 and Co 0238 with 5-80% incidence. Some fungal/viral diseases like red stripe, leaf scald, banded sclerotial, eye spot, leaf binding and mosaic were also observed upto various extend in various varieties (Fig 13.8).

Table 13.10: Incidence of red rot recorded in different factory zone

Name of Diseases	Varieties affected	Incidence (%)	Factory zones/Districts (Plot wise surveyed area)
Red rot	Co 0238	4-5	Khai khedi, Muzaffarnagar
	Co 0238	3-4	Deoband, Saharanpur
	Co 0238	2-10	Bilai, Bijnor
	Co 98014	Stray	
	Co 0238	Stray	Najibabad, Bijnor
	Co 0238	15-20	Dhanora, Amroha
	Co 0238	5-7	Chandanpur, Amroha
	Co 0238	70-80	Bundki, Bijnor

	Co 0238	30-100	Afzalgarh, Bijnor
	Co 0238	5-7	Morna, Muzaffarnagar
	Co 0238	10-20	Barkatpur, Bijnor
	Co 0238	10-60	Dhampur, Bijnor
	Co 0238	25-30	Noorpur, Bijnor
	Co 0238	15-25	Asmoli, Sambhal
	Co 0238	10-40	Rajpura, Sambhal
	Co 0238	2-3	Khatauli, Muzaffarnagar

Fig13.8 Severe incidence of red rot in field

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 I plant: Under this trial 12 genotypes/varieties (12+4) i.e. S-45/17, S-155/17, S-161/17, S-168/17, S-01/18, CoLk 19201, CoLk 19202, CoLJ 19204, CoS 17232, CoS 18232, CoS 22451, U.P.22452, CoJ 64, CoS 767, Co 0238 and Co Pant 97222 were examined under field conditions. Pokkah boeng disease was recorded from 0.6 to 14.0 % on seven genotypes/varieties *viz*; S-45/17, (0.7%), S-161/17 (0.6%), S-01/18 (0.9%), CoLk 19201 (2.0%), CoS 22451 (4.4%), CoS 17232 (14.0%) and Co 0238 (5.5%). SCMV was reported S-45/17 (20.2), S-168/17 (15.0%), CoLk 19202 (15.0%) and CoLk 19204 (15.0%). Stinking rot (Bacterial disease) was also found U.P.22452 up to 2.9%.

State varietal trial II Plant: Under this trial 09 genotypes/varieties (9+4) i.e. CoS 20221, COS 20232, CoS 21231, CoS 21233, CoSe 21451, U.P. 21452, S-310/16, S-27/17, CoJ 64, CoS 767, Co 0238 and Co Pant 97222 were examined under natural field condition. Pokkah boeng disease was recorded on nine genotypes/varieties i.e. CoS 20231 (3.0%), CoS 20232 (3.8%), CoS 21231 (2.6%), CoS 21233 (3.0%), U.P. 21452 (1.0%), CoSe 21451 (0.7%), CoJ 64 (0.8%), Co 0238 (10.0%) and Co Pant (1.5%). SCMV also reported in S-27/17 (25.0%).

State varietal trial ratoon: Under this trial 09 genotypes/varieties (Same set of varieties used in SVT II plant) were examined under natural field condition. Smut disease was found in two varieties CoS 20231 (0.6%) and CoS 20232 (0.5%), respectively. Pokkah boeng disease was recorded in two varieties i.e. CoSe 21451 (5.0%) and Co 0238 (6.5 %), bacterial rot is also recorded in CoSe 21451 with 3% incidence. SCMV was observed in four varieties/genotypes CoSe 21451 (15.0%), S-310/16 (10.0%), S-27/17 (30.0%) and Co Pant 97222 (50.0%).

Evaluation of genotypes/varieties for resistance to red-rot

The various genotypes/varieties were tested again different pathotypes *viz*; CF 08 and CF 13 in state varietal trial (SVT) 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, 17 genotypes/ varieties (11+4+2) including agronomical and pathological standard were tested against red-rot with two pathotypes viz CF 08 and CF 13. The various genotypes/varieties were tested against different pathotypes separately by plug and nodal cotton swab method. Total 08 genotypes/ varieties were found MR with both the pathotypes by plug method. All the 13 test genotypes/varieties were found resistant (MR) with both the pathotypes with nodal cotton swab method. Varieties/Genotypes (S-45/17, S-161/17 and CoLk 19204 were found MS with both the pathotypes used the plug method. Including standard all the 17 genotypes/varieties also similar result by nodal cotton swab method. Two varieties (Co 11015 and CoPb 095) was also tested with two pathotypes Cf 08 and Cf 13 by both method of inoculation, varieties Co 11015 was found HS with both the pathotypes where as CoPb 095 was found S and HS with Cf 08 and Cf 13 respectively by plug method given in the Table 13.11.

Evaluation of genotypes/varieties for resistance to smut.

Under this trial 11 genotypes/varieties were tested against smut excluding standard. All the 11 genotypes/varieties of SVT were found (R) against smut disease except standard.

Table 13.12: Behaviour of SVT genotypes/varieties against different pathotypes of red-rot

S. No.	Genotypes/ Varieties	CF 08			CF 13		
		Plug method		NCSM	Plug method		NCSM
		Behaviour	Score		Behaviour	Score	
1	CoS 17232	MR	3.1	R	MR	3.7	R
2	CoS 18232	MR	3.6	R	MR	3.5	R
3	CoSe 22451	MR	3.5	R	HS	9.0	S
4	S-01/18	MR	3.2	R	MR	2.8	R
5	S-45/17	MS	4.7	R	MS	4.5	R
6	S-155/17	MR	3.6	R	MR	3.8	R
7	S-161/17	MS	4.1	R	MS	5.3	R
8	S-168/17	MR	3.2	R	MR	3.9	R
9	CoLk 19201	MR	3.6	R	MR	3.4	R
10	CoLk 19202	MR	3.1	R	MR	3.1	R
11	CoLk 19204	MS	4.4	R	MS	5.1	R
12	CoJ 64	S	8.0	S	MS	4.8	R
13	Co 0238	MS	4.7	R	HS	9.0	S
14	CoS 767	HS	8.5	S	MS	5.6	R
15	Co Pant 97222	MS	5.6	R	S	6.8	S
16	Co 453	HS	9.0	S	MS	4.5	R
17	Co 312	HS	9.0	S	HS	9.0	S
18	Co 11015	HS	8.2	S	HS	9.0	S
19	CoPb 95	S	8.0	S	HS	8.2	S

UPCSR- GSSBRI, Seorahi

Survey of sugarcane diseases in eastern Uttar Pradesh.

Periodic observations were recorded in pre monsoon, monsoon and post 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 (Table 13.12). An incidence of red rot severity varied from trace to 25% in Co 0238 and CoS08272 followed by 05 to 15% incidence on CoPk 05191, Co 05009, and CoS 08279 (Fig 13.9). Root rot incidence varied from 11 to 20% in the variety CoLk 14201 followed by 01-10% incidence in Co 0118, Co 98014, CoS 08272, CoS 08279 and Co 0238 was observed depend upon locality. Wilt incidence also noticed varied from trace to 20% in the variety Co 0238 followed by 02 to 15% incidence on Co 0118, CoLk 14201, CoS 08279 and Co 15023. An incidence of smut trace to 05% was observed in the varieties *viz*. Co 05009, CoS 08272, CoSe 92423, CoLk 14201, CoSe 08452, CoLk 94184, CoSe 01434, Co 98014, Co 0238 and CoS 13231. Grassy shoot disease was observed in the varieties *viz.* Co 98014, CoLk 14201, Co 0118, CoSe 08452, CoLk 94184, CoS 08272, CoS 08279 and Co 15023 ranging from (01 to 06%). An incidence of pokkah boeng varied from (01 to 20 %) in the varieties *viz*. Co 98018, Co 15023, CoS 8436, CoS 08279 and Co 0238. Stinking/Bacterial top-rot was noticed in Co15023, CoS 08272 and CoS 13235 ranging from (trace to 10%) incidence. Leaf fleck (Bacilliform virus) incidence varied from 01 to 25% in the variety Co 15023 followed by trace - 20% incidence in CoS 13235 and CoLk 14201 was observed depend upon locality. Ratoon stunting disease (01 to 10%) incidence was found in CoS 08272, Co 0118, CoLk 14201 and CoLk 94184. Leaf Scald (trace – 5%) incidence was noticed in the varieties *viz*. Co 98014, Co 0118 and CoS 13235. YLD was observed in CoLk 14201 from 01 to 20% incidence and sugarcane mosaic was also noticed in CoS 13235 and Co 15023 upto 10% in the farmers field, while CoLk 14201 and Co 15023 in experimental trial at Seorahi center (Table 13.12).

Collection and maintenance of pathogenic isolates of sugarcane diseases.

An extensive survey of various districts of Eastern U.P. was conducted during 2024-25 to collect the isolates of *C. falcatum* prevalent in the area from various infected varieties of sugarcane. Fourteen new isolates *viz*. Cf2401Seo (Co 0238), Cf2402Seo (Co 0238), Cf2403Seo (Co 0238), Cf2404Seo (Co 0238), Cf2405Seo (Co 0238), Cf2406Seo (Co 0238), Cf2407Seo (Co 0238), Cf2408Seo (Co 0238), Cf2309Seo (CoS 08279), Cf2410Seo (CoS 08279), Cf2411Seo (CoS 08279), Cf2412Seo (CoS 09232), Cf2413Seo (CoS 08272) & Cf2414Seo (CoJ88) of different sugar factory zones. Out of 14 new isolates of *C. falcatum*, eight were isolated from variety Co 0238 and other isolates were isolated from different sugar cane varieties namely CoS 08279 (03- Isolates), CoS 09232(01- Isolate), CoS 08272 (01- Isolate) & CoJ 88 (01- Isolate) of different sugar mill areas in farmers field. Fourteen new isolates along with 13 designated pathotypes *viz.* CF01 (Source-Co1148), CF02 (Source-Co 7717), CF03 (Source-CoJ64), CF04 (Source-Co 419), CF05 (Source-Co 997), CF06 (Source-CoC671), CF07 (Source-CoJ64), CF08 (Source-CoJ64), CF09 (Source-CoS767), CF10 (Source-85A261), CF11 (Source-CoJ64), CF12 (Source-Co 94012) and CF13 (Source-Co 0238) were cultured and maintained and purified for further studies.

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

Two designated pathotypes (CF08 and CF13) along with 10 new isolates (Cf 2301Seo, Cf 2302Seo, Cf 2303Seo, Cf 2304Seo , Cf 2305Seo , Cf 2308Seo , Cf 2310Seo (Source-Co 0238), Cf 2306Seo (Source-CoJ 88), Cf 2307Seo (Source-CoS 08272), Cf 2309Seo (Source-CoJ 85) were examined for pathogenic variability in 20 sugarcane pathological differentials *viz.* Co 419, Co 975, Co 997, Co 1148, Co 7717, Co 7805, Co 62399, Co 86002, Co 86032, Co 0238, BO 91, CoJ 64, CoS 767, CoS 8436, CoV 92102, CoSe 95422, Baragua (*S.officinarum*), Khakai (*S. sinense*), CoC 671, SES-594 (*S. spontaneum*) by plug method of inoculation and disease intensity was assessed on the basis of the resistant (R), Intermediate (I) and Susceptible (S) reaction (Fig13.12). Seven isolates Cf 2301Seo, Cf 2302Seo, Cf 2303 Seo, Cf 2304 Seo, Cf2305 Seo, Cf 2308 Seo, Cf 2310Seo (Source-Co 0238) from different location of eastern UP were observed their disease reaction on 20 pathological sugarcane differentials which showed virulence pattern similar reaction to (CF13) strain. One local isolate Cf 2307 Seo (Source-CoS 08272) was not found with virulence pattern as compare to other isolates. Except the two-isolates obtained from Cf 2306 Seo (CoJ 88) and Cf 2309 Seo (CoJ 85) the virulence patterns of the other isolates were more or less matched with the existing pathotypes of this area in the (Table 13.13). It was found that both new isolates have specific virulence development of a new specific virulence at this area.

Evaluation of genotypes/varieties for resistance to red rot.

