Proceedings STAI, Sugarcane Agriculture
Vol. 82 (2024) : 75-80 doi: 10.69794/82SAC/978-81-969264-0-3/75-80

Performance Assessment of Potential Sugarcane Varieties in Mawana Sugars Ltd. Command Area During 2022-23 and 2023-24

Roop Lal Regar*[1], Abhishek Srivastava[2] and S.P. Singh[3]
[1]Asst. GM (Cane) – Nanglamal Sugar Complex, Nanglamal;
[2]General Manager – Cane, Mawana Sugars Limited
[3]Dy.GM (Cane) – Mawana Sugar Works, Mawana

Received : June 14 2024; Accepted : June 23, 2024

ABSTRACT

The study was conducted in the command area of Mawana Sugars Limited (MSL) units – Mawana Sugar Works (MSW) and Nanglamal Sugar Complex (NSC) in Meerut, Uttar Pradesh, India. Performance of sugarcane varieties, Co 15023, Co 0118, and Co Lk14201 was evaluated in comparison to Co 0238. The assessment encompassed various growth and yield parameters over the cropping seasons of 2022-23 and 2023-24. Notably, Co 15023 exhibited the highest average sucrose content of 12.91 % (ratoon and plant), while in Co 0118 and CoLk 14201, it was 12.64 and 12.46% respectively. The variety Co 15023 had average cane weight 0.86 kg. However, its softer nature and lodging tendency,losses by wild animal attacks, poses a challenge. Strategies to mitigate such vulnerabilities, including expanding cultivation across more fields, should be explored to optimize its potential. Co 0118 demonstrated a consistent sucrose content of 12.64 % and a good yield of 81.25 tons (average ratoon+plant) per hectare. CoLk 14201 displayed the highest number of millable canes but had lower yield and cane weight. Co 0238 emerged as the top performer in yield but exhibited more susceptibility to red rot disease, therefore, the area under cultivation of variety Co 0238 should be minimized. The study suggested that cultivation of Co 0118 is advisable under current circumstances because the yield and recovery in Co 0118 is better than Co 0238. Although, Co 0118 is performing better, it would be important to avoid monoculture and thus the varieties Co 15023 and CoLk 14201 is required to increase in the area

Keywords: Sugarcane, variety evaluation, Co 15023, Co 0118, CoLk 14201, Co 0238, red rot, top bore, pol in cane, millable cane.

INTRODUCTION

Sugarcane is one of the most important economic crop in India. It contributes to the agricultural sector as well as the overall economy of the country. Indian sugar industry is an important agro-based industry that impacts the rural livelihood of about 50 million sugarcane farmers and around 5 lakh workers directly employed in sugar mills. India is the world's second-biggest producer of sugarcane, beh-ind Brazil. The principal growing areas for sugarcane include the states of Maharashtra, Uttar Pradesh, Karnataka, Tamil Nadu and Andhra Pradesh. Over 5.95 million hectares of land is used to cultivate sugarcane in India, with 2.90 million hectares in Uttar Pradesh. *(https://www.atlasbig.com/en-in/countries-by-sugarcane-production).*

The Mawana Sugars Limited is one of the larger sugar producing company in India and has been in operation since last about 75 years *(https://www.mawanasugars.com, 2024).* The two sugar producing units of MSL are located in the lush cane-growing region of West Uttar Pradesh. These units are located in Mawana and Nanglamal in District, Meerut. In Mawana Sugars Limited, there is an overall 63731 ha.area under sugarcane cultivation. The company has a total installed capacity of 19,000 TCD and a 120 KLPD distillery.

*Corresponding Author email: rooplalregar@mawanasugars.com

The popular cane variety of Uttar Pradesh Co 0238 has now become susceptible to red rot disease, therefore it is necessary to reduce the area of Co 0238 and replace the area with other promising varieties.

In view of the afore mentioned challenges, Mawana and Nanglamal are conducting studies and experiments to sustain the productivity and quality of sugarcane varieties. As part of this ongoing effort, our study focussed on a comprehensive assessment of sugarcane varieties: Co 15023, Co 0118, and CoLk 14201, in comparison to Co 0238. The focus was on evaluating their growth and yield parameters within the operational domains of Mawana and Nanglamal sugar units.

