

CoPb 95: A new early maturing and high-yielding sugarcane cultivar released for commercial cultivation in Punjab state

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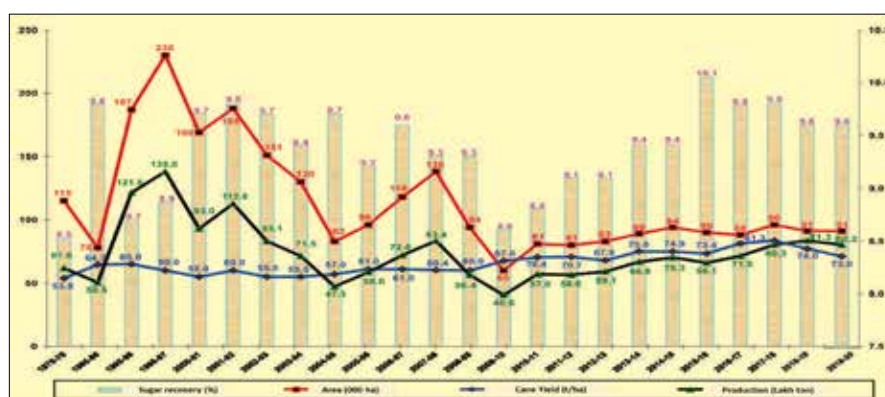
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The sugar industry is one of Punjab's most important agro-based sectors, and it helps to diversify the rice-wheat cycle. Sugarcane is used as a raw material for a variety of commercial goods, including jaggery, khandasari, alcohol, paper, chemicals, and cow feed. As a result, high cane production and high sucrose cultivars are necessary to suit the demands of this sector. In the sugarcane varietal development program, per hectare production and per cent sugar recovery are the two most important factors. As the currently cultivated cultivar Co 238 suffers from many issues, hence there is a need to find out a suitable alternative that must be popularized among the cane farmers for maintaining the potential yields and recovery. CoPb 95 is that alternative early maturing and high-yielding cane cultivar which reportedly suffers from lesser attacks of insect pests and diseases, reduces the overall cost of cultivation and improves the livelihoods of cane farmers.

Keywords: Cane yield, CoPb 95, Punjab, Recovery, Sugarcane

SUGARCANE growers in Punjab are looking for early maturing cultivars due to the Punjab sugar mills' short crushing schedule. Moreover, the susceptibility of the renowned sugarcane variety Co 238 to red rot disease is a source of concern for the industry as well as the state's sugarcane growers. During 2019–20, the state sugar industry was handled by 16 sugar mills (9 cooperatives + 7 private), with a total sugarcane demand of 96 thousand hectares, producing 730 lakh quintals and productivity of 802 q/ha. The major goal of maturity-based cultivar classification is to make it easier to harvest varieties at the right time to improve overall recovery and, as a result, sugar production. When a sugarcane variety reaches above 17% sucrose and 85% purity of cane juice at the age of 8–10 months, it is called early maturing.

Punjab Agricultural University (PAU), Ludhiana, Punjab developed CoPb 95, an early maturing sugarcane variety, for sugarcane



Sugarcane production in Punjab from 1975–76 to 2019–20

growers in the state of Punjab in 2021. This variety was developed at the National Hybridization Garden, Sugarcane Breeding Institute Coimbatore, Tamil Nadu from a poly cross of CoLk 8102, and recognized at Regional Research Station, PAU, Kapurthala, Punjab where it was tested for years at the research station and other sites before being released. This variety was produced in comparison to CoPb 92, a recent local release, and Co 238, a popular variety. Perusal of Table 1 reveals the field performance of CoPb 95

for its cane yield (t/ha), components traits, viz. cane length (cm), cane diameter (cm), single cane weight (kg), number of millable canes (000/ha), sugar yield (t/ha), commercial cane sugar (CCS) (%), sucrose (%), purity (%) followed by insect pests and disease attacks.

The mean cane yield of CoPb 95 was 95.06 t/ha, which was 14.56% greater than CoPb 92 (82.67 t/ha) and 10.73% higher than the popular variety Co 238 (85.53 t/ha) based on 14 research trials (12 plant trials and 2 ratoon trials). In comparison

Table 1. Comparative performance of CoPb 95 vis-à-vis Co 238 for cane yield components and juice quality parameters under Punjab conditions

Name of traits		CoPb 95	Co 238
Cane yield	Plant crop (t/ha)	106.3	96.5
	Ratoon (t/ha)	90.82	82.75
Components traits	Cane length (cm)	269.0	237.7
	Cane diameter (cm)	2.56	2.42
	Single cane wt. (kg)	1.50	1.20
	Number of millable canes (000/ha)	85.53	81.90
Juice quality parameters	CCS (t/ha)	11.25	10.39
	CCS (%)	11.88	11.75
	Sucrose (%)	17.11	16.96
	Purity (%)	89.58	90.01
Disease and Insect pest	Red rot (Artificial inoculation)	Moderate susceptible	Moderate resistant
	Smut	Moderate resistant	Susceptible
	Grassy shoot disease	Absent	Observed
	Yellow leaf disease	Absent	Observed
	Borer complex (Early shoot/top/stalk)	Less susceptible	Moderate susceptible (Top borer)

whereas smut, Pokkah boeng, grassy shoot and yellow leaf infection were found in Co 238. CoPb 95 showed moderately resistant smut reaction when artificial inoculation by steeping method was used for smut screening, whereas Co 238 was susceptible and CoPb 92 was moderately sensitive. CoPb 95 showed moderate sensitive and resistant reactions in red rot screening utilizing artificial inoculation using the plug method and nodal/cotton swab method, respectively. CoPb 95 showed less susceptibility to early shoot borer (6.46), top borer (6.77), and stalk borer (7.72) during insect pest resistance testing, whereas Co 238 showed less susceptibility to early shoot borer (7.27) and stalk borer (8.13) and intermediate susceptibility to top borer (18.17).