The different genotypes along with standard varieties were screened against (CF08 and CF13) two references pathotypes in Standard Varietal trial (SVT), Preliminary Varietal Trial (PVT) and Second-

Generation Trial (C-2) by plug method as well as nodal cotton swab (NCS) method of inoculation. Inoculation was done second week of August, 2024 with *Colletotrichum falcatum* Went; conidial suspension. The canes were cut at ground level and were splits open longitudinally to assess red rot severity inside the cane after 60th days of inoculation. The following parameters lesion width, nodal transgression, presence of white spot and condition of top crown, were conceders for assessing red rot severity and they were given maximum score of 3, 3, 2, and 1, respectively. The disease severity was rated according to standards disease scale of 0–9. The disease reactions were scored as resistant (0–2.0=R), moderately resistance (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=SH)

State varietal trial I & II plant : In this experiment, 19 varieties were evaluated against red rot along with five checks *viz.* Co 0238, CoJ 64, CoS 767, CoSe 95422 and CoPant 97222 at Seorahi center by plug and nodal cotton swab inoculation techniques. Two designated pathotypes *viz.* CF08 and CF13 inoculums were used for red rot evaluation in the (Table 13.14). Out of 19 varieties, 17 varieties were rated as MR, 01 varieties rated as MS and 01 variety was found as Susceptible to CF08 while 17 varieties were rated as MR, 01 varieties rated as MS and 01 variety was found as Susceptible to CF13 by plug method. By nodal cotton swab method, same varieties were rated as (R) reaction to both designated pathotypes.

Preliminary varietal trial : In this experiment, 15 genotypes were tested at Seorahi along with 6 standards (CoP 06436, BO91, CoLk 94184, CoS 767, CoJ 64 and Co 0238) by plug and nodal cotton swab methods of inoculation against inoculums *i.e.* CF 08 and CF 13 (Table 13.15). Out of 15 genotypes, 06 genotypes (Seo 383/22, Seo 500/22, Seo 320/22, Seo 259/22, Seo 348/22, Seo 18/22) were rated as MR, 04 genotypes (Seo 347/22, Seo 259/22, Seo527/22 and Seo 31/22) rated as MS, while rest genotypes (Seo 224/22, Seo 331/22, Seo 527/22, Seo 398/22, Seo 345/22, Seo 180/22) were rated as Susceptible reaction to red rot.

C_2 generation trial : In this experiment, 47 genotypes were tested at Seorahi along with 2 standards (CoJ 64 and Co 0238) by plug methods of inoculation against inoculums *i.e.* CF08 and CF 13. Out of 47 genotypes, 15 genotypes ((Seo 338/22, Seo 374/22, Seo 285/22, Seo 259/22, Seo 32/22, Seo 496/22, Seo 507/22, Seo 13/22, Seo 494/22, Seo 240/22, Seo 345/22), Seo328/22, Seo429/22, Seo84/22 and Seo338/22) were rated as R/MR, while 16 genotypes were rated as moderately susceptible, 12 genotypes were rated as susceptible and three genotypes were rated as highly susceptible reaction to red rot in the (Fig 13.16).

Varietal resistance test against smut disease.

Standard varietal trial (SVT) : A total of 19 varieties along with one standard (CoS 13231) were tested by primary and secondary methods of inoculation against smut disease. Out of these 02 (CoSe22451, S310/16) varieties were found moderately susceptible (MS) and one variety (CoS 21233) was found susceptible (S), while rest varieties were found (R) reaction to smut (Table 13.14).

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

No incidence was recorded in major diseases *viz.* red rot, wilt, and root rot under natural conditions. Smut incidence was recorded in three genotypes *viz.* (CoLk 19204, CoS 20231 and S27/17), Grassy shoot was recorded in three genotypes (S 155/17, CoS 21231 and CoS 20231), Red leaf scald was recorded in six genotypes (S 45/17, S 168/17, UP 21452, S 310/16, CoS 21233 and CoS 21231), Stinking rot/ Bacterial top- rot was recorded in four genotypes (S 168/17, CoS 20231, CoS 20232, and CoS 21232) while pokkah boeng was recorded in two genotypes (S 01/18 and CoS 21233) in stray condition in SVT I plant under natural conditions.

Table 13.13: Status of red rot in various sugar mill areas in eastern UP during 2024-25

S. N.	Name of sugar mills area Surveyed	Districts	% Incidence range (clump basis)	Varieties affected	Crop stage (Month)	Total affected Area in (ha.)
1	The United Provinces Sugar Co Ltd.-Seorahi.	Kushinagar	02 – 21	Co 0238	6 – 7	260.28
2	Triveni Engineering and Industries Ltd., Ramkola.	Kushinagar	02 – 16	Co 0238	6 – 7	285.22

3	Avadh Sugar and Energy Ltd., (Hata) Dhadha Buzurg.	Kushinagar	01 – 15	Co 0238	7 – 8	380.26
4	Indian Potash Ltd., Raja Bajar Khadda	Kushinagar	02–26	Co 0238	5 – 6	286.80
5	Indian Potash Ltd., (Sugars & Chemical Division) Siswa Bazar.	Maharaj Ganj	08 – 10	Co 0238	6– 7	246.50
			05 – 15	CoS08272	6– 7	05.20
6	Kisan Sahkari Chini Mills Ltd., Ghosi	Mau	06 - 12	Co 0238	7 – 8	198.40
			05 – 10	CoSe 92423	5 – 6	16.25
7	The Kisan Sahakari Chini Mills Ltd. Sathiaon.	Azamgarh	05 – 20	Co 0238	7 – 8	126.15
			05 – 10	CoS 08272	8 – 9	11.50
8	UP State Sugar and Cane Deve. Corp. Ltd., Pipraich.	Gorakhpur	10 – 15	Co 0238	7– 8	225.16
			05 – 15	CoS 08272	6 – 7	12.10
9	UP State Sugar and Cane Deve. Corp. Ltd., Munderwa	Basti	03 – 05	Co 5009	6 –7	15.40
			05 – 16	Co 0238	6 – 7	116.10
10	Balrampur Chini Mills Ltd., Unit-Babhanan.	Gonda	02 – 05	CoPk 05191	5 – 6	02.40
			1 – 25	Co 0238	8 – 9	225.16
11	Bajaj Hindustan Sugar Limited Unit-Rudhaulli.	Basti	05 – 15	CoS 08279	6 – 9	12.10
			02 – 10	CoJ 85	7 – 8	45.90
			02 – 24	Co 0238	7 – 8	148.50
12	Balrampur Chini Mills Ltd., Unit-Manakapur.	Gonda	04 –22	Co 0238	7 – 8	240.20
			06 – 08	CoJ 85	7 – 8	40.90
13	Balrampur Chini Mills Ltd., Unit-Tulsipur.	Balrampur	08 –10	CoS 08272	6 - 7	14.50
			12 –14	CoPk05191	8 – 9	16.10
			15 –25	Co 0238	7– 8	242.16
14	Bajaj Hindustan Sugar Limited Unit-Kundurkhi.	Gonda	05 – 12	Co 0238	6 – 7	248.10
			01 – 12	CoJ 88	7 – 8	18.30
15	Bajaj Hindustan Sugar Limited Itai Maida, Unit-Balarampur.	Balarampur	02 – 25	Co 0238	6 – 7	235.40
			01 – 12	CoJ 88	7 – 8	16.30
16	Bajaj Hindustan Sugar Ltd., Itai Maida, Unit-Utaraula	Balarampur	05 – 16	CoPk05191	8– 9	18.40
			15 – 25	Co 0238	7 – 8	225.04
			01 – 10	CoJ 88	6 – 7	10.60
17	Balrampur Chini Mills Ltd., Unit-Maizapur,	Gonda	02 – 21	CoS 08272	7 – 8	18.20
			02 – 24	Co 0238	7- 8	155.10
18	Balrampur Chini Mills Ltd., Unit-Haidergarh.	Barabanki	05 – 16	CoPk05191	6 – 9	19.40
			01 – 25	Co 0238	7 – 8	168.50
19	Balrampur Chini Mills Ltd., Unit-Rauza Gaon	Ayodhya	02 – 10	CoS 08272	7 – 8	18.60
			01 – 25	Co 0238	8– 9	269.50
20	Bajaj Hindustan Sugar Limited Unit-Pratappur	Deoria	02 – 16	CoS 08272	7 – 8	16.20
			01 – 10	Co 0238	7 – 8	164.50
21	Balrampur Chini Mills Ltd., Unit-Mijhaura (Akbarpur)	Ambedkar Nagar	01 – 12	CoJ 88	7– 8	15.60
			12 – 14	CoS 08279	7– 8	26.21
			02 – 22	CoJ 85	7– 8	15.80
			01 – 26	Co 0238	8– 9	168.50
22	K.M. Sugar Mills Limited, Masaudha	Ayodhya	01– 20	CoJ 85	6 – 7	12.80
			01 – 16	CoJ 88	8 – 9	16.30
			02 – 06	CoS 08272	7 – 8	18.10
			01 – 25	Co 0238	8 – 9	228.50

Table 13.13: Characterization and identification of pathotypes /races of red rot pathogen during 2024-25.

S. N.	Pathotypes /Isolates	Source		Co 975	Co 997	Co 1148	Co 7717	Co 62399	CoC 671	CoJ 64	CoS 767	CoS 8436	BO 91	Co 86002	Co 86032	Co 7805	CoV 92102	CoSe 95422	Baragua	Khakai	SES 594	Co 0238
A	CF 08	CoJ 64	I	I	S	S	S	I	I	S	S	R	R	S	I	S	I	R	R	S	R	R
B	CF 13	Co 0238	I	S	I	I	I	S	S	R	R	I	R	I	R	I	S	I	I	I	R	S
1	Cf2301Seo	Co 0238	I	S	I	I	I	S	S	I	R	I	R	I	R	I	S	R	I	I	R	S
2	Cf2302Seo	Co 0238	I	S	R	I	I	S	S	R	R	I	R	I	R	I	S	I	I	I	R	S
3	Cf2303Seo	Co 0238	I	S	I	I	I	S	S	I	R	S	I	I	R	I	S	R	I	I	R	S
4	Cf2304Seo	Co 0238	I	S	R	I	I	S	I	R	R	I	R	I	R	I	S	I	I	I	R	S
5	Cf2305Seo	Co 0238	I	S	I	I	I	S	S	I	R	S	R	I	R	I	S	R	I	I	R	S
6	Cf2306Seo	CoJ 88	R	I	R	S	S	R	R	I	S	R	S	R	S	R	I	I	S	I	R	I
7	Cf2307Seo	CoS08272	S	I	S	R	R	R	R	S	I	S	I	S	I	S	R	S	R	R	R	I
8	Cf2308Seo	Co 0238	I	S	R	I	I	S	S	R	R	I	R	I	R	I	S	R	I	I	R	S
9	Cf2309Seo	CoJ85	S	I	R	R	I	S	I	R	R	R	R	I	I	I	S	R	S	R	R	S
10	Cf2310Seo	Co 0238	I	S	R	I	I	S	S	R	R	I	R	I	R	I	S	R	I	I	R	S

Table 13.14: Evaluation of sugarcane SVT (E +M) genotypes for red rot and smut, during 2024-25.

