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New high-yielding
sugarcane varieties for north-west zone

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Sugarcane is the primary source of sugar in India and serves as the main cash crop. It is cultivated in both tropical and sub-tropical regions across the country. The Northwest zone, which includes areas in Haryana, Punjab, Rajasthan, Uttarakhand plains, and western to central UP, is particularly notable for its sugarcane production. The key to enhancing the productivity and overall production of sugarcane lies in the adoption of new varieties and the replacement of seeds. In this context, various newly developed sugarcane varieties are good replacements for wonder cane Co 238, which has become susceptible to red rot disease. These sugarcane varieties are typically categorized into two groups based on their maturation period: early and mid-late. Their classification is dependent on their ability to attain 16% sucrose and 85% purity at either the 10-month or 12-month stage. Consequently, farmers are keen to know about new varieties for cultivation; hence, information on the characteristic features of these varieties is vital for popularizing these varieties.

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SUGARCANE (*Saccharum* sp. complex) is the primary source of sugar in India. It has a prominent position in the Indian agricultural scenario due to its widespread adoption in the various agro-climatic conditions of the country. India is the world's second-largest sugarcane producer, which occupies a 49.18 lakh hectare area of the country. Sugar is India's second largest industry after cotton textiles, accounting for approximately 6% of agricultural GDP. It has been observed that in south India, sugarcane growers have achieved a cane yield of around 175 t/ha by adopting good agronomic practices, whereas in subtropical India, it is about 100 to 125 t/ha. So, there are still opportunities to increase sugarcane productivity in both regions as well. In sub-tropical regions, the extremes of the climate are the characteristic feature. Because of extremes of weather, active sugarcane growth is restricted to 4-5 months only. The five agro-climatic zones were identified primarily for varietal development. They are North Western Zone, North Central Zone, North Eastern Zone, Peninsular Zone, and Coastal Zone. The major part of the Northwest zone comprising the areas in Haryana, Punjab, Rajasthan, Uttarakhand plains and western to central Uttar Pradesh, faces very low temperature in December and January, which frequently causes frost injury. To significantly increase yield and overall income, a farmer must carefully select sugarcane varieties that are adapted to subtropical extreme environmental conditions. Several suitable varieties have been developed and are continuously being developed as a result of the concerted efforts under the All India Coordinated Research Project(s) on Sugarcane, which is booming the sugarcane-based agro-industry in Northwest India. As a result, they must be popularised, and farmers must be made aware of these varieties. At the moment, the following new varieties have been developed and recommended for India's North Western region, including Uttarakhand.

Early varieties

CoLk 11203 (Ikshu-5)

This variety was released in 2018 under the early maturing group for cultivation in the North Western Zone of the country. It was developed by ICAR-IISR, Lucknow through selection from segregating population of biparental cross CoLk 8102 x Co 1148. The variety exhibited excellent performance with 18.41% sucrose during January (10 months) which qualifies for the early maturing character in this crop. The cane yield of this variety was 81.97 t/ha and 10.52 t/ha CCS yield. The features of variety are erect, medium thick canes and medium plant height. Ikshu-5 is a good ratooner, with an approximately 27% increase in cane yield over the standard check CoJ 64 in the ratoon crop. This is an added advantage as

the ratoon crop constitutes around 50% of the total sugarcane acreage in the country. The variety is resistant to red rot and smut disease. This variety also showed the least susceptibility to the major pests like top borer, stalk borer and other borers. Overall, this variety is a good addition to the existing spectrum of sugarcane varieties for commercial cultivation in farmers' fields in the north western zone of India.

Co Pant 12221

Co Pant 12221 is an early maturing sugarcane variety that was developed by Govind Ballabh Pant University of Agriculture and Technology, Pantnagar from the progeny of general collection CoS8436GC collected from N.H.G., Sugarcane Breeding Institute, Coimbatore. This variety exhibits high-sugared, high-yielding, non-lodging, disease resistance and is suitable for irrigated conditions. This variety has been released by SVRC in 2021 for cultivation in Uttarakhand. Co Pant 12221 has a higher sugar yield and cane yield per hectare with at par sugar content than checks CoJ 64 and Co 0238 along with moderate resistance against red rot and smut. Because of the heavy incidence of red rot in Co 0238, variety Co Pant 12221 is a good alternative for farmers. It has given 131.73 t/ha cane yield, 17.98 t/ha commercial cane sugar (CCS) yield and 17.84% sucrose content at 10 months. The variety has excellent field habits like erectness, smooth rind surface, absence of pithiness, and free from splits on the internode.