MATERIALS AND METHOD

The field study were conducted to observe the performance of cane varieties Co 15023, Co 0118, CoLk 14201 against Co 0238 in MSL command area in Units: Mawana and Nanglamal during cropping season 2022-23 and 2023-24. In this study, farmer fields were selected with 5 ratoon plots and 5 plant plots for each variety within both MSL units. The total of 20 ratoon plots and 20 plant plots were selected every year under the study, where the observation were recorded. In the demo fields, the fertilizer has been applied according to the state recommendation dose (N-180, P-80, K-60) for sugarcane cultivation.

The data were collected on various parameters, including the number of millable cane per unit area, plant height, internode thickness, average cane weight, yield per hectare, and pol in cane. These parameters were analysed to compare the performance of the varieties.

The evaluation centered on the following key parameters:

Millable cane per hectare

The number of mature and harvestable sugarcane stalks was counted for determining yield and productivity. This metric provided an estimate of the potential yield of a given field, enabling farmers to predict harvest quantities and make informed decisions about crop management and resource allocation. (Srinivasan and Glaz, 2000).

Plant height

Measuring the vertical stature of the sugarcane plants was done which indicates their overall growth and development. Taller plants typically reflect good health and vigorous growth conditions, which are essential for achieving high yields (Madhu Bindu et al. 2015). Plant height is an important indicator of the effectiveness of agricultural practices and environmental conditions.

Internode thickness (Girth)

Evaluating the diameter or girth of the sugarcane stems was done which influences sugar content and yield potential. Thicker internodes generally suggest a higher capacity for storing sugars, thus directly impacting the quality and quantity of the harvested cane (Lingle et al. 2012). This trait is vital for selecting and breeding varieties with superior sugar content.

Average cane weight

The average weight of individual sugarcane stalks was calculated by weighing a representative sample of canes. This measure is crucial for determining yield and productivity, as heavier canes typically contain more juice and sugar (Yousif et al. 2021). Average cane weight helps in assessing the overall performance of the crop and in making comparisons between different varieties or growing conditions.

Yield per hectare

The amount of sugarcane harvested per unit area was counted which reflects the efficiency and productivity of the varieties. Yield per hectare is a comprehensive measure that considers the number of stalks, their size, and weight, providing an overall assessment of how well a sugarcane variety performs under specific growing conditions (James, 2004).

Pol in cane

The concentration of sucrose in the sugarcane juice was determined. This is a critical factor for assessing the quality and commercial value of the crop. Pol in cane indicates the percentage of pure sucrose and is used to evaluate the economic worth of the harvested cane. Higher sucrose content translates to better profitability and marketability of sugarcane (Sulaiman et al. 2015).

To ensure comprehensive analysis, data from two ratoon crops and two plant crops were aggregated for each variety within both MSW and NSC regions.

Subsequently, the collected data was organized into tabular formats for meticulous scrutiny and interpretation.

RESULTS AND DISCUSSION

The demo was conducted to study the comparative performance of Co 15023, Co 0118 and CoLk 14201, In comparison to Co 0238.

Table 1 : Ratoon - pooled data of pol in cane, cane yield, millable cane and other growth parameters of two ratoon crops trials (2022-23 and 2023-24) of existing and new cane varieties in Mawana Sugars Limited units - Mawana and Nanglamal command area

Sr. No	Variety	Average Pol in Cane % (Lab Crusher)			Avg. Pol in Cane %	Avg. Yield Tons/Ha.	Millable cane per Hect. x 000	Height Avg. (C.M)	Girth of Intern odes Avg. (C.M)	Avg. weight of per cane (KG.)
		Nov.	Dec	Jan						
1	Co 15023	12.14	12.57	13.07	12.59	73.50	81.64	254.85	3.04	0.90
2	Co 0118	11.85	12.26	12.49	12.20	79.81	93.13	267.81	3.03	0.86
3	CoLk 14201	11.43	12.35	12.49	12.09	66.23	105.68	248.44	2.71	0.63
4	Co 0238	11.66	12.16	12.58	12.14	93.96	105.51	279.31	2.93	0.89

Note: The average Pol in cane data shown in the above table is based on lab crusher analysis, therefore these Pol in cane figures are only indicative. However, the actual average Pol in cane of the MSL units in ratoon crop is 12.03%, 12.94% and 12.99% respectively in month November, December and January with average Pol in cane 12.70%