S. No.	Name of varieties	Disease's reaction (Red rot and Smut)				
		CF 08		CF 13		Smut
		Plug	NCS	Plug	NCS	
SVT (I) plant						
1	CoS 18232	2.7/MR	R	4.0/MR	R	R
2	CoSe 22451	4.6/MS	R	5.8/MS	R	MS
3	UP 22452	3.2/MR	R	3.9/MR	R	R
4	S168/17	3.8/MR	R	3.5/MR	R	R
5	CoLk 19204	3.1/MR	R	4.0/MR	R	R
6	CoLk 19201	3.8/MR	R	3.7/MR	R	R
7	CoLk 19202	3.0/MR	R	3.4/MR	R	R
8	S 45/17	3.4/MR	R	3.6/MR	R	R
9	S 501/18	3.2/MR	R	4.0/MR	R	R
10	S 155/17	2.2/MR	R	4.0/MR	R	R
11	CoS 17232	4.0/MR	R	3.4/MR	R	R
12	S 161/17	6.4/S	R	7.8/S	R	R
SVT (II) Plant						
1	S 310/16	3.9/MR	R	3.2/MR	R	MS
2	S 27/17	3.1/MR	R	3.2/MR	R	R
3	UP 51452	3.4/MR	R	4.0/MR	R	R
4	CoS 20231	3.8/MR	R	3.7/MR	R	R
5	CoS 21233	3.2/MR	R	3.2/MR	R	S
6	CoS 20232	3.8/MR	R	4.0/MR	R	R
7	CoSe 21451	3.9/MR	R	4.0/MR	R	R

Checks						
1	CoS 767	5.3/MS	R	3.2/MR	R	R
2	CoPant 97222	3.6/MR	R	5.0/MS	R	R
3	CoLk 94184	3.3/MR	R	3.8/MR	R	R
4	CoJ 64	7.8/S	S	4.0/MR	R	R
5	Co 0238	4.0/MR	R	8.8/HS	S	R
6	CoS 13231	-	-	-	-	S

Table 13.15: Evaluation of sugarcane PVT genotypes for red rot during 2024-25

S.N.	Name of varieties	Disease's reaction					
		CF08			CF13		
		Score	Plug	NCS	Score	Plug	NCS
PVT							
1	Seo383/22	4.0	MR	R	3.5	MR	R
2	Seo224/22	6.3	S	S	6.2	S	S
3	Seo500/22	3.3	MR	R	4.0	MR	R
4	Seo320/22	3.2	MR	R	4.0	MR	R
5	Seo331/22	5.0	MS	R	6.9	S	S
6	Seo347/22	4.5	MS	R	4.9	MS	R
7	Seo244/22	3.7	MR	R	4.0	MR	R
8	Seo398/22	3.8	MR	R	7.0	S	R
9	Seo259/22	4.6	MS	R	5.0	MS	R
10	Seo527/22	6.7	S	S	6.0	MS	S
11	Seo345/22	5.3	MS	S	7.0	S	S
12	Seo31/22	7.5	S	R	5.0	MS	R
13	Seo348/22	4.5	MS	R	4.0	MR	R
14	Seo180/22	8.7	HS	S	7.0	S	S
15	Seo18/22	4.9	MR	R	4.0	MR	R
Checks							
16	CoP 06436	3.5	MR	R	5.0	MS	R
17	BO 91	..	MR	R	3.6	MR	R
18	CoLk 94184	3.5	MR	R	4.0	MR	R
19	CoS 767	5.9	MS	R	4.0	MR	R
20	CoJ 64	6.8	S	S	4.0	MR	R
21	Co 0238	4.0	MR	R	9.0	HS	S

Table-13.16: Evaluation of C2 genotypes for red rot during 2024-25

S.N.	Name of Genotypes	Disease's reaction			
		CF08		CF13	
		Score	Plug	Score	Plug
1	Seo 338/22	4.0	MR	3.4	MR
2	Seo 440/22	7.0	S	6.5	S
3	Seo 334/22	5.6	MS	4.4	MS
4	Seo 75/22	5.1	MS	5.8	MS
5	Seo 115/22	6.2	S	6.8	S
6	Seo 374/22	3.8	MR	4.0	MR

7	Seo 323/22	6.8	S	6.2	S
8	Seo 112/22	5.0	MS	4.4	MS
9	Seo 385/22	3.2	MR	3.6	MR
10	Seo 84/22	9.0	HS	8.6	HS
11	Seo 185/22	7.4	S	6.5	S
12	Seo 400/22	4.4	MS	7.2	S
13	Seo 263/22	4.8	MS	6.0	MS
14	Seo 19/22	4.6	MS	5.8	MS
15	Seo 97/22	4.2	MS	5.2	MS
16	Seo 384/22	5.8	MS	6.2	S
17	Seo 259/21	3.2	MR	3.6	MR
18	Seo 343/22	4.2	MS	6.0	MS
19	Seo 113/22	4.6	MS	5.6	MS
20	Seo 32/22	3.0	MR	5.2	MR
21	Seo 51/22	8.2	HS	6.0	MS
22	Seo 502/22	5.6	MS	5.8	MS
23	Seo 496/22	3.4	MR	4.0	MR
24	Seo 595/22	4.6	MS	6.2	S
25	Seo 507/22	3.6	MR	4.0	MR
26	Seo 525/22	6.8	S	8.8	HS
27	Seo 155/22	6.2	S	6.2	S
28	Seo 13/22	6.0	MS	3.5	MR
29	Seo 80/22	4.2	MS	4.4	MS
30	Seo 454/22	4.4	MS	4.6	MS
31	Seo 442/22	5.6	MS	6.2	S
32	Seo 313/22	5.6	MS	4.8	MS
33	Seo 150/22	6.8	S	5.6	MS
34	Seo 155/22	5.0	MS	7.2	S
35	Seo 443/22	5.6	MS	4.6	MS
36	Seo 164/22	8.4	HS	9.0	HS
37	Seo 494/22	3.4	MR	4,0	MR
38	Seo 240/22	4.0	MR	2.8	MR
39	Seo 345/22	3.4	MR	3.6	MR
40	Seo 517/22	8.3	HS	8.6	HS
41	Seo 166/22	8.0	S	8.4	HS
42	Seo 328/22	3.6	MR	6.0	MS
43	Seo 429/22	4.0	MR	3.8	MR
44	Seo 75/22	7.0	S	6.8	S
45	Seo 13/22	3.2	MR	4.0	MR
46	Seo 84/22	3.8	MR	3.8	MR
47	Seo 338/22	4.2	MS	3.6	MR

Fig 13.9: Natural incidence of red rot at different farmers field in eastern UP

14. STATISTICS

UPCSR- SRI, Shahjahanpur

During the year 2024-25 Statistics Division of Shahjahanpur institute received about 699 data of research experiments conducted by different disciplines of SRI Shahjahanpur, SRI Gola and SRI Muzaffarnagar for statistical analysis. Statistics division also received around 266 data of All India Coordinated Research project from Breeding, Agronomy and Entomology divisions for analysis. The data were in different statistical designs mainly in RBD, factorial, split plot, strip plot and CRD. The data were analysed using appropriate statistical methods in Microsoft Excel and summary results sent to the respective disciplines.

The data of earlier experiments of Physiology division repeated for three or more years 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 were done on some data received from some disciplines.

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

Sampling by crop cutting method to estimate the yield of various crops at Shahjahanpur, Gola, Balrampur and Sirsa centers was carried out by Statistics division in association with other members. The harvesting, weighing and sale of these crops was also supervised by statistics division as part of committee at Shahjahanpur center.

Statistics division managed the centralized 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.

UPCSR- GSSBRI, Seorahi

During the year 2023-24, the division of Statistics provided technical advice and statistical guidance to the scientists of various divisions of the centre in planning the experiments. The computer programmes for different statistical designs were developed and installed in the computer and worked on R software.

The division carried out statistical analyses of data received from various divisions of this institute. Approximately 388 data sheets regarding Germination, Tillers, Shoots, Millable cane, yield, C.C.S. (%) and Juice quality etc. were statistically analysed through software and interpreted. The results were sent to concerning divisions. Comparative study was also done for different attributes with the help of graphs like Bar graphs, Histograms, Line graphs, Pie charts, Stem and leaf plots etc. Crop-cutting survey was made to estimate the yield of wheat, paddy and barley crop at Seorahi, Katya sadaat, Gorakhpur and Luxmipur.

15. ECONOMICS

Cost of cultivation/production of sugarcane in U.P. (2024-2025)

S. N.	Particulars	2024-25	
		Plant	Ratoon
1.	Field preparation		
	Disc Ploughing – 3 hrs		-
	Harrow – 2 - 4 hrs		-
	Cultivator – 2 - 3 hrs		-
	Pata – 2 - 1 hrs	7700	-
	Labours – 2 11 hrs	600	
		8300	
2.	Seed and preparation		
	Seed – 70 qtl.	31500	-
	Harvesting – 12 labours	3600	-
	Sett cutting – 8 labours	2400	-
	Seed transportation – 1 hr	700	-
		38200	
3.	Planting		
	Seed treatment – 112g Bavistin	83	-
	Labour – 2	600	-
	Furrow opening – 3 hrs	2100	-
	Sett placing – 8 labours	2400	-
	Sett covering with soil 4 labour	1200	
		6383	
4.	Ratoon preparation		
	Spreading of trash – 4 labours	-	1200
	Shredding with tractor drawn mulcher -4 hrs	-	2800
	Seed cane for gap filling – 5qtl.	-	2250
	Labour 4	-	1200
			7450
5.	Irrigation –		
	6+1 (pre-sowing) and 5 (15 hrs/ irrigation)	31500	22500
	Labour – 14 and 10	4200	3000
		35700	25500
6.	Manure, fertilizer & application		
	Plant – FYM @ 100 qt.	7500	-
	Transportation FYM -2 hr	1400	-
	Spreading -4 lab.	1200	-
	NPK – 250 Kg	7350	-
	Urea – 369 kg	1967	-
	MOP – 34 kg	1156	-
	Zinc sulphate –25 kg	2750	-
	Bio-fertilizer-	-	-
	i. Azotobactor – 10kg	500	
	ii.PSB – 10kg	500	
	Labour- 01	300	
	Ratoon –		

	NPK -250 kg	-	7350
	Urea -429 kg	-	2287
	MOP -34 kg	-	1156
	Transportation (3/4 hr. ½ hr.)	525	350
	Labour – 3	900	900
		26048	12043
7.	Plant protection		
	Fipronil GR 0.3% – 20 kg	1720	-
	Labour – 1	300	-
	Chlorantraniliprole 18.5 S.C. 0.375 lit.	1860	1860
	Labour- 1	300	300
	Profenofos + Cypermethrin 44% @ 1.0 lit./ h2 times (2.0 lit.)	1300	1300
	Labour – 2	600	600
	Bio-Agent-		
	i. Trichoderma 20kg	1120	-
	ii. Beauveria & Metarhizium 10kg	1680	-
		8880	4060
8.	Interculture operation		
	Hoeing with Tractor (3/2 times)- 6 hrs	6300	4200
	Line hoeing with kassi – (3/2 times) 36/24 labour	10800	7200
	Earthing with tractor 3 hrs	2100	2100
	Mannual earthing –1/1 @ 30 labour	9000	9000
	Binding – 2 @ 20 labour/ binding	12000	12000
		40200	34500
9.	Harvesting @ 50/q	42,500	37,500
10.	Supervision	25,000	25,000
Cost of cultivation Rs/ha		2,31,211	1,46,053
11.	Overhead charges		
	i) Rental value of land	40000	40000
	ii) Loading & Transportation @ Rs 16/qtl.	13600	12000
	iii) Depreciation on machines	2312	1460
	iv) Interest on working capital @ 12% for 6 months	13873	8763
		69785	62223
Cost of production Rs./ha		3,00,996	2,08,276
Average yield q/ha		850	750
Cost of production Rs./q		354.11	277.70
Average cost of production		2,54,636	
Average yield q/ha		800	
Cost of production Rs/q		318.30	

Rates

Sugarcane (seed)	Rs 450/ q	Zinc Sulphate	Rs. 110 /kg
Tractor	Rs. 700 / hr	Carbendazim	Rs. 740 /kg
Labour	Rs. 300 / day	Fipronil	Rs 86 / kg
FYM	Rs 75 /q	Chlorantraniliprole	Rs 4960 /lit.
Azotobactor	Rs 50 /kg	Trichoderma	Rs 56 /kg
PSB	Rs 50 /kg	Beauveria& Metarhizium	Rs. 168 /kg
Urea	Rs. 533 /q	Profenofos+Cypermethrin 44%	Rs. 650 / lit.
NPK	Rs. 2940 /q	Irrigation	Rs. 300 / hr
MOP	Rs. 3400 /q		

16. EXTENSION

UPCSR-SRI, Shahjahanpur

Result demonstration

A Varietal Result demonstration of Autumn planting with ten varieties were conducted at Sugarcane Research Farm Shahjahanpur to motivate the farmers regarding high yielding high sugarcane varieties. The purpose of this demonstration is also to motivate the farmers towards Autumn cane planting with new varieties. All varieties were planted by trench method . Total 10 varieties i.e. CoS 17231, CoLk 14201, CoS 13235, Co 15023, CoS 18231, CoLk 16202, CoS 16233, CoSe 13452, U.P.14234 and CoS 14233 were planted in demonstration. Sugarcane farmers of different districts of Uttar Pradesh, Bihar and Haryana were visited on demo plot and saw the performance of new released varieties.

Another Varietal Result Demonstration of Spring cane planting with the varieties i.e. CoS 18231, CoLk 16202, CoS 13235, CoS 17231, CoS 19231, CoLk 14201, Co 15023, CoS 13231, U.P. 05125, CoS 16233, CoSe 13452, U.P.14234, CoS 14233, CoS 10239 and CoS 0767 were conducted at Sugarcane research farm Shahjahanpur.