Co 15023 (Karan-15)

This variety has been developed by ICAR-SBI Regional Centre, Karnal (Haryana). It is an early maturing clone and was released by the CVRC in 2021 for North West Zone. The variety recorded 89.17 t/ha cane yield, 19.41% sucrose in juice and 12.16 t/ha CCS yield. This variety exhibited moderate resistance (MR) for red rot.

CoS 13235

This variety has been developed by UP Council of Sugarcane Research, Shahjahanpur in the early maturing group and released in 2020 for North West Zone. It was developed by clonal selection from the cross MS 6487 and *Co 1148*. Average cane yield is 81-92 t/ha and 11.55 t/ha CCS yield. The straight, thick, and yellowish-green colour are the characteristic features of this variety. The variety exhibits good ratooning ability and is moderately resistant to red rot. So, CoS 13235 variety is supposed to be a good replacement of Co 238 due to its resistance to red rot and high yield than its counterpart.

CoLk 14201 (Ikshu-10)

Another early maturing sugarcane variety, CoLk 14201 (Ikshu-10) was developed by ICAR-IISR, Lucknow and released by CVRC in 2021 for North West Zone. This variety produces 81.99 t/ha cane yield, 10.55 t/ha CCS yield, and 18.67% sucrose at harvest. The cane diameter (2.55 cm) and cane height (217 cm) with small internodes. Resistant to smut, moderately resistant red rot and also exhibit water logging tolerance. This variety is also identified as a good replacement of Co 238 due to high- yield and resistance to red rot disease.

Mid-late varieties

CoLk 11206 (Ikshu-4)

This variety was developed by ICAR-IISR, Lucknow in 2018 under mid-late group for North West Zone. It was developed by segregating progenies of cross Co Pant 90223 x Co 62198. The variety showed excellent performance in this zone with 91.50 t/ha cane yield, 11.20 t/ha CCS yield and 17.65% sucrose in juice. The cane is medium thick and yellow-green in colour. The top is green and the leaves are straight and circular in front. It is moderately resistant to red rot disease and also tolerant to lodging conditions. This variety is suitable for multiple ratooning with the lush green top at maturity. This provides additional benefits to the farmer in the form of green fodder during the late crushing season.

Co Pant 12226

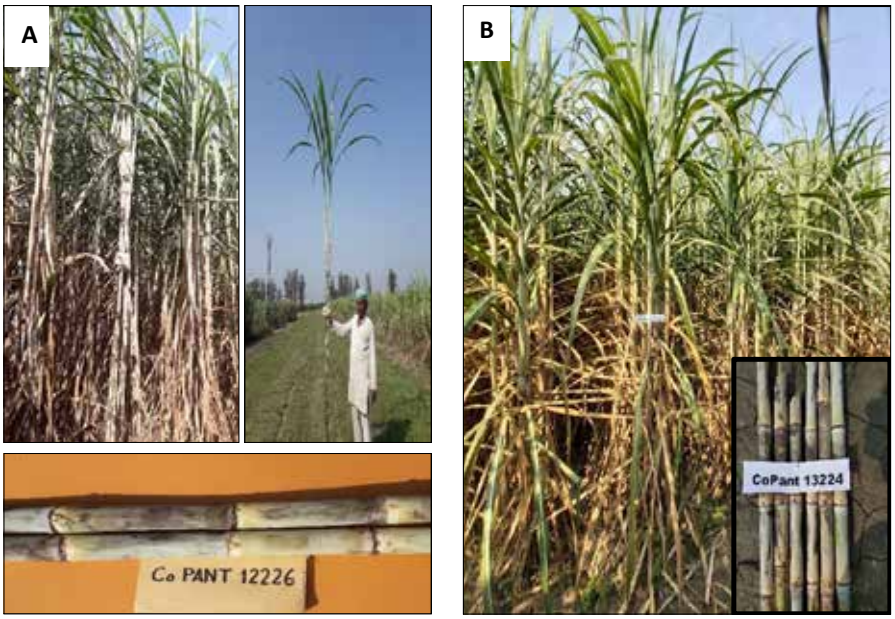
Co Pant 12226 is a mid-late maturing variety that was developed from the cross Co 1158 x Co Pant 90223 made at N.H.G., Sugarcane Breeding Institute, Coimbatore and evaluated at G. B. Pant University of Agriculture and Technology, Pantnagar. The proposed variety recorded 127.56 t/ha cane yield, 17.44 t/ha CCS yield and 19.42% sucrose. It showed moderate resistance against red rot and smut disease. Co Pant 12226 was released by SVRC in 2021 for cultivation in Uttarakhand and recommended for irrigated conditions. This variety exhibits desirable features i.e., erect, tall, non-lodging, non-flowering and absence of pithiness and splits on internodes.