(Table 1) represents a summary of the pooled data from two ratoon crops demo (2022-23 and 2023-24) conducted by Mawana Sugars Limited in the Mawana and Nanglamal command areas. It includes comparisons of three sugarcane varieties Co 15023, Co 0118, CoLk 14201 with Co 0238 based on their performance across several agronomic and quality parameters. Co 15023 exhibited the highest average sucrose content, peaking at 13.07% in January and averaging 12.59% overall, along with the heaviest average cane weight at 0.90 kg and the thickest internodes at 3.04 cm. Co 0118 maintained a consistent average sucrose content of 12.20% and demonstrated a good yield of 79.81 tons per hectare with a significant millable cane count of 93.13 thousand per hectare. CoLk 14201 had the highest number of millable canes at 105.68 thousand per hectare but showed a lower average yield of 66.23 tons per hectare and the lowest cane weight at 0.63 kg. Co 0238 stood out with the highest yield of 93.96 tons per hectare, the tallest plants averaging 279.31 cm, and a moderate average sucrose content of 12.14%. Overall, Co 0238 excelled in yield and plant height, Co 15023 in sucrose content and cane weight, and CoLk 14201 in millable cane count but with lower yield and cane weight. Co 0118 demonstrated balanced performance across the evaluated parameters.

Table 2 : Plant - pooled data of pol in cane, cane yield, millable cane and other growth parameters of two ratoon crops trials (2022-23 and 2023-24) of existing and new cane varieties in Mawana Sugars Ltd. units - Mawana and Nanglamal command area.

Sr. No	Variety	Average Pol in Cane % (Lab Crusher)			Avg. Pol in Cane %	Avg. Yield Tons/Ha.	Millable cane per Hect. x 000	Height Avg. (C.M)	Girth of Intern odes Avg. (C.M)	Avg. weight of per cane (KG.)
		Nov.	Dec	Jan						
1	Co 15023	12.92	13.26	13.50	13.23	78.62	94.73	253.32	2.89	0.83
2	Co 0118	12.71	13.40	13.15	13.09	82.69	94.70	248.04	2.91	0.87
3	CoLk 14201	12.41	12.99	13.12	12.84	65.83	101.48	231.26	2.65	0.65
4	Co 0238	12.60	13.20	13.27	13.02	91.88	101.15	254.47	2.81	0.91

Note: The average Pol in cane data shown in the above table is based on lab crusher analysis, therefore these Pol in cane figures are only indicative. However, the actual average Pol in cane of the MSL units in Plant crop is 13.49%, 14.15% and 14.07% respectively in the month of February, March and April with average Pol in cane 13.90%.

The results presented in (Table 2) revealed a summary of the pooled data from two plant crops demo (2022-23 and 2023-24) conducted by Mawana Sugars Limited in the Mawana and Nanglamal command areas. Variety Co 15023 exhibited the highest average Pol in cane at 13.23%, with a peak of 13.50% in April, and had a yield of 78.62 tons per hectare and a millable cane count of 94.73 thousand per hectare. Co 0118 had a similar high sucrose content averaging 13.09%, the highest yield at 82.69 tons per hectare, and a millable cane count of 94.70 thousand per hectare. CoLk 14201 showed lower average Pol in cane at 12.84%, a yield of 65.83 tons per hectare, but the highest millable cane count at 101.48 thousand per hectare. Co 0238 had a high sucrose content averaging 13.02%, the highest yield at 91.88 tons per hectare, and a millable cane count of 101.15 thousand per hectare. Overall, Co 0238 excelled in yield and cane weight, Co 15023 and Co 0118 in sucrose content, while CoLk 14201 had the highest millable cane count but lower yield and cane weight.

The results of performance of three sugarcane varieties Co 15023, Co 0118, CoLk 14201 with Co 0238 are discussed herein:

1. Co 0238 emerged as the top performer in terms of yield i.e., 93.96 Mt in ratoon and 91.88 Mt in plant, with Co 0118 following closely behind (i.e., 79.81 Mt and 82.89 Mt in ratoon and plant respectively), trailed by Co 15023 (i.e., 73.50 Mt and 78.62 Mt in ratoon and plant respectively) and CoLk 14201 (i.e., 66.23 Mt and 65.83 Mt in ratoon and plant respectively). However, it is crucial to note that Co-0238 exhibited maximum susceptibility to red rot disease. (Figure 1) average two years cane yield ratoon and plant – MT./ha.)