Facebook live programme

To provide contemporary information of sugarcane cultivation to state cane farmers Extension Division conducted Facebook live programme on weekly basis. During the year total 25 Facebook live programme has conducted through Council Facebook Page covering all aspect of sugarcane cultivation likes Breeding, Agronomy, Entomology, Plant Pathology, Tissue culture, Soil chemistry, Sugar chemistry, Gur Chemistry and 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. Total 2212082 farmers were trained through the Facebook live programme. UPCSR Facebook page followers were only 759 before start of this programme and now it has increased 30559. This programme is very popular among cane farmers and cane development personnel.

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.

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.

T.V. talk at state channel D.D.U.P., Lucknow : Three T.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.

Talk on all India radio Delhi : Two Radio talk regarding sugarcane cultivation delivered on AIR Delhi during the year.

You-Tube Channel : To provide quick & contemporary issues of sugarcane cultivation to the farmer in audio-visual mode, 23 videos related to variety identification, intercropping, ratoon management, insect and pest control prepared and uploaded time to time for the updating of farmers.

Training programme:

One day/five days training programme : Total 185 training programme (offline) were conducted for 14076 sugarcane farmers and sugar mill officials regarding new scientific technique of sugarcane cultivation. Out of 185 training 178 one day training were conducted in which 13818 farmers of different cane producing districts of UP State. This huge one day training programme was sponsored by Cane Development Department UP.

Another one day paid training programme was conducted for 30 farmers of district Pilibhit and Shahjahanpur which is sponsored by M.S. Sehgal Foundation. One another one day training programme conducted for 40 farmers of Haryana State which was sponsored by Agriculture Department, Palwal (Haryana).

During year 05 Five days paid training programme were conducted which was sponsored by Cane Development Department, Motihari and Pusa (Samastipur) under the scheme of Chief Minister Cane Development Programme of Bihar Government. 200 farmers of different districts of Bihar State were participated in the five days training programme. In these training Rs. 12.00 Lakh revenue generated.



Exhibition

Participated in 10 exhibitions and shows the technique of sugarcane cultivation before farmers so that they can understand easily. These exhibitions were placed at India Expo Mart, Noida (UP International Trade Show), millets fair organized by Agriculture Department Shahjahanpur, farmers fair on the occasion of birth anniversary of Chaudhary Charan Singh at Shahjahanpur, farmers fair organized by Dainik Jagran, farmers fair at Navada (Khudaganj) organized by Agriculture Department Shahjahanpur and farmers fair at Atal Bihari Bajpai Auditorium Shajahjahanpur.




Lecture on village gosthies : 18 lectures delivered on scientific sugarcane cultivation in Village meeting before farmers.

Visitors : During the year 5630 farmers from different places visited our research institute.

School/college students visit : During the year 1690 students of school/ college from different places visited our Research Institute for inspiring the young minds towards the scientific research and technology in agriculture.

Kisan Mela (Mithas) : Extension Division conducted "Virat Kisan Mela" at our Campus on 16 October 2024 in which more than 5100 farmers, sugar mill representatives and cane development personals participated from all over India as well as Nepal. Mithas Mela is organized in autumn to encourage sugarcane sowing and to make sugarcane farmers familiar with new technology. Various techniques of sugarcane production are demonstrated through a live exhibition at the fair, as well as the latest information on sugarcane cultivation is shared with farmers through stalls of various products. A total of 4 thousand mini seed kits of new sugarcane varieties CoS 18231 and CoLk 16202, booked through online gateway, were distributed among the farmers at the fair. This is the result of extension activities through social media.

UPCSR- SSR, Muzaffarnagar

A varietal demonstration was conducted at research station, Muzaffarnagar farm during the year 2024-25 in spring planting with CoS 13235, Co 0118, Co 15023, CoS 17231, CoS 18231, Co 05011, CoS 14233, CoS 15233, CoS 16233 and Colk 14201 varieties of sugarcane. The highest yield of sugarcane 93.80 t/ha. was recorded in CoS 17231 followed by 91.08 t/ha. in CoS 16233 respectively.

A method demonstration was conducted at farmers field in 2024-25 during the spring planting with CoS 13235, CoLk 14201, Co 15023 and C 0118 varieties of sugarcane. The highest sugarcane yield of 92.00 was recorded in CoS 13235 followed by 87.20 t/ha. in Co 15023 respectively.

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

Demonstration-04, G.K.S. Ghosties-186, Hello DD Kisan Chanel-04 Redio talk-10 and literature distribution 650.

Other activities	Numbers
Exhibition / Farmer fair	05
Training	45
Field days / Gosthies /Lectures	258
Visitors	3820

Visitors

Sugarcane Farmer Training

UPCSR- GSSBRI, Seorahi

Varietal demonstration

A varietal demonstration was conducted in autumn planting at seorahi farm with sugarcane varieties CoS 13235, Co 0118, UP 05125, CoS 17231, CoSe 13452, CoS 09232, CoS 10239 and CoSe 08452. Maximum yield potential was recorded in variety CoS 13235 (105.28 t ha^{-1}) followed by Co 118 (91.10 t ha^{-1}) and CoS 17231 (90.16 t ha^{-1}) in the early maturing group where as in mid late group CoSe 08452 (101.21 t ha^{-1}) gave highest yield followed by CoS 09232 (90.11 t ha^{-1}) and CoS 10239 (85.11 t ha^{-1}).

A varietal demonstration was conducted in spring planting at Seorahi farm to demonstrate the performance of newly released and promising sugarcane varieties. Total eight varieties of sugarcane were planted in which four varieties viz CoS 13235, Co 0118, UP 05125 and CoS 17231 were early maturing and other four varieties such as CoSe 13452, CoS 09232, CoS 10239 and CoSe 08452 were mid late maturing. Highest cane yield was recorded in variety CoS 13235 (91.15 t ha^{-1}) followed by Co 0118 (85.62 t ha^{-1}) and CoS 17231 (82.16 t ha^{-1}) in the early maturing group where as in mid late group maximum yield potential was obtained in CoSe 08452 (91.26 t ha^{-1}) followed by CoS 09232 (82.10 t ha^{-1}) and CoSe 13235 (80.88 t ha^{-1}).

Mechanization demonstration

Farmers fair

17. SEED PRODUCTION

UPCSR-SRI, Shahjahanpur

Planting and maintenance of breeder seed cane nurseries

During 2024-25 breeder seed cane nurseries were planted in 267.19 ha area in autumn 2024 and spring 2025 at research farms and sugar mill's farms (Table 17.1a & 17.1b). In autumn 2024 total 78.42 ha area was at research farms while in spring 2024, it was 97.54 ha. At sugar mill farms total 91.23 area was under breeder seed cane out of which 36.19 ha in autumn 2024 and remaining 55.04 in spring 2025.The early maturing varieties covered more area at research and sugar mill's farms.

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 2024-25 from the breeder seed cane nurseries planted in 2023-24 a total of **3,93,17,550** single buds of CoS 17231, CoS 18231, CoLk 16202 and CoLk 15466 and 93,032.52 qt. of other varieties of breeder seed cane was distributed from research and sugar mill's farms. Also **12,17,425** single buds in form of mini seed kit of new released varieties viz. CoS 17231, CoS 18231, CoS 19231, CoSe 17451 and CoLk 16202 were distributed under online mini seed kit registration programme (Table 17.2b, 17.2c & 17.2d). Hence, in year 2024-25 total production is 164531.31qt in which seed cane distributed 132350.08qt., seed used in planting 18702.77, sugar mill's supply 12261.04qt. and 1217.42qt. in form of mini seed kit.

Table 17.1a: Planting area of breeder seed cane nurseries at research and sugar mill's farms during 2024-2025

S.N.	Research/Sugar Mill's Farms	Area (ha)		
		Autumn 2024	Spring 2025	Total
A. Research farms				
1	Shahjahanpur	15.63	10.87	26.50
2	Gola (Lakhimpur)	17.03	22.77	39.80
3	Seorahi (Kushinagar)	21.45	16.0	37.45
4	Muzaffarnagar	4.43	8.91	13.34
5	Amhat (Sultanpur)	2.35	4.12	6.47
6	Balrampur	1.34	1.39	2.73
7	Laxmipur (Kushinagar)	3.59	6.71	10.30
8	Sadat (Gazipur)	5.00	5.00	10.00
9	Sirsha (Bareilly)	2.60	4.00	6.60
10	Arnikhana (Mahola)	0.00	5.35	5.35
11	Pipraich (Gorakhpur)	0.00	5.42	5.42
	Total	**73.42**	**90.54**	**73.42**
12	I.I.S.R. Lucknow	5.00	7.00	12.00
	Total	**78.42**	**97.54**	**175.96**

B. Sugar Mill's Farms				
i.	**Private Sugar Mill's Farms**			
1	Pilibhit	7.80	7.20	15.00
2	Seohara	4.80	20.00	24.8
3	Dhampur	6.00	5.40	11.4
4	Biswa (Sitapur)	4.00	2.10	6.10
5	Agauta	2.00	2.10	4.10
Total	**24.60**	**36.80**	**61.40**	
ii.	**Co-operative Sugar Mill's Farms**			
1	Morna	2.01	1.87	3.88
2	Tilhar	1.77	1.30	3.07
3	Puwayan	1.00	2.41	3.41
4	Semikheda	0.43	1.27	1.70
5	Sultanpur	1.50	1.50	3.00
6	Baghpath	0.56	0.00	0.56
7	Bilaspur	0.24	3.41	3.65
8	Puranpur	1.00	1.00	2.00
9	Gazraula	0.50	1.87	2.37
10	Ramala	0.65	1.41	2.06
11	Naziwabaad	0.40	1.60	2.00
12	Nanauta	0.00	0.60	0.60
13	Mhemudabaad	1.53	0.00	1.53
Total		**11.59**	**18.24**	**29.83**
Sub -Total		**36.19**	**55.04**	**91.23**
Grand Total		**114.61**	**152.58**	**267.19**

Table 17.1b: Variety wise planting area (ha.) of breeder seed cane nurseries at research and sugar mill's farms during 2024-2025

S.N.	Variety	Autumn 2024		Total	Spring 2025		Total	Grand Total
		Research Farms	Sugar Mill's Farms		Research Farms	Sugar Mill's Farms		
Early Varieties								
1	CoS 17231	28.32	10.71	**39.03**	8.17	7.23	**15.40**	**54.43**
2	CoS 13235	11.60	9.80	**21.40**	8.90	12.92	**21.72**	**43.12**
3	CoLk 16202	4.32	1.49	**5.81**	23.79	2.63	**26.52**	**32.33**
4	Co 0118	5.28	4.25	**9.53**	0.25	17.96	**18.21**	**27.74**
5	CoS 18231	3.46	0.20	**3.66**	18.24	3.24	**21.48**	**25.14**
6	CoLk 14201	8.81	6.11	**14.92**	5.33	4.82	**10.15**	**25.07**
7	Co 15023	0.02	3.27	**3.29**	0	5.03	**5.03**	**8.32**
8	UP 05125	2.58	0	**2.58**	5.15	0.30	**5.45**	**8.03**
9	CoSe 17451	0.00	0	**0.00**	6.25	0	**6.25**	**6.25**
10	CoLk 11203	1.00	0	**1.00**	4.00	0	**4.00**	**5.00**
11	CoS 13231	0.30	0	**0.30**	0.77	0.38	**1.15**	**1.45**
12	CoS 19231	0.17	0	**0.17**	1.56	0	**1.56**	**1.73**
13	Co 98014	0.20	0	**0.20**	0	0	**0**	**0.20**
Total		**66.06**	**35.83**	**101.89**	**82.41**	**54.51**	**136.92**	**238.81**
Mid Late Varieties								
1	CoSe 13452	1.42	0	**1.42**	0	0.33	**0.33**	**1.75**
2	CoS 09232	4.36	0	**4.36**	3.80	0	**3.80**	**8.16**
3	CoS 10239	2.64	0	**2.64**	6.11	0.00	**6.11**	**8.75**
4	CoSe 08452	1.86	0	**1.86**	2.82	0	**2.82**	**4.68**

5	CoS 16233	0.33	0	**0.33**	0.20	0	**0.20**	**0.53**
6	UP 14234	1.62	0	**1.62**	1.90	0	**1.90**	**3.52**
7	CoS 14233	0.09	0.18	**0.27**	0	0.17	**0.17**	**0.44**
8	CoS 19235	0.00	0	**0.00**	0.19	0	**0.19**	**0.19**
9	CoS 15233	0.04	0.18	**0.22**	0.11	0.04	**0.15**	**0.37**
Total		**12.36**	**0.36**	**12.72**	**15.13**	**0.53**	**15.66**	**28.38**
Grand Total		**78.42**	**36.19**	**114.61**	**97.54**	**55.04**	**152.58**	**267.19**