Co Pant 13224

Co Pant 13224 is a mid-late maturing sugarcane variety released by SVRC in 2021 for cultivation in Uttarakhand. This clone was developed through selection from the progenies of the cross Co 1158 x Co Pant 90223. Co Pant 13224 has inherited good juice quality and yield characteristics from its parent, which are high-yielding varieties of the mid-late maturity group in North-west Zone. It exhibited 97.89 t/ha cane yield, 17.33 t/ha CCS yield and 19.90% sucrose. This variety is moderately resistant to red rot and resistant against smut disease. With good ratooning ability, it will be a good alternative for the farmers of Uttarakhand. This variety exhibits desirable features i.e., erect, high number of millable canes, non-lodging, non-flowering and absence of pithiness and splits on internodes. This clone was recommended for the irrigated condition.

CoLk 14204 (Ikshu-8)

This variety has been developed by ICAR-IISR, Lucknow in mid-late group and released in 2021 for North West Zone i.e. for Punjab, Haryana, Uttarakhand, Rajasthan, Central and Western Part of Uttar Pradesh. This variety was developed by crossing between CoLk 8102 and CoSe 92423 in N.H.G., Sugarcane Breeding Institute, Coimbatore, followed



Co Pant 12226 (A) and Co Pant 13224 (B) Mid-late maturing sugarcane varieties.

by clonal selection. The variety recorded 92.73 t/ha cane yield, 11.39 t/ha CCS yield and 17.73% sucrose in juice. The clone showed moderate disease resistance against red rot.

CoPb 14185 (CoPb 98)

This variety has been developed by PAU RS, Faridkot in the mid-late group and released in 2021 for North West Zone. It was developed by clonal selection from the poly cross (PC) progenies of CoS 8436. The cane yield of CoPb 14185 was 88.99 t/h, 18.50% sucrose in juice and 11.58 t/ha CCS yield. The distinguishing characteristics of the variety are medium thick whitish-yellow green cylindrical cane (i.e. ~210.50 cm length, ~2.44 cm diameter), with pentagonal bud, curved leaf canopy, purple dewlap, incipient auricle and deltoid ligule. The variety has high sugar potential and is very responsive to fertilizers and irrigation without lodging. It showed moderate resistance against red rot disease. As a result, it is expected that this will improve sugar recovery and cane productivity of the nation.

SUMMARY

The newly developed sugarcane varieties for the North-west zone by different research institutes and SAUs exhibit high yield as well as resistance to biotic and abiotic stress. The recently released early maturing sugarcane varieties for this zone, such as CoLk 11203, Co Pant 12221, Co 15023, CoS 13235, and CoLk 14201, along with the mid-late maturing varieties CoLk 11206, Co Pant 12226, Co Pant 13224, CoLk 14204, and CoPb 14185, exhibit resistance to red rot disease of sugarcane. Therefore, these varieties serve as good replacements for Co 238 against this highly destructive sugarcane disease. Moreover, the majority of the described varieties also exhibit resistance to smut disease and tolerance to lodging conditions. The mid-late maturing variety CoLk 11206 is suitable for multiple ratooning and also for producing green fodder. Hence, in the extreme climatic conditions of sub-tropical India, these varieties can provide significant benefits to the sugarcane-growing farmers.

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