AICRP- SUGARCANE

Objectives

1. Development of high yielding, high sugar and disease resistant sugarcane varieties for Uttarakhand and neighboring states.
2. To develop agro-technology to enhance sugarcane productivity and quality in Uttarakhand state.
3. To develop approach for crop protection against major diseases.

A. Sugarcane Breeding

1. Significant Achievements:

<table>
<thead>
<tr>
<th>Name of variety</th>
<th>Year of release</th>
<th>Region for which recommended</th>
<th>Maturity</th>
<th>Cane Yield (t/ha)</th>
<th>Sucrose (%)</th>
<th>Red Rot Reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>CoPant-84211</td>
<td>1991 CVRC</td>
<td>North west plain zone</td>
<td>Early</td>
<td>650-750</td>
<td>16.0-19.5</td>
<td>Moderately resistant to red rot</td>
</tr>
<tr>
<td>CoPant-84212</td>
<td>1999 SVRC</td>
<td>Uttarakhand &amp; U.P.</td>
<td>Mid-late</td>
<td>750-800</td>
<td>17.0-19.0</td>
<td>Moderately resistant to red rot</td>
</tr>
<tr>
<td>CoPant-90223</td>
<td>2000 SVRC</td>
<td>Uttarakhand &amp; U.P.</td>
<td>Mid-late</td>
<td>750-850</td>
<td>17.0-19.0</td>
<td>Moderately resistant to red rot, Tolerance to water logging</td>
</tr>
<tr>
<td>CoPant-94211</td>
<td>2004 SVRC</td>
<td>Uttarakhand &amp; U.P.</td>
<td>Early</td>
<td>650-750</td>
<td>17.0-19.0</td>
<td>Moderately resistant to red rot</td>
</tr>
<tr>
<td>CoPant-96219</td>
<td>2004 SVRC</td>
<td>Uttarakhand &amp; U.P.</td>
<td>Mid-late</td>
<td>750-800</td>
<td>16.0-19.0</td>
<td>Moderately resistant to red rot</td>
</tr>
<tr>
<td>CoPant-97222</td>
<td>2005 SVRC</td>
<td>Uttarakhand &amp; U.P.</td>
<td>Mid-late</td>
<td>800-850</td>
<td>17.0-19.0</td>
<td>Moderately resistant to red rot</td>
</tr>
<tr>
<td>CoPant-99214</td>
<td>2007 SVRC</td>
<td>Uttarakhand &amp; U.P.</td>
<td>Mid-late</td>
<td>800-850</td>
<td>17.0-19.0</td>
<td>Moderately resistant to red rot</td>
</tr>
<tr>
<td>CoPant-03220</td>
<td>2011 SVRC</td>
<td>Uttarakhand &amp; U.P.</td>
<td>Early</td>
<td>800-950</td>
<td>16.5-18.5</td>
<td>Moderately resistant to red rot</td>
</tr>
<tr>
<td>CoPant-05224</td>
<td>2012 SVRC</td>
<td>Uttarakhand &amp; U.P.</td>
<td>Mid-late</td>
<td>800-850</td>
<td>16.5-18.5</td>
<td>Moderately resistant to red rot</td>
</tr>
</tbody>
</table>

1. A total of 09 varieties of sugarcane developed and released for cultivation, which includes 03 early and 06 mid-late maturing varieties. CoPant 84211 (1991), CoPant 90223 (2001), CoPant 97222 (2006) were released by CVRC for cultivation in North west zone, while CoPant 84212 (1999), CoPant 94211 and CoPant 96219 (2004), CoPant 99214 (2007), CoPant 3220 (2011) and CoPant 05224 (2012) were release by SVRC for the
2. Trials indented & conducted: Pantnagar centre is mainly conducting trials under irrigated ecosystem that comprises the trials on early and mid-late maturing sugarcane varieties. Every year around 08 trials are being conducted to represent the Northern plain zone of the country. Besides 04 station trials (two each in early and mid-late group) were also conducted every year. Based on yield, resistance/tolerance to red-rot and smut, maturity duration and over all phenotypic acceptability under respective situations, promising clones were identified.