2. Co 15023 has highest Pol in cane *i.e.,* 12.59% and 13.23% in ratoon and plant respectively. It is followed by Co 0118 (*i.e.*, 12.20% and 13.09% in ratoon and plant respectively), Co 0238 (*i.e.*, 12.14% and 13.02% in ratoon and plant respectively) and CoLk 14201 (i.e., 12.09% and 12.84% in ratoon and plant respectively) (Figure 2 : average (two years) pol in cane % ratoon and plant).

3. The vulnerability of Co 15023 to attacks by wild animals was noticed due to its softer nature. Consequently, further analysis of this variety is required. Expanding the number of fields in the region may mitigate the impact of wild animal attacks.

These findings highlight the comparative performance and inherent characteristics of the sugarcane varieties, providing valuable insights for agricultural practices and future research endeavors.

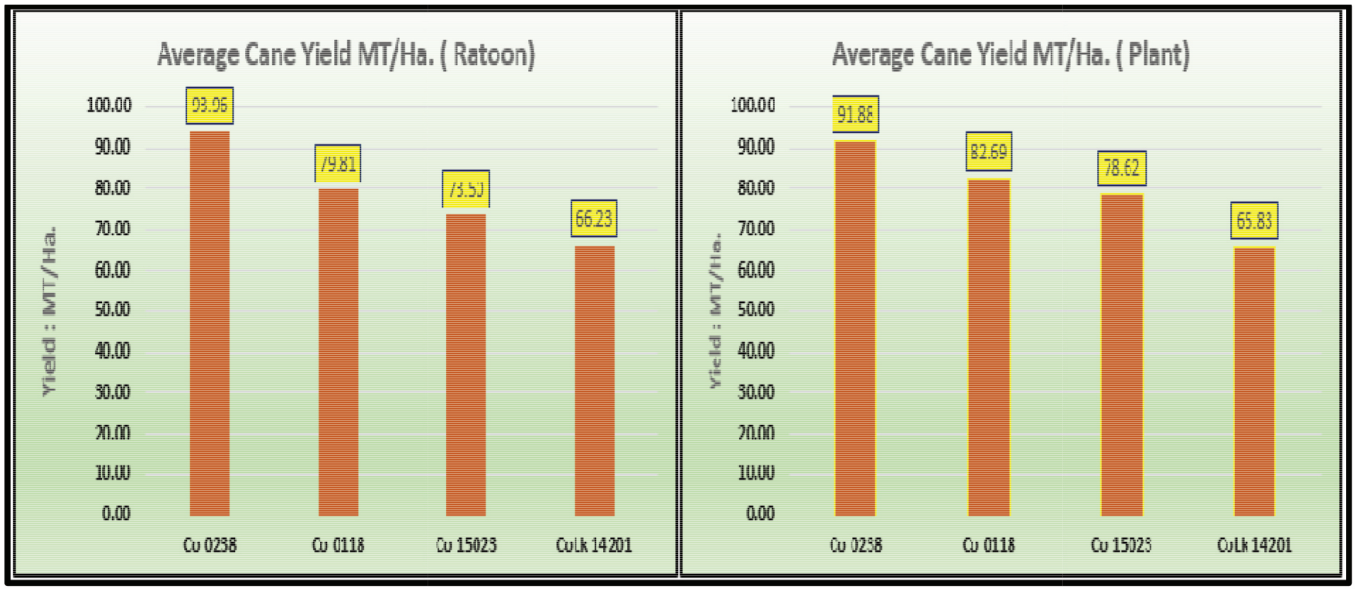

Figure 1 : Average (Two Years) Cane Yield Ratoon and Plant – MT./Ha.