Table 17.2a: Breeder seed cane production (qt) at research farms and sugar mill's farms during (2024-25)

S.N.	Research and Sugar mill's Farms	Distribution		Seed cane used in planting	Single bud (qt)	Sugar mill's supply	Mini Seed Kit (q)	Production
		Autumn 2024	Spring 2025					
A. Research farms								
1	Shahjahanpur	8720.28	2126.85	1855	8675.17	4672	1058.22	**27107.52**
2	Gola (Kheri)	4620.15	5212.57	2786.1	6904.84	348.72	-	**19872.38**
3	Seorahi	11104.96	5326.49	2621.5	1958	1262.44	-	**22273.39**
4	Muzaffarnagar	2246.75	2102.06	933.8	7985.32	684.24	80.50	**14032.67**
5	Sultanpur	906.03	660.4	452.9	1097.51	0	52.20	**3169.04**
6	Balrampur	507.19	85.01	191.1	1311.36	25.14	-	**2119.8**
7	Laxmipur	2163.91	3200.03	721	1690.13	-	-	**7775.07**
8	Sadat	618.41	732.06	700	338.79	-	-	**2389.26**
9	Pipraich(Gorakhpur)	-	856.22	379.4	0	123.95	-	**1359.57**
10	Arnikhana (Mahola)	-	3116.69	374.5	32.5	-	-	**3523.69**
11	Sirsa	873.86	-	462	1562.65	325.46	26.50	**3250.47**
12	IISR Lucknow	2700	800	840	2140	-	-	**6480.00**
Total		**34461.54**	**24218.38**	**12317.3**	**33696.27**	**7441.95**	**1217.42**	**113352.86**
B. Private sugar mill farms								
1	Pilibhit	3604.03	2082.94	1050	1061.42	1510	-	**9308.39**
2	Seohara	3621.76	-	1736	-	-	-	**5357.76**
3	Dhampur	4427	3711.85	798	-	-	-	**8936.85**
4	Neoli	484.06	150	-	-	-	-	**634.06**
5	Agauta	1045.04	1464.53	287	118.68	-	-	**2915.25**
6	Biswan	3530	777	427	2547.82	1800	-	**9081.82**
Total		**16711.89**	**8186.32**	**4298**	**3727.92**	**3310**	**-**	**36234.13**
C. Private sugar mill farms								
1	Mahmudabad	-	666.20	107.1	325.00	200	-	**1298.30**
2	Morna	944.06	1222.30	271.32	42.91	-	-	**2480.59**
3	Tilhar	345.5	226.43	214.83	0.00	-	-	**786.76**
4	Gazraula	108	225.00	165.9	193.45	-	-	**692.35**
5	Bilashpur	347.81	249.54	255.64	-	482	-	**1334.99**
6	Puwayan	712.27	574.04	238.35	179.98	-	-	**1704.64**
7	Baghpath	-	170.00	39.2	32.00	-	-	**241.20**
8	Ramala	217.21	457.82	143.99	217.85	-	-	**1036.87**
9	Nanauta	-	453.50	42	298.77	-	-	**794.27**
10	Nazimabaad	1471.9	-	140	61.72	-	-	**1673.62**
11	Sultanpur	-	-	210	-	-	-	**210.00**
12	Puranpur	340.18	340.34	140	541.70	161.87	-	**1524.09**
13	Semikhera	382.29	-	119.14	-	665.22	-	**1166.65**
Total		**4869.22**	**4585.17**	**2087.47**	**1893.38**	**1509.09**	**-**	**14944.33**
Grand Total		**56042.65**	**36989.87**	**18702.77**	**39317.57**	**12261.04**	**1217.42**	**164531.31**

Table 17.2b: Single bud distribution at research and sugar mill's farms (2024-2025)

S.N.	Research and Sugar mill farms	Autumn 2024			Total	Spring 2025			Total	Grand Total
		CoS 17231	CoLk 16202	CoLk 15466		CoS 17231	CoS 18231	CoLk 16202		
1	Shahjahanpur	2202377	-	-	**2202377**	5561346	474275	437171	**6472792**	**8675169**
2	Gola	1586299	-	-	**1586299**	4740764	-	577771	**5318535**	**6904834**
3	Muzaffarnagar	2306465	-	-	**2306465**	5457450	221400	-	**5678850**	**7985315**
4	Seorhi	-	-	-	**-**	1958000	-	-	**1958000**	**1958000**
5	Luxmipur	475636	-	-	**475636**	1214494	-	-	**1214494**	**1690130**
6	Sultanpur	304587	-	-	**304587**	736672	-	56250	**792922**	**1097509**
7	Balrampur	390620	-	-	**390620**	920744	-	-	**920744**	**1311364**
8	Sadat	37480	-	-	**37480**	301308	-	-	**301308**	**338788**
9	Sirsha	103000	-	-	**103000**	1431096	-	28550	**1459646**	**1562646**
10	Mahola	-	-	-	**-**	32500	-	-	**32500**	**32500**
11	I.I.S.R.	-	1000000	460000	**1460000**	-	100000	580000	**680000**	**2140000**
Total		**7406464**	**1000000**	**460000**	**8866464**	**22354374**	**795675**	**1679742**	**24829791**	**3,36,96,255**
Sugar Mill's Farms										
1	Pilibhit	828500	-	-	**828500**	232920	-	-	**232920**	**1061420**
2	Biswa	1200368	-	-	**1200368**	1347450	-	-	**1347450**	**2547818**
3	Mhemudabaad	-	-	-	**-**	325000	-	-	**325000**	**325000**
4	Morna	13500	-	-	**13500**	29412	-	-	**29412**	**42912**
5	Gazraula	43000	-	-	**43000**	150445	-	-	**150445**	**193445**
6	Agauta	-	-	-	**-**	118680	-	-	**118680**	**118680**
7	Puwayan	52940	-	-	**52940**	127044	-	-	**127044**	**179984**
8	Baghpath	-	-	-	**-**	32000	-	-	**32000**	**32000**
9	Ramala	-	-	-	**-**	217848	-	-	**217848**	**217848**
10	Nanauta	-	-	-	**-**	298768	-	-	**298768**	**298768**
11	Naziwabaad	30400	-	-	**30400**	31320	-	-	**31320**	**61720**
12	Puranpur	155700	-	-	**155700**	386000	-	-	**386000**	**541700**
Total		**2324408**	**-**	**-**	**2324408**	**3296887**	**-**	**-**	**3296887**	**5621295**
Grand Total		**9730872**	**1000000**	**460000**	**11190872**	**25651261**	**795675**	**1679742**	**28126678**	**3,93,17,550**

Table 17.2c: Single bud distribution through Mini seed kit at research farms (2024-2025)

S. N	Research farms		Autumn 2024		Total	Spring 2025				Total	Grand Total
		CoS 18231	CoS 17231	CoLk 16202		CoS 19231	CoS 18231	CoLk 16202	CoSe 17451		
1	Shahjahanpur	273900	700	99700	37430	1025	449700	231700	1500	**683925**	**1058225**
2	Muzaffarnagar	-	-	-	-	-	80500	-	-	**80500**	**80500**
3	Sultanpur	-	-	-	-	-	-	52200	-	**52200**	**52200**
4	Sirsa	-	-	-	-	-	-	26500	-	**26500**	**26500**
Total		**273900**	**700**	**99700**	**374300**	**1025**	**530200**	**310400**	**1500**	**843125**	**12,17,425**

Table 17.2d: Variety wise distribution of breeder seed cane at research and sugar mill's farms during 2024-2025

S.N.	Variety	Autumn 2024		Total	Spring 2025		Total	Grand Total
		Research Farms	Sugar Mill's Farms		Research Farms	Sugar Mill's Farms		
Early Varieties								
1	CoS 13235	6847.13	7493.74	**14340.9**	6146.43	5631.27	**11777.70**	**26118.57**
2	CoLk14201	16789.21	7121.13	**23910.3**	9134.99	2541.28	**11676.27**	**35586.61**
3	Co 0118	3413.07	3530.97	**6944.04**	2341.34	1916.79	**4258.13**	**11202.17**
4	UP 05125	1513.53	-	**1513.53**	1313.38	-	**1313.38**	**2826.91**
5	Co 15023	31.00	2391.43	**2343.09**	7	1947.09	**1954.09**	**4376.52**
6	CoS 13231	19.09	-	**19.09**	253.69	-	**253.69**	**272.78**
7	CoLk 11203	800	-	**800**	100	-	**100**	**900.00**
8	CoLk 12207	-	-	**-**	100	-	**100**	**100.00**
Total		**29413.03**	**20537.27**	**49950.30**	**19396.83**	**12036.43**	**31433.26**	**81383.56**
Mid Late Varieties								
1	CoSe 08452	788.59	-	**788.59**	1162.23	-	**1162.23**	**1950.82**
2	CoS 09232	1198.38	-	**1198.38**	1265.15	-	**1265.15**	**2463.53**
3	CoSe 13452	1119.04	850	**1969.04**	219.71	552	**771.71**	**2740.75**
4	CoS 10239	461.04	-	**461.04**	973.74	-	**973.74**	**1434.78**
5	CoS 16233	737.72	188.84	**926.56**	435.26	109.97	**545.23**	**1471.79**
6	CoS 14233	165.14	-	**165.14**	4	10	**14**	**179.14**
7	CoS 15233	25.5	5	**30.5**	63.3	63.09	**126.39**	**156.89**
8	UP 14234	153.1	-	**153.1**	598.16	-	**598.16**	**751.26**
9	CoLk 15207	200	-	**200**	-	-	**-**	**200.00**
10	CoLk 14204	200	-	**200**	-	-	**-**	**200.00**
11	CoLk 09709	-	-	**-**	100	-	**100**	**100.00**
Total		**5048.51**	**1043.84**	**6092.35**	**4821.55**	**735.06**	**5556.61**	**11648.96**
Grand Total		**34461.54**	**21581.11**	**56042.65**	**24218.38**	**12771.49**	**36989.87**	**93032.52**

Poly bag of CoS 18231 at Gola centre

CoS 18231 in breeder seed plot at SRI, Shahjahanpur

Verification & distribution of mini seed kit at SRI, Shahjahnapur

Visit of Vice Chancellor of ANDUAT, Ayodhya, Dr Vijendra Singh at breeder seed nursery (Variety CoS 18231)

CoSe 17451 at GSSBRI, Seorahi, Kushinagar

RAC members along with scientific team at breeder seed plot of CoS 17231 at SRI, Shahjahanpur

18. PUBLICATIONS

Research Articles

- N. Singh, M. Priya, S.S. Tripathi, P.K. Rai and A.K. Tiwari (2025). Seed Treatment: suitable approaches for establishing nursery of sugarcane free of phytoplasma associated diseases. *Phytopathogenic mollicutes* 15 (1) 151-152.
- Priyanka Singh, Varucha Misra & Govind P. Rao. (2024). Sustainability Issues and Opportunities for Sugar and Integrated Industries in ASEAN Region, special issue edited by S. Solomon, Wirat Vanichsriratana, Cao Anh Duong, R. Manimekai. *Sugar Tech* (July–Aug 2024) 26(4):932–950.
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- Priyanka Singh and GP Rao (2024). Drone Application in Sugarcane Agriculture: A Transformative Approach. *RASSA Journal of Science for Society* 6(3): 123-126.
- R.K. Awasthi, S.N. Singh, Sujeet Pratap Singh, A. Kumar and J.P. Rai (2024). Determination of tolerance in sugarcane genotypes/varieties evaluated against red rot of sugarcane. *Ecology, Environment and Conservation*, 30 (3):1383-1388, NAAS: 5.05
- R. Viswanathan, S.P. Singh, R. Selvakumar, Chandramani Raj, Dinesh Singh, Y.P. Bharti, M.L. Chhabra, Anuradha Sharma, Md. Minnatullah, Rakesh Mehra, Harvinder Singh Yadav, Sanjay Kumar Goswami, Shweta Singh and Rahul Kumar Tiwari (2025). Widespread occurrence of *Colletotrichum falcatum* pathotype *CF13* in the subtropical India dictates continuous pathogenic virulence and severe sugarcane crop destructions. *Sugar Tech*; https.//dio.org/10.1007/s12355-025-01587-1.
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- Satendra kumar and Subhash Chandra Singh (2024). Efficacy of spacing arrangement and modern planting methods on growth, juice quality and productivity of sugarcane (*Saccharum officinarum*). *Agrica*, 13(S):235-241.
- Satendra kumar and Subhash Chandra Singh (2024). Evaluation of promising midlate sugarcane genotypes for yield and quality traits in north central zone. *Plant Archives* 24:136-141.
- Satendra Kumar, Subhash Chandra Singh and S.K. Shukla (2024).Agronomic performance of elite early sugarcane genotypes for yield and quality traits in north ventral zone. *Agrica*: 13-34-40.
- S. Solomon, Govind P. Rao, Yang Rui Li, Wirat Vanichsriratana, R. Manimekai, Priyanka Singh, Cao Anh Duong. (2024). Silver Jubilee Special Issue: Sustainability through Diversification in the Sugar Industry. *Sugar Tech* 26: 921-925.
- Sujeet Pratap Singh, Jyoti Rasogi, RK Singh and RB Singh (2025). Construction of an integrated linkage map of sugarcane using unigene-derived microsatellite (SSR) markers. *Reproduction and Breeding*, 5(1):12-22
- Y.P. Bharti, Sanjay Kumar, V.K. Shukla and S.K. Shukla (2024). Assessment of Red-Rot Resistance in C-1 Generation of Sugarcane Genotypes in Eastern Uttar Pradesh, India. *Flora and Fauna*, 30 (2): 28-32.
- Yukti Gupta, Archana and A.K. Tiwari (2024) Hormonal manipulation for rapid micropropogation of new sugarcane variety CoS 17231: *Agrica* 13, 68-70.