3. Entries nominated in trials: Pantnagar centre had nominating 2-4 entries of sugarcane clones every year in AICRIP for zonal testing and based on the performance these entries were being advanced in zonal testing. Since 1970-71 approximately more than 200 entries were nominated for different trials under irrigated ecosystem of north west zone.

4. Breeding material generated: In order to generate breeding material, Scientists were visiting SBI Coimbatore every year and executing 20-25 crosses through hybridization of desirable donars for yield, sucrose and biotic stress tolerance. On an average 20-25 thousands seedlings were raised every year and evaluated for morphological traits. About 500 best clones were being evaluated in clonal generation first and finally 20-25 superior clones were evaluated in station trials and 2-4 nominations were proposed every year in AICRP sugarcane zonal trials.

5. Nucleus & breeder seed production: The centre has produced sufficient quantity of nucleus seed of different varieties to supply to Breeder Seed Production Centre to produced sufficient breeder seed for supply to farmers of the state. All the 09 varieties developed from Pantnagar and some of the promising varieties of the zone are being maintained at the centre and nucleus seeds produced to meet the requirement of breeder seeds production in every year. Around 8-10 thousand quintals of breeder seed was being produced every year for supply to farmers.

Impact:

1. Sugarcane varieties developed under this Project since 1970-71 for all the 5 sugarcane growing zones in the country brought about 2.7 times increase in sugarcane production and added significantly to the National Exchequer.

2. The data from the office of Cane Commissioner Government of Uttarakhand clearly indicated that there has been an
increase of area brought under improved varieties developed under this project (upto 13.5% of sugarcane area under pantnagar varieties).

2. Research Publications:

A. Research Papers:


B. Abstract in symposium/seminars:


Symposium on Global Research Initiative for Sustainable Agriculture & Allied Science (GRISAAS 2017), Dec. 02-04, 2017 SSDAT Meerut and Rajasthan College of Agriculture, Maharana Pratap Univ. of Ag. & Tech., Udaipur (Rajasthan) p.


C. Invited lectures:


D Articles / Extension Literature


3. Thesis Research:

1. Sangeeta Singh.2011. Studies on Genetic divergence in sugarcane (Saccharum spp. complex) submitted for Ph.D. to GBPUAT under supervision of Dr. S. P. Singh.

2. Sandeep Kumar. 2012.DUS characterization of Sugarcane clones, their evaluation and study of polymorphism for Sugar content
through SSR markers submitted for Ph.D. to GBPUAT under supervision of Dr. S. P. Singh.

3. Dharm Nath Kamat. 2014. GXE interaction and Stability in sugarcane (Saccharum spp. complex) using AMMI Models submitted for Ph.D. to GBPUAT under supervision of Dr. S. P. Singh.

4. Arvind Singh Negi. 2017. Screening for red rot and genetic diversity analysis among early generation clones of sugarcane (Saccharum Species Complex) submitted for Ph.D. to GBPUAT under supervision of Dr. S. P. Singh.


4. Future Thrusts:

1. Development of early maturing drought tolerant varieties.

2. Development of mid-late maturing drought tolerant varieties.

3. Integration of molecular markers in crop improvement to overcome bottleneck problems of conventional breeding.

4. Development of high biomass yielding medium duration varieties for energy cane production.

5. Development of low input and high nutrient use efficient varieties for doubling the farmer’s income.
B. Sugarcane Agronomy:

1. Significant Achievements:
   - About 20 recommendations of Crop Production and Crop Protection have been made. The notable recommendations are as follows:
   1. Late planted sugarcane can be grown with 75% of recommended nitrogen to save input.
   2. Application of subsoiler enhances cane yield.
   3. Paired row planting was found superior than conventional and FIRB methods with respect to water productivity.
   4. Winding weed could be managed with Metribuzin @1.25 kg ai/ha (PE) with a spray of Dicamba @350 g ai/ha at 75DAP.
   5. Addition of 40 kg sulphur and 25 kg Zinc with recommended dose of fertilizer enhances sugarcane yield.
   6. Highest cane yield in planted cane and ratoon can be achieved with the application of 20 ton FYM + inorganic nutrients applied on the soil test basis.
   7. The germination percent can be hastend 20 days earlier by soaking cane setts in Ethephon @ 100 ppm overnight.
   8. GA3 spraying @ 35 ppm on 90, 120 and 150 days after planting enhance the cane production.
   9. Trench planted paired row (30 : 120 cm) with mulch increase NMC and cane yield over flat method of planting and no mulch.
   10. In sugarcane-ratoon-wheat cropping system, highest cane yield and wheat yield was recorded with trash mulch alongwith trichoderma application