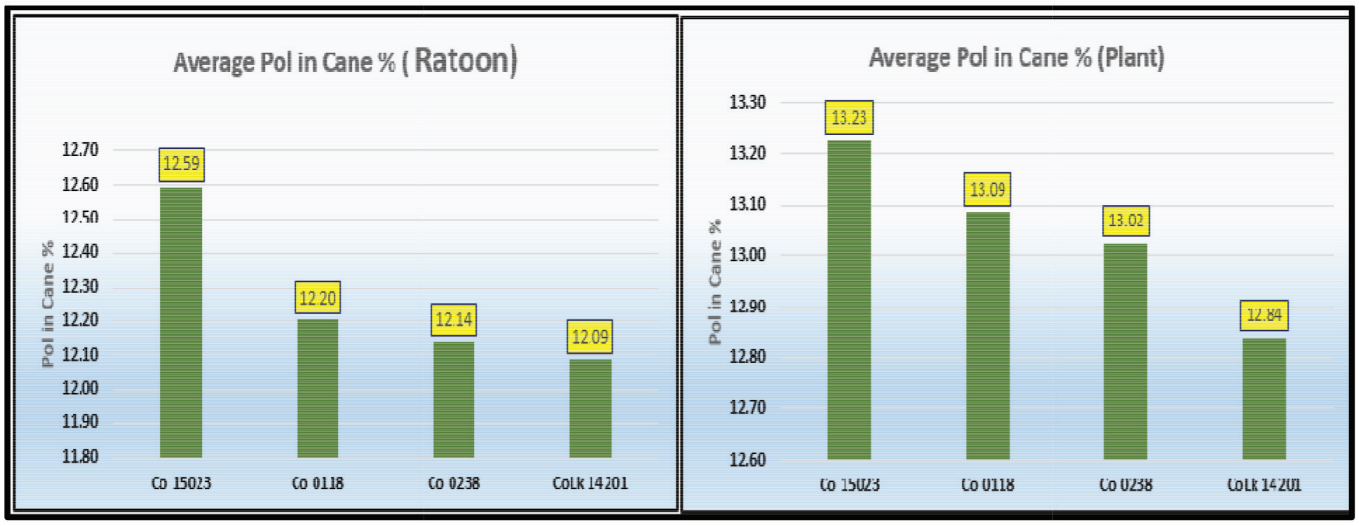

Figure 2 : Average (Two Years) Pol in Cane % Ratoon and Plant

CONCLUSION

Although the Co 0238 is better in all parameters of yield in comparison to Co 0118, Co 15023 and CoLk 14201. But due to high susceptibility to red rot disease, this is right time to replace this in phase manner with other promising varieties. The data obtained from this study suggested that the variety Co 0118 is best substitute for Co 0238 followed by Co 15023 and CoLk 14201. Hence, it is suggested on the basis of this study that avoid monoculture of the any single variety in any sugar factory area.

ACKNOWLEDGEMENT

We would like to express our gratitude to Mawana Sugars Limited's management, staff, and the farmers in Mawana and Nanglamal for their assistance and co-operation in conducting the field demonstrations of comparative varietal performance of Co 15023, Co 0118, CoLk 14201 against Co 0238 in Mawana Sugars Limited command area during season 2022-23 and 2023-24.

REFERENCES

James, N.I. (2004).Evaluating yield potential in sugarcane cultivars. *Journal Agricultural Systems,* 82 : 215-231.

Lingle, S.E. and Thomson, J.L. (2012). Sugarcane internode composition during crop development, *Bio Energy Research,* 5 (1) : 168-178.

MadhuBindu, G.S., Vijay Kumar, M., Suresh, K. and Chiranjeevi, K. (2015). Performance of sugarcane under different plant spacing and irrigation methods. *Annals of Plant and Soil Research*, 17 (Special Issue):66-68.

Srinivasan, R., and Glaz, B. (2000) 'Assessing the productivity of millable cane in sugarcane breeding trials'. *Crop Science* 40(6): 1527-1536.

Sulaiman, M., Abdulsalam, Z. and Damisa, M.A. (2015). Profitability of sugarcane production and its contribution to farm income of farmers in Kaduna State, Nigeria. *Asian Journal of Agricultural Extension, Economics and Sociology,* 7(2) : 1-9.

Yousif, E.M.M., Grad, W.E. and EL-Bakry, A. (2021). Impact of nitrogen fertilization on yield and quality for plant cane, ratoon crop and correlation analyses of some sugarcane varieties, *Direct Research Journal of Agriculture and Food Science,* (9) : 121-136.

https://www.atlasbig.com/en-in/countries-by-sugarcane-production, Last accessed on 20.06.2024.

https://www.mawanasugars.com, Last accessed on 20.06.2024.