Book Chapter

- S. Solomon and Priyanka Singh (2024). Management of Postharvest Quality of Sugarcane: Industry Perspectives. Biotechnological Transformation for Sugarcane Management. Apple Academic Press, CRC Press, Taylor & Francis group, Canada, USA. Edited By Krishan K. Verma, Xiu-Peng Song, Munna Singh, Jian- Ming Wu, Yang-Rui Li.

Book

- Plant Disease and their management: A sustainable approach. Eds by D. Srivastava, RK Gaur and AK Tiwari. Published by Taylor and Francis, UK

Abstracts in conference/symposia/Seminar

- Archana (2025). Development of an efficient protocol for new early variety CoS 18231 (*Saccharum officinarum* L.) through meristem culture International Conference (Hybrid Mode) Published

in proceeding, in Innovation, Entrepreneurship and Incubation in Agriculture, Science, Commerce and Social Sciences & quot; 07–08 March 2025, pp 59.

- Priyanka Singh, Prasoon Kumar, Kuldeep Kumar and Sanjay Awasthi (2024) "Utilization of sugarcane and sugar industry wastes for sustainable sugarcane production and post-harvest quality management" e-Proceedings of 82nd Annual Convention & International Sugar Expo 2024, 30-31 July 2024 at Jaipur Exhibition & ConventionCentre, Jaipur, Rajasthan, PP 13-25.
- Priyanka Singh (2024). Green technology to improve early growth in sugarcane: Impact of naturally derived bio-stimulant DPV application under sub-tropical conditions. 8th IAPSIT International Sugar Conference SUGARCON-2024 & sugar expo on Building a Resilient and Sustainable Global Sugar & Bio-energy Industry: Transforming ASEAN Sugar Sector 16 to 19 September 2024 at ICISE, Quy Nhon, Vietnam, PP-117.
- Satendra Kumar and Subhash Chandra Singh (2024). Evaluation of promising midlate sugarcane genotypes for yield and quality traits in north central zone. Souvenir/abstract book of international conference on global approaches in agricultural, biology, environment and life science for sustainable future at Kanthmandu held on 7-9 June 2024, published by *Amigo international publisher*, pp 423.
- Sujeet Pratap Singh, S.P. Singh, S.K. Vishwakarma, Y.P. Bharti, A. Dagar, Arvind Kumar, Sachin Kashyap and V.K. Shukla (2024). Path Travelled by Red Rot with Sugarcane variety Co 0238 in Uttar Pradesh. *Punjab Agricultural University, Ludhiana, ICAR- The crop Improvement Society of India on "35th Biennial Workshop of All India Coordinated Research Project on Sugarcane"* ICAR-PAU, Ludhiana (Punjab) on 21 -22 October, 2024: *Sugarcane: Some Insights, A Souvenir* (12): 153 - 165.
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- Y.P. Bharti, Sanjay Kumar, Krishna N and, V.K. Mishra, V.K. Shukla and S.K. Shukla (2024). Screening of C-1 Generation of Sugarcane Genotypes for Resistant to Red-Rot Disease clone. *IPS-National Conference on "Plant health for Food Security: Threats and Promises,* ICAR-IISR, Lucknow (UP) on 1-3 February, 2024; PP (14)-2398-2308; pp. 414 - 415.
- Y.P. Bharti, V.K. Mishra, S.C. Singh, Sanjay Kumar, R. Viswanathan and S.K. Shukla (2024). Prevalence of new races of *Colletotrichum falcatum* Went of Red Rot Disease from North Central Zone. *IPS-National Conference on "Plant health for Food Security: Threats and Promises,* ICAR-IISR, Lucknow (UP) on 1 -3 February, 2024; SO (3)-2398-2367; pp. 197 - 198.

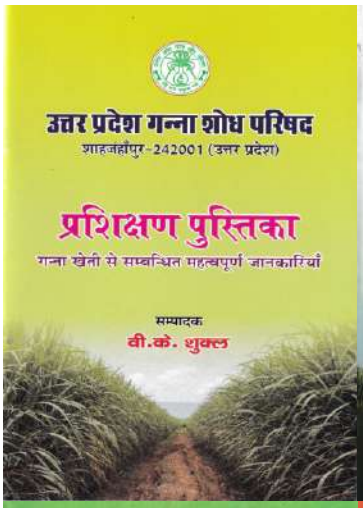
Awards/Honour

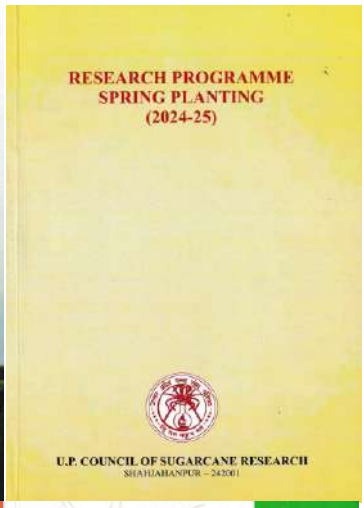
- Women Scientist Award received by Priyanka Singh. The Society for the Science of Climate Change and Sustainable Environment (SSCE) awarded Women Scientist Award on 24 August 2024 in recognition of contribution to sustainable agriculture practices.

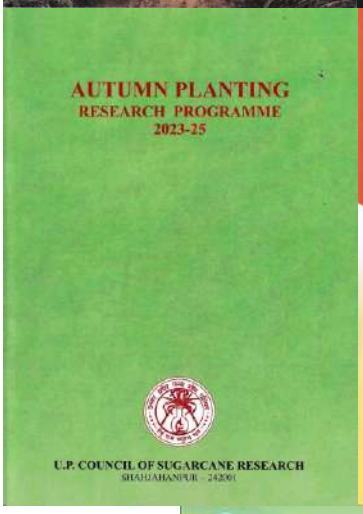
- Best paper to Priyanka Singh: Agriculture on "Sugarcane-based rural entrepreneurship: Empowering Farmers and Diversifying Sustainable Income in India, "Bhartia Sugar", 7th August 2024.

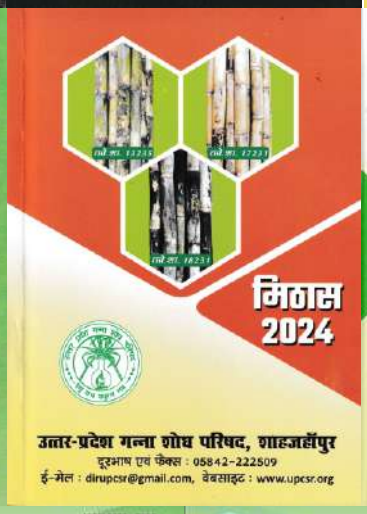
Development of Literature

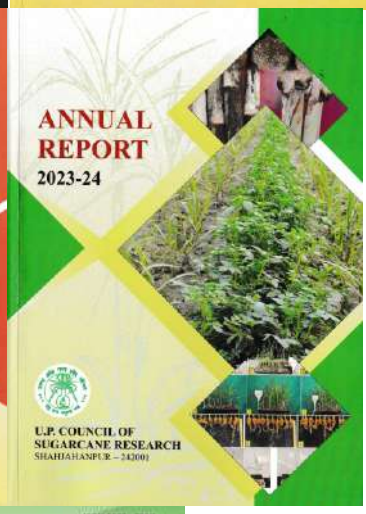
1. One Day Training Booklet
2. RKVY Booklet (2024-25)
3. Annual Report
4. Mithas (2024)
5. Autumn Technical Booklet (2023-25)
6. Spring Technical Booklet (2025-26)
7. Ganna Kheti (Jan. to June)
8. Ganne Kheti (July to December)