2. Research Publications:
   Research Papers:
   1. Kumar, Jitendra and Singh Dheer 2009 weed management in sugarcane ratoon crop.
   5. Yadav, R. D.; Singh Dheer; Bhatnagar Amit, 2014 Effect of sett size, seed rate and seed treatment on yield attributes and productivity on spring sugarcane (Saccharum officinarum L.) in sub tropical india. Madras Agricultural journal (TNAU)
   8. Kumar, Rajeev and Dheer Singh (2014). Effect of macro and micro nutrients on growth, yield
and juice quality of sugarcane (Saccharum officinarum L.) in national symposium on “ECM technology for safe, secure and profitable food, production” held at G.B.P.U.A & T. Pantnagar, Oct. 10-11 pp 150.


**Technical Bulletin:**


**3. Thesis Research:**

1. Nirdesh Kumar. 2012. Studies on planting geometry for mechanized inter-cultivation of sugarcane (Saccharum officinarum L.) submitted for M. Sc. Ag to GBPUAT under supervision of Dr. S. K. Saini.


4. Ram Das Yadav. 2012. Studies on seed cane economy in sugarcane (Saccharum officinarum L.) cultivation submitted for M. Sc. Ag to GBPUAT under supervision of Dr. Dheer Singh.

5. Rajeev Kumar. 2013. Nutrient management studies on productivity and profitability in spring planted sugarcane (Saccharum officinarum L.) submitted for Ph.D. to GBPUAT under supervision of Dr. Dheer Singh.

management in sugarcane (*Saccharum officinarum* L.) submitted for Ph.D. to GBPUAT under supervision of Dr. Dheer Singh.


**B. Sugarcane Pathology:**

1. **Significant Achievements:**

1. Furrow application of Zinc Sulphate @ 25kg/h + Copper Sulphate @ 5kg/h+ Borex @ 10kg/h can be used to reduces the incidence of red rot under field condition and also enhanced the yield attributes

2. A large number of resistant (40) and moderately resistant (60) genotypes were identified against red rot disease during the period under report.

3. Similarly 14 resistant and 34 moderately resistant genotypes were also identified against smut disease during the period under report.

2. **Research Publications:**

**Research papers:**


**Abstract in symposium / seminars:**

Conference held at CBSH GBPUAT, Pantnagar. November 15-17.


21. Chauhan, Harshvardhan, Vishvanath and Sahu,


**Popular articles:**


**Proceeding papers:**


34. Sharma, Geeta 2017. Minimizing Pre-Harvest Disease Scenario of Sugarcane. Proceedings of 35th Training on Technological Advances to
Minimize Pre-and Post Harvest Losses in Agricultural and Horticultural Crops to Enhance Farmer’s Income November 22 to December 12, 2017 under Centre of advances Faculty Training in Plant Pathology, GBPUA&T, Pantnagar, 149-154.


Technical Bulletins:


3. Thesis Research:


Disease of Sugarcane. submitted for M.Sc.Ag. to GBPUAT under supervision of Dr Geeta Sharma.


4. Future Thrusts:

1. Collection and maintenance of virulent strains and bio types of pathogens causing major diseases of sugarcane

2. Screening of germplasms of sugarcane to identify the source of resistance against major diseases.

3. Development of eco-friendly, sustainable management techniques for major diseases

4. Identification of new disease problems and ascertaining its cause and economic importance.

   Integrated approach to manage red-rot and smut diseases of sugarcane.