After the plant crop, the ratoon crop also covers a significant area as it doesn't require any type of field preparations or new seed as under ratooning previously harvested plant crop is regrown. Sugarcane N fertilization trials of ratoon crops of CoPb 95, CoPb 16181, CoJ 64, CoPb 92 and Co 238 were carried out during 2020–21 at Regional Research Station, Kapurthala, Punjab. Under ratoon crop, the performance of CoPb 95 was reported with better yield and quality parameters as compared to other popular cultivars when a 25% higher dose than the

to CoPb 92 (93.2 t/ha) and Co 238 (104.7 t/ha), CoPb 95 was evaluated in farmers' fields during 23 adaptive trials, yielding 118 t/ha. Overall, CoPb 95 produced 106.4 t/ha cane, which is 20.71% greater than CoPb 92 and 11.86% higher than Co 238. CoPb 95 yielded 11.25 t/ha of commercial cane sugar (CCS t/ha), which was 4.71% greater than CoPb 92 (10.67 t/ha) and 6.87% higher than Co 238 (10.39 t/ha) in terms of sugar production. CoPb 95, as an

early maturing variety, has 14.96% sucrose, 85.56% purity, and 10.19% CCS at 8 months, and 17.11% sucrose, 89.58% purity, and 11.88% CCS after 10 months.

The seed cane rate of 6000 buds/acre with 90 cm row-to-row spacing was found to be better for CoPb 95 in agronomic testing. In comparison to 150 kg/ha of nitrogen (127.2 t/ha), a nitrogen dose of 187.5 kg/ha generated 129.7 t/ha of cane. CoPb 95 was disease-free in the field,



A, CoPb 95 in farmer's field; B, sugar mill official and farmer in CoPb 95 field; C, CoPb 95 in research trials; D, Breeder seed plot of CoPb 95 at Regional Research Station, Kapurthala and; E, Crop cutting experiment of CoPb 95 at farmers' field

Success story

The early adopters of this variety have many success stories with respect to its production and planting experience. A progressive farmer from command area of Cooperative Sugar Mill, district Fazilka, Mr. Dhiraj Kumar planted CoPb 95 with few canes in his farm. Due to performance of this variety in his field, he has planted 20 acres under this variety. According to him, this variety does not lodge and has marked it as an excellent variety for sugarcane growers. Another farmer from command area of Cooperative Sugar Mill, district Nakodar, Jalandhar, Sardar Lakmir Singh planted CoPb 95 on more than 10 acre and got cane yield of more 600 q/acre. Similarly, Sardar Baldev Singh from command area of Cooperative Sugar Mill, district Ajnala, Amritsar is successfully cultivating CoPb 95 and considers this variety a boon for the farmers.

Table 2. Comparative field performance of sugarcane ratoon cultivars during 2020–21 at Regional Research Station, Kapurthala, Punjab

Cultivar	Brix (°)	Pol (%)	Purity (%)	Extraction (%)	CCS (%)	Yield (t/ha)	CSS (t/ha)
CoPb 95	17.87	17.2	96.25	54.46	12.36	89.13	11.02
Co 238	18.17	17.3	96.21	54.91	12.37	80.50	9.96

CSS, Commercial sugarcane sugar; CCS, Commercial cane sugar.

recommended N dose was applied (Table 2).

CoPb 95 has better performance as compared to the other generally prevailing cultivars. Comparing the above facts, CoPb 95 was already released in the state of Punjab for improving the livelihoods of cane growers of Punjab in the year 2021. In a short period, farmers frequently are demanding for its seed due to its better performance and resistance to insect pests and disease attacks.

Economics

The average cane yield of the Punjab state is 82.2 t/ha. While the average cane yield of this variety is more than 100 t/ha, if this variety is

adopted the average cane yield of state will increase. As per current cane price in Punjab (₹380/q), the gross income from per hectare of sugarcane is ₹3,12,360. If farmers will adopt CoPb 95, their gross income will be ₹4,03,750/ha. This will help in increasing the farm income of sugarcane growers of the state.

SUMMARY

To summarize, CoPb 95 is a high-yielding, early-maturing cultivar suitable for sugar mills of Punjab. The short running span of state sugar mills has created a huge demand among sugarcane growers for early variety. The previously

released sugarcane varieties in early group in state ranged from 75–84 t/ha for average cane yield where CoPb 95 has significant edge for cane yield (106 t/ha). In the current situation, where the popular variety Co 238 has become prone to red rot in the state and needs to be replaced, CoPb 95 is a good alternative for sugarcane growers in the state of Punjab. Farmers prefer its seed due to its early maturing, high yield, and high quality coupled with lesser attacks by insect pests and diseases. The average cane yield of the Punjab state was 82.2 t/ha in 2021–22 and this variety has potential to increase the average cane yield of state. This variety can help to increase the farm income of sugarcane growers and ultimately sugar industry of the state.

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