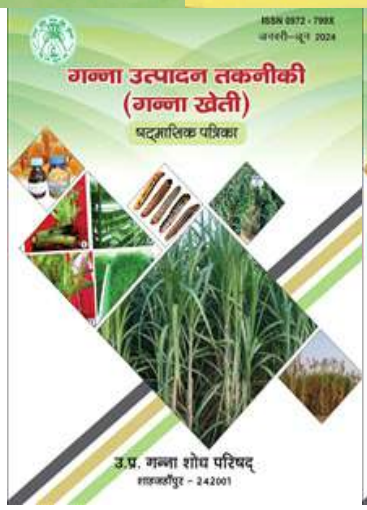


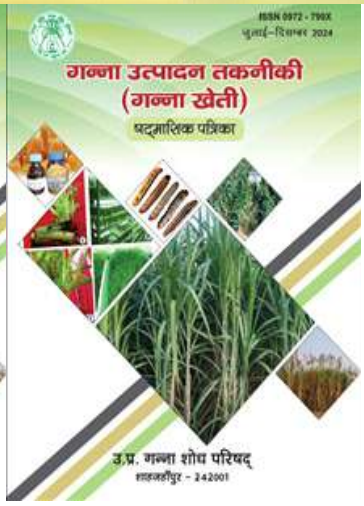












19. SCIENTIFIC AND TECHNICAL STAFFS 2024-25

UPCSR- Sugarcane Research Institute, Shahjahanpur	
Shri V.K. Shukla	Director
BREEDING	
Dr. Arvind Kumar	Senior Scientific Officer
Dr. Manish Mohan Das	Senior Scientific Assistant
Shri Nand Kishore Karma	Senior Scientific Assistant
TISSUE CULTURE	
Shri Atul Chaturvedi	Lab Assistant
AGRONOMY	
Dr. Shri Prakash Yadav	Scientific Officer
Shri Durvijay Singh	Scientific Assistant
Shri S.K. Yadav	Agriculture Supervisor
SOIL CHEMISTRY	
-	-
ENTOMOLOGY	
Mrs. Neelam Kureel	Scientific Officer
CHEMISTRY /SUGAR CHEMISTRY	
Dr. (Mrs.) Priyanka Singh	Senior Scientific Officer
Dr. Man Mohan Singh	Senior Scientific Assistant
PHYSIOLOGY	
Shri Shiv Pal Singh	Senior Scientific Officer
Dr. (Mrs.) Archana	Scientific Officer
BIO-CHEMISTRY	
Dr. Gorakh Nath Gupta	Scientific Officer
PATHOLOGY	
Dr. Sujeet Pratap Singh	Scientific Officer
Dr. Suneel Kumar Vishwakarma	Scientific Officer
SEED PRODUCTION	
Mrs. Sonia Yadav	Scientific Officer
STATISTICS	
Shri Sudhir Kumar Dixit	Statistical Officer
Shri Vivek Kumar Shukla	Senior Scientific Assistant
EXTENSION	
Dr. Sanjeev Kumar Pathak	Extension Officer
FARM	
Dr. Anil Kumar Singh	Farm Management Officer
Dr. Chidda Singh Poswal	Senior Farm Management Assistant
Shri Chandramani Singh	Scientific Assistant
LIBRARY	
Dr. Narsingh Narain Saxena	Senior Librarian
UPCSR- Sugarcane Research Institute, Muzaffarnagar	
AGRONOMY	
Dr. Jai Prakash Singh	Senior Scientific Officer & Officer-in-Charge
PLANT PATHOLOGY	
Dr. Surendra Pratap Singh	Scientific Officer
BREEDING	
Shri Onkar Singh Joshia	Senior Scientific Officer
Shri Avdhesh Kumar	Senior Scientific Assistant
SOIL CHEMISTRY	
Dr. Ved Prakash	Scientific Officer
ENTOMOLOGY	
Shri Ajay Kumar Singh	Senior Scientific Assistant
ECONOMICS	
-	-
FARM	
Shri Kiran Singh	Senior Farm Management Assistant
UPCSR- G.S.S.B.R.I., Seorahi (Kushinagar)	
Dr. Subhash Chandra Singh	Joint Director
BREEDING	
Dr. Krishna Nand	Senior Scientific Assistant
Shri Ajai Kumar Rai	Senior Scientific Assistant
AGRONOMY	
Dr. Satendra Kumar	Scientific Officer
SOIL CHEMISTRY	
-	-
SEED PRODUCTION	
Dr. Archana Siraree	Senior Scientific Officer
PHYSIOLOGY	
Shri Krishna Pal	Scientific Officer
Shri Kishore Kumar Singh	Senior Scientific Assistant
PATHOLOGY	
Dr. Yogendra Prasad Bharti	Scientific Officer
ENTOMOLOGY	
Dr. Vinay Kumar Mishra	Senior Scientific Assistant
STATISTICS	
Shri Kamal Kishore Sahu	Statistical Officer
FARM	
Shri Vrdhi Chandra	Agriculture Supervisor
Shri Sanjeev Kumar Mishra	Agriculture Supervisor
UPCSR- Sugarcane Research and Seed Multiplication Centre, Gola, Kheri	
SEED PRODUCTION	
Dr. Ajay Kumar Tiwari	Senior Scientific Officer & Officer-in-Charge
FARM	
Shri Ravi Pratap Singh	Senior Farm Management Assistant
Shri Keshava Kumar	Agriculture Supervisor
AGRONOMY	
Dr. Sarnam Singh	Scientific Officer
UPCSR- Sugarcane Research Centre, Pipraich-Gorakhpur	
TECHNICAL	
Sri Gyaneshwar Kumar Mishra	A.E. (Civil) & Officer in-Charge

PHYSIOLOGY	
Shri Vinod Kumar Shahi	Senior Scientific Assistant
FARM	
Shri Lallan Prasad	Fram Management Assistant
UPCSR- Sugarcane Research Centre, Katya-Sadat-Ghazipur	
BREEDING	
Shri Ramai Ram	Scientific Officer & Officer in Charge
TECHNICAL	
Shri Jyoti Bhushan Singh	J.E. (Mech)
UPCSR- Sugarcane Seed Multiplication Centre, Amahat-Sultanpur	
SEED PRODUCTION	
Dr. Sanjay Pratap Singh	Scientific Officer & Officer in Charge

AGRONOMY	
Shri Yogesh	Senior Scientific Assistant
Shri Chandra Pratap Singh	Scientific Officer
UPCSR- Sugarcane Seed Multiplication Centre, Luxmipur-Kushinagar	
BREEDING	
-	-
UPCSR- Sugarcane Seed Multiplication Centre, Balrampur	
AGRONOMY	
Shri Bhagwandeen	Senior Scientific Assistant & In-Charge

SUPERANNUATION

No.	Name & Designation	Photo	No.	Name & Designation	Photo
1	Dr. S.K. Shukla Director Place : Shahjahanpur Date of Superannuation : 27-04-2024		5	Dr. Krishna Nand SSA (Breeding) Place : Seorahi Date of Death : 26-01-2025	
2	Shri Shiv Pal Singh SSO (Plant Physiology) Place : Shahjahanpur Date of Superannuation : 31-12-2024		6	Shri Ravi Pratap Singh SFMA (Farm) Place : Gola Date of Superannuation : 31-01-2025	
3	Shri Vivek Kumar Shukla SSA (Statistic) Place : Shahjahanpur Date of Superannuation : 31-03-2025		7	Shri Yogesh SSA (Agronomy) Place : Sultanpur Date of Superannuation : 31-12-2024	
4	Avdhesh Kumar SSA (Breeding) Place : Muzaffarnagar Date of Superannuation : 31-03-2025		8	Dr. Sanjay Pratap Singh SO (Seed) Place : Sultanpur Date of Death: 26-12-2024	

20. WEATHER REPORT

UPCSR-SRI,Shahjahanpur							
S.N.	Month	Temp. Mean (C)		Relative Humidity (%)		Total Rainfall (mm)	No. of Rainy Days
		Max.	Min.	Forenoon	Afternoon		
1	April 2024	37.1	21.6	52	27	9.4	02
2	May 2024	38.5	25.0	63	40	33.0	03
3	June 2024	39.3	28.8	63	43	57.0	07
4	July 2024	34.0	27.3	89	75	449.4	18
5	August 2024	33.1	26.8	90	96	213.0	16
6	September 2024	32.7	26.0	91	74	236.0	10
7	October 2024	33.5	22.1	88	52	8.0	01
8	November 2024	28.6	15.3	89	52	NIL	-
9	December 2024	23.3	9.3	86	50	01	2 days
10	January 2025	19.8	9.2	90	65	02	1 day
11	February 2025	25.8	11.8	83	45	1.4	01
12	March 2025	31.0	15.7	73	33	2.8	01

UPCSR-SRS,Muzaffarnagar							
S.N.	Month	Temp. Mean(C)		Relative Humidity (%)		Total Rainfall (mm)	No. of Rainy Days
		Max.	Min.	Forenoon	Afternoon		
1	April 2024	34.5	18.7	63	24	-	-
2	May 2024	38.7	26.5	58	27	-	-
3	June 2024	38.9	25.4	62	41	50.6	03
4	July 2024	34.7	25.7	91	76	300.0	11
5	August 2024	33.2	25.4	90	70	144.8	09
6	September 2024	32.4	24.5	91	70	225.4	11
7	October 2024	32.8	19.1	88	50	1.0	01
8	November 2024	27.5	13.8	91	58	-	-
9	December 2024	22.0	8.2	81	49	49.3	02
10	January 2025	19.8	8.8	91	60	9.2	02
11	February 2025	24.7	11.4	84	42	15.6	03
12	March 2025	29.4	14.9	77	34	14.0	02

21. IMPORTANT COMMITTEES

1–	**शोध प्राथमिकता, निगरानी एवं मूल्यांकन समिति**	
	1. संस्थान/केन्द्रों की शोध प्राथमिकता, निगरानी एवं मूल्यांकन। 2. राज्य सरकार, भारत सरकार एवं वाह्य सहायतित परीक्षणों की निगरानी। 3. शोध कार्यों में गुणोत्तर सुधार हेतु सुझाव। 4. परीक्षणों से प्राप्त परिणामों का मूल्यांकन।	**अध्यक्ष–** निदेशक **सदस्य–** संयुक्त निदेशक, सेवरही एवं सम्बद्ध केन्द्रों के प्रभारी। समस्त अनुभागाध्यक्ष। लेखाधिकारी। **सदस्य सचिव–** डा. अजय कुमार तिवारी, वरिष्ठ वैज्ञानिक अधिकारी (सीड प्रोडक्शन)।
2–	**वित्तीय एवं प्रशासनिक/नियोजन तथा नीति निर्धारण एवं अन्य समीक्षा हेतु समिति**	
	1. परिशद के कार्मिकों के सम्बन्ध में मा. गवर्निंग बाडी के माध्यम से वित्तीय/ प्रशासनिक नीतियों का निर्धारण। 2. प्रोन्नति/ए.सी.पी./अन्य सेवा सम्बन्धी/वित्तीय लम्बित प्रकरणों की समीक्षा एवं निस्तारण। 3. समस्त कार्मिकों से सेवा अभिलेखों का ससमय परीक्षण एवं अनुरक्षण। 4. सक्षम न्यायालयों में चल रहे वादों की समय–समय पर समीक्षा। 5. बजट आवंटन एवं व्यय की समीक्षा तथा आगामी बजट प्रस्तावों का परीक्षण। 6. फन्डेड परीक्षणों से आय एवं व्यय। 7. आउटसोर्स एजेन्सियों का भुगतान।	**अध्यक्ष–** निदेशक **सदस्य–** डा. सुभाष चन्द्र सिंह, संयुक्त निदेशक। डा. (श्रीमती) प्रियंका सिंह, वरि.वैज्ञा.अधि.। डा. श्रीप्रकाश यादव, वैज्ञा. अधिकारी लेखाधिकारी। **सदस्य सचिव–** श्री अविनेश कुमार, प्रधान सहायक। (प्रशासनिक मामले) श्री मौजी लाल यादव, लेखाकार। (वित्तीय मामले)
3–	**अभिजनक बीज उत्पादन कार्यक्रम समिति**	
	1. शासन द्वारा निर्धारित लक्ष्य के अनुरूप अभिजनक बीज गन्ना पौधशालाओं की स्थापना हेतु प्लाटों का चयन (शोध, चीनी मिल एवं कृशक प्रक्षेत्र) एवं उत्पादन। 2. किस्मों का चयन, शुद्धता सुनिश्चित करते हुए अभिजनक बीज गन्ना बुवाई, पर्यवेक्षण एवं वितरण। 3. बीज गन्ना का गर्म जल उपचार। 4. वितरण के समय बीज प्रमाणीकरण।	**अध्यक्ष–** डा. अजय कुमार तिवारी, वरि.वैज्ञा. अधिकारी। **सदस्य–** डा. अरविन्द कुमार, वरि.वैज्ञा.अधिकारी। डा. अनिल कुमार सिंह, प्रक्षेत्र प्रबन्ध अधि.। **सदस्य सचिव–** श्रीमती सोनिया यादव, वैज्ञानिक अधिकारी।
4–	**क्रय सलाहकार समिति**	
	1. प्रयोगशाला उपकरणों, कृषि यंत्रों, ग्लासवेयर्स, फ्लीवेयर्स एवं रसायनों का क्रय। 2. केन्द्रीय भण्डार से सम्बन्धित समस्त क्रय यथा कार्यालय एवं स्टेशनरी। 3. कम्प्यूटर, प्रयोगशाला उपकरणों तथा अन्य के वार्शिक अनुरक्षण अनुबन्ध सम्बन्धी कार्यवाही। 4. निश्प्रयोज्य समानों/वाहनों/कृशि यन्त्रों की नीलामी सम्बन्धी कार्यवाही।	**अध्यक्ष–** लेखाधिकारी। **सदस्य–** डा. संजीव पाठक, प्रसार अधिकारी। डा. सुजीत प्रताप सिंह, वैज्ञानिक अधिकारी। डा. जी.एन. गुप्ता, वैज्ञानिक अधिकारी। **सदस्य सचिव–** श्री राजेश शर्मा, वरिष्ठ सहायक।

5–	**प्रक्षेत्र सलाहकार समिति**	
	1. प्रक्षेत्र पर नियोजन एवं आधुनिकीकरण। 2. श्रमिकों का उचित उपयोग। 3. प्रक्षेत्र उत्पादित फसलों का निस्तारण एवं उनके उचित मूल्य का निर्धारण। 4. संविदा पर श्रमिकों को लगाये जाने हेतु उनकी आवश्यकता का निर्धारण। 5. परीक्षणों हेतु प्लाट का आवंटन। 6. प्रक्षेत्र हेतु निवेशों यथा बीज, खाद, रसायन, डीजल आदि की आवश्यकता का निर्धारण एवं क्रय समीक्षा। 7. प्रक्षेत्र की आय बढ़ाने हेतु सुझाव एवं प्रयास। 8. प्रक्षेत्र पर ट्रैक्टर, नलकूप, कृषि यंत्रों एवं जैनरेटर की मरम्मत।	**अध्यक्ष–** डा. अजय कुमार तिवारी, वरि.वैज्ञा.अधिकारी। **सदस्य–** डा. अरविन्द कुमार, वरि.वैज्ञा.अधि.। डा. (श्रीमती) प्रियंका सिंह, वरि.वैज्ञा.अधि.। डा. श्रीप्रकाश यादव, वैज्ञानिक अधिकारी। डा. सुनील विश्वकर्मा, वैज्ञानिक अधिकारी। लेखाधिकारी। **सदस्य सचिव–** डा. अनिल कुमार सिंह, प्रक्षेत्र प्रबन्ध अधिकारी
6–	**प्रशिक्षण, पुस्तकालय एवं मानव संसाधन विकास समिति**	
	1. कार्यालय, तकनीकी एवं वैज्ञानिक स्टाफ की ट्रेनिंग सम्बन्धी कार्ययोजना। 2. अध्ययन अवकाश संबधी पालिसी। 3. वैज्ञानिक/शोध सहायक स्टाफ को वाह्य संस्थानों में आयोजित सेमानीर/ सिम्पोजियम/ प्रशिक्षण/ कार्यशाला में भाग लेने सम्बन्धी कार्यवाही। 4. शोध परिशद के वैज्ञानिकों/शोध सहायकों के संस्थान में समय–समय पर लेक्चर का आयोजन। 5. गन्ना किसान संस्थान/चीनी मिलों द्वारा आयोजित संगोष्ठियों में वैज्ञानिक वार्ता हेतु वैज्ञानिकों का चयन। 6. पुस्तकालय में उपलब्ध जर्नल्स, पुस्तकों, न्यूजपेपर आदि का अनुरक्षण एवं वैज्ञानिकों एवं स्टाफ के वाचन सम्बन्धी व्यवस्था।	**अध्यक्ष–** डा. संजीव पाठक, प्रसार अधिकारी। **सदस्य–** डा. सुजीत प्रताप सिंह, वैज्ञानिक अधिकारी। डा. (श्रीमती) अर्चना, वैज्ञानिक अधिकारी। **सदस्य सचिव–** डा. एन.एन. सक्सेना, वरिश्ठ पुस्तकालयाध्यक्ष।
7–	**कार्य एवं अनुरक्षण समिति**	
	1. कार्ययोजना तैयार करना। 2. चल रहे कार्यों का पर्यवेक्षण। 3. सिविल, मैकेनिकल एवं इलेक्ट्रिक कार्यों को समय से सम्पन्न कराना। 4. जेनेरेटर का अनुरक्षण एवं मरम्मत। 5. आडिटोरियम, सभाकक्ष, अतिथिगृह एवं कार्यालय तथा प्रयोगशालाओं का अनुरक्षण एवं मरम्मत। 6. विद्युत आपूर्ति की निरन्तरता सुनिश्चित करना। 7. कार्यालय एवं अनुभागों में कैमरों का आवंटन। 8. वाहनों का अनुरक्षण एवं मरम्मत। 9. परिषद परिसर, प्रयोगशाला, अतिथिगृह की स्वच्छता की समीक्षा एवं सुधार हेतु कार्ययोजना एवं कार्य।	**अध्यक्ष–** डा. (श्रीमती) प्रियंका सिंह, वरि.वैज्ञा.अधि.। **सदस्य–** डा. संजीव पाठक, प्रसार अधिकारी। डा. जी.एन. गुप्ता, वैज्ञानिक अधिकारी। लेखाधिकारी अथवा उनके द्वारा नामित सदस्य **सदस्य सचिव–** डा. एन.एन. सक्सेना, वरिश्ठ पुस्तकालयाध्यक्ष।
8–	**सुरक्षा सलाहकार एवं अनुशासन समिति**	
	1. प्रक्षेत्र, आवासीय भवनों, प्रयोगशाला भवनों तथा कार्यालय सहित सम्पूर्ण परिसर की सुरक्षा की समीक्षा तथा हेतु सुझाव। 2. सुरक्षा कर्मियों के भुगतान की समीक्षा। 3. अनुशासन सम्बन्धित शिकायत।	**अध्यक्ष–** डा. सुजीत प्रताप सिंह, वैज्ञानिक अधिकारी। **सदस्य–** श्री संजीव कुमार पाठक, प्रसार अधिकारी। डा. एस.पी. यादव, वैज्ञानिक अधिकारी। लेखाधिकारी। **सदस्य सचिव–** श्री मौजीलाल, लेखाकार।

9–	**प्रकाशन समिति**	
	गन्ना उत्पादन तकनीकी "गन्ना खेती" वार्षिक प्रतिवेदन तकनीकी प्रोग्राम, न्यूजलेटर, मिठास, प्रशिक्षण पुस्तिका, फोल्डर, पम्पलेट आदि का प्रकाशन।	**अध्यक्ष–** डा. अजय कुमार तिवारी, वरि.वैज्ञा.अधिकारी। **सदस्य–** डा. एन.एन. सक्सेना, वरिश्ठ पुस्तकालयाध्यक्ष। डा. सुनील कुमार विश्वकर्मा, वैज्ञा. अधिकारी। **सदस्य सचिव–** श्री संजीव कुमार पाठक, प्रसार अधिकारी।
10–	**आवास आवंटन समिति**	
	कार्मिकों आर्हता/वरिश्ठता के अनुसार उनके आवासों का आवंटन, अनाधिकृत रूप से काबिज आवासों को रिक्त कराना, आवासों में विद्यमान समस्याओं का निरीक्षण कर सुझाव देना।	**अध्यक्ष–** डा. अरविन्द कुमार, वरि.वैज्ञा.अधिकारी। **सदस्य–** श्री संजीव कुमार पाठक, प्रसार अधिकारी। **सदस्य सचिव–** डा. जी.एन. गुप्ता, वैज्ञानिक अधिकारी।
11–	**विशाखा समिति**	
	कार्यस्थल पर महिला लैंगिक उत्पीड़न (निवारण, प्रतिशेध और प्रतितोश) अधिनियम–2013 के कियान्वयन हेतु।	**अध्यक्ष–** डा. (श्रीमती) प्रियंका सिंह, वरि.वैज्ञा.अधिकारी। **सदस्य–** डा. सुजीत प्रताप सिंह, वैज्ञानिक अधिकारी। श्री जितेन्द्र कुमार मिश्र, जिला गन्ना अधि.। श्रीमती नीलम कुरील, वैज्ञानिक अधिकारी। श्रीमती विमला बहन, समाजसेवी, विनोबा सेवा आश्रम, बरतारा, शाहजहॉपुर। **सदस्य सचिव–** श्रीमती सोनिया यादव, वैज्ञानिक अधिकारी।
12–	**कृषक पंजीकरण समिति**	
	बीज गन्ना उत्पादक कृषक पंजीकरण एवं प्राप्त प्रार्थना पत्रों के त्वरित परीक्षण तथा पंजीयन प्रमाण पत्र निर्गत संबंधी संस्तुति हेतु।	**अध्यक्ष–** डा. अर्चना, वैज्ञानिक अधिकारी। **सदस्य–** डा. अनिल कुमार सिंह, प्रक्षेत्र प्रबंध अधिकारी। डा. सुनील कुमार विश्वकर्मा, वैज्ञा.अधि.। श्री सुधीर दीक्षित, सांख्यिकी अधिकारी। **सदस्य सचिव–** श्रीमती सोनिया यादव, वैज्ञानिक अधिकारी।
13–	**आनलाइन मिनी सीड किट वितरण समिति**	
	नवीन गन्ना किस्मों के मिनी सीड किट की बुकिंग एवं वितरण व्यवस्था हेतु।	**अध्यक्ष–** डा. अजय कुमार तिवारी, वरि.वैज्ञा. अधिकारी। **सदस्य–** डा. अनिल कुमार सिंह, प्रक्षेत्र प्रबंध अधिकारी। श्रीमती सोनिया यादव, वैज्ञानिक अधिकारी। डा. सुजीत प्रताप सिंह, वैज्ञानिक अधिकारी। **सदस्य सचिव–** डा. जी.एन. गुप्ता, वैज्ञानिक अधिकारी।

14–	**इन्टर्नशिप / अप्रैन्टिसशिप समिति**	
	1. इन्टर्नशिप की आवश्यकता निर्धारण, इन्टर्नशिप हेतु प्राप्त आवेदन पत्रों की स्क्रीनिंग कर पात्र प्रशिक्षुओं की चयन की संस्तुति देने, अभिलेखों का सत्यापन व गोपनीयता संबंधी घोशणा पत्र प्राप्त करना आदि। 2. अप्रैन्टिसशिप संबंधी विविध कार्य।	**अध्यक्ष–** डा. (श्रीमती) प्रियंका सिंह, वरि.वैज्ञा.अधिकारी। **सदस्य–** श्रीमती सोनिया यादव, वैज्ञानिक अधिकारी। श्रीमती नीलम कुरील, वैज्ञानिक अधिकारी। श्री सुधीर दीक्षित, सांख्यिकी अधिकारी। **सदस्य सचिव–** डा. सुजीत प्रताप सिंह, वैज्ञानिक अधिकारी।
15–	**फार्म / परिषदीय उत्पाद मूल्य निर्धारण समिति**	
	1. वाह्य संस्थाओं के रासायनिक उत्पादों के लैब / प्रक्षेत्र पर परीक्षण हेतु परीक्षण शुल्क। 2. निजी चीनी मिल द्वारा जातीय पहचान / रोग एवं कीट की पहचान, सुझाव तथा चीनी परता जॉच हेतु शुल्क। 3. टिशु कल्चर द्वारा उत्पादित पौधों एवं स्थापित कल्चर का प्रति पौधा / प्रति कल्चर का मूल्य। 4. परिषद् पर उत्पादित विभिन्न जैव उत्पादों / बायोपेस्टीसाइड / ट्राइकोडर्मा का मूल्य। 5. अतिथिगृह के श्रेणीवार कमरों का रुम रेंट निर्धारण, शुल्क, परिशदीय कर्मचारी / अन्य राजकीय कर्मचारी / व्यक्तिगत् / सेवानिवृत्त परिशदीय कर्मचारी। 6. गुड का प्रति कि.ग्राम. मूल्य निर्धारण।	**अध्यक्ष–** **निदेशक।** **सदस्य–** डा. अजय कुमार तिवारी, वरि.वैज्ञा.अधिकारी। डा. सुजीत प्रताप सिंह, वैज्ञानिक अधिकारी। डा. सुनील कुमार विश्वकर्मा, वैज्ञा.अधि.। डा. अनिल कुमार सिंह, प्रक्षेत्र प्रबंध अधि.। **सदस्य सचिव–** लेखाधिकारी।

22. REVENUE GENERATION

S.N.	Particulars	Revenue (INR)
1	Farm Receipt	7,27,31,349.00
2	Bio-Product	57,04,892.00
3	Trichocard	4,54,000.00
4	Soil Testing	4,87,550.00
5	Training Fee	1,42,11,000.00
6	Seed Grower Registration Fee	4,67,000.00
7	Logistics	6,94,900.00
8	Contract Field Trail Fee	46,00,000.00
9	Other Income	66,31,582.00
Total		**10,59,82,273.00**

Memories of 2024-25

Additional Cane Commissioner Sri V.K. Shukla is welcomed by Director, Dr. S.K. Shukla

Handed over (by Dr. S.K. Shukla) and taken over (Sri V.K. Shukla) charge of Director UPCSR

Farewell party of Director Dr. S.K. Shukla

Farewell dinner to Director Dr. S.K. Shukla by Scientific Team of UPCSR

Sapling by Sri Anil Kumar, ACS, at UPCSR-SRI, Shahjahanpur

Plantation by Scientific and Cane Development Team at SRI, Shahjahanpur

On the occasion of republic day celebration

Scientific Team of ICAR-SBI, Coimbatore visited and interacted to the cane growers during training seasons at SRI, Shahjahanpur

RAC members in spring technical meeting at SRI, Shahjahanpur

RAC members in autumn technical meeting at SRI, Shahjahanpur

Presentation by senior breeder during spring technical meeting

On day of retirement party of Sri S.P. Singh, Senior Scientific Officer

Inaugural session of one day training programme at SRI, Shahjahanpur

Director is visiting poly bag nursery of CoS 19231

Vice Chancellor of ANDUAT, Ayodhya with Scientific team of UPCSR-SRI, Shahjahanpur

Vice Chancellor of ANDUAT, Ayodhya with Scientific team of UPCSR at GSSBRI, Seorahi, Kushinagar

Glimpse of Students Visitors at UPCSR-SRI, Shahjahnapur

Glimpse of Trainning Programmes


गन्ना किसान प्रशिक्षण कार्यक्रम

MITHAS 2024-25








U.P. COUNCIL OF SUGARCANE RESEARCH
SHAHJAHANPUR – 242001