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Sanjay Kumar
Junior Research Office, Sugarcane Research Centre, Bazpur road, Kashipur G.B.P.U.A. &T., Uttarakhand, India

Sidharth Kashyap
Scientific Officer, Sugarcane Research Centre, Bazpur road, Kashipur-244713, G.B.P.U.A. &T., Uttarakhand, India

Shailbala
Junior Research Office, Sugarcane Research Centre, Bazpur road, Kashipur-244713, G.B.P.U.A. &T., Uttarakhand, India

VK Tyagi
Joint Director, Sugarcane Research Centre, Bazpur road, Kashipur-244713, G.B.P.U.A. &T, Uttarakhand, India

Mahavir Singh
Assistant Professor, KVK, Saharanpur, Sugarcane Research Centre, Bazpur road, Kashipur-244713, G.B.P.U.A. &T., Uttarakhand, India

Correspondence
Sanjay Kumar
Junior Research Office, Sugarcane Research Centre, Bazpur road, Kashipur G.B.P.U.A. &T., Uttarakhand, India

Technological options to enhance sugarcane production in plains of Uttarakhand

Sanjay Kumar, Sidharth Kashyap, Shailbala, VK Tyagi and Mahavir Singh

Abstract
Sugarcane agriculture is the largest livelihood provider in the rural plain areas in Uttarakhand. It has lower productivity of sugarcane (60.5 & 64.6 mt/ha) than the national productivity (70.0 & 68.2 mt/ha) during 2016-17 & 2017-18*. Among causes of low productivity are rejected cane varieties, delayed planting, water logging and unawareness against ratoon management etc. Technological options is to be given to boost cane productivity and recovery up to 100.0 mt/ha & 12.5% respectively through adoption of newly released early high yielding varieties, improved planting methods, INM and use of bio-fertilizer. With the help of different technological options there was vast increase in sugarcane production (6269 -7235 thousand mt) and productivity (57.4 -64.6 mt/ha) during last five years in Uttarakhand. Keeping all these facts in view, there is a need to improve cane yield & recovery through available and new technological options.

Keywords: Sugarcane productivity, recovery, INM, planting methods, mono-cropping

Introduction
Sugarcane (*Saccharum officinarum L.*), is one of the most important cash crop covering an area of eighty-four thousand hectare in Uttarakhand. The average productivity of sugarcane is lower (60.5 & 64.6 mt/ha) than the national productivity (70.0 & 68.2 mt/ha) during 2016-17 & 2017-18*. The soil of plains of Uttarakhand (Haridwar and Udham Singh Nagar and some part of Dehradun and Nanital districts) are characterized as young with remarkable content of organic matter, medium to heavy imperfectly to moderately well drained, dark coloured with organic matter. At present state had seven factories out of which three situated in U.S. Nagar, three in Haridwar and one in Dehradun with the total crushing capacity is 34250 TCD and sugar recovery is 9.98% while sugar production is 40.8 lakh metric tonnes during 2017-18*.

Materials and Methods
Present work was undertaken to study the sugarcane production & productivity in Uttarakhand during the last five years. Also data of cane crushed & sugar production was obtained from the different sugar mill which is situated in Uttarakhand. The main aim of the study was to investigate the impact of different technology on sugarcane production, productivity and recovery. To investigate it included detailed questions from farmers/ cane development staff/ sugar industries. During this study we had investigated different type of problems and challenges faced by sugarcane growers, sugarcane industries and personal who are engaged in disseminating technological advances.

Major problems related to the sugarcane production in state are late planting, monoculture of sugarcane, improper varietal balance, unbalanced use of fertilizer, pest and disease build up, poor crop rotation management, poor ratoon management, insufficient credit facilities and marketing problems. The major diseases evident from reports are grassy shoots, pokkha-boeing, smut, leaf spot, leaf scald and red-rot. Among the pests early shoot borer in the late planted crops is considerably serious problem. Productivity of the soil has come down and management concerns like physical, chemical, and biological degradation and declining carbon content are also becoming increasing relevant. Mono-cropping of sugarcane for several decades have depleted the soil fertility considerably. Out of total cane area about 50% area is under ratoon crop. In recent years mid-late varieties area has decreased (52%) whereas early varieties area increasing at optimal rate (44%) and 4% under other varieties of cane.

Results and Discussion
It can be observed from the data in table-1, which the sugarcane productivity during last five year showing good improvement where as sugarcane area and production is increasing during

the current year. The data given in table-2 reflected that the cane crushed is increasing (350.6 to 402.64 lakh metric tonnes), sugar production (34.55 to 40.79 lakh metric tonnes) and recovery (9.64 to 9.98%) respectively during the last two years. Major challenges in sugarcane production in state can be overcome by more intelligent fertilizing, elimination of certain cane diseases and pests, better control of weeds, introduction of legumes, diversified cropping system, mechanization etc. Improved cultural practices, credit facilities and cane payments may transform a major portion of sugarcane area.

There has been ample scope to increase productivity up to 100.0 mt/ha and sugar recovery of 12.5% in the state. It can be increase by early planting strategy to cover the area as well as diversification of it. Management practice adopted for increased fertilizer use efficiency. Emphasis of cultural practices is to promoting planting strategy to cover about 25% of the reserved area in October. In Haridwar and Doiwala & Vikas nagar belt of Dehradun delayed planting of sugarcane after harvesting of wheat crop should be avoided. Integrated pest and disease management help to increase production. Fifty percent of ratoon should be maintained. Diversification of sugarcane based cropping system help in production. Timely payment has boost farmers to increase area. As far as recovery is concerned, reduction in transport and post harvest losses as well as latest technology in sugar mill plant will help to increase the sugar recovery. Harvesting of crop on maturity basis and planting of special purpose varieties for localized condition will enhanced sugar production. Adoption of 60% early varieties in the mill area and promotion of autumn planting will boost the recovery. Hence, the challenge is to meet sugarcane production with economic viability to the factory and profitability to the farmers.

Conclusion

It was concluded that the area of the sugarcane production and recovery increasing gradually. It was evident from the study that low productivity is due to rejected cane varieties, delayed planting, water logging and unawareness against ratoon management etc. Technological options is to be given to boost cane productivity and recovery up to 100.0 mt/ha & 12.5% respectively through adoption of newly released early high yielding varieties, improved planting methods, INM and use of bio-fertilizer. There is an urgent need to improve cane yield & recovery through available and new technological options.

Table 1: Cane Area, Production, Recovery, Cane crushed and Sugar produced in Uttarakhand during 2013-18.

Year	Area (thousand ha)	Production (thousand tonnes)	Productivity (q/ha)
2013-14	109	6269	574
2014-15	99	6096	617
2015-16	93	5676	610
2016-17	85	5142	605
2017-18	112	7235*	646*

*Projected data

Table 2: Cane Crushed, Sugar production and Recovery position of different Mills situated in Uttarakhand (2016-17 & 2017-18)

Sl. No.	Sugar Mill	Crushingcapacity (M.T)		Cane Crushed (Lakh M.T.)			Sugar Production (MT)			Sugar Recovery (%)		
		2016-17	2017-18	2016-17	2017-18 (till 28th Feb, 2018)	2017-18*	2016-17	2017-18 (till 28th Feb, 2018)	2017-18*	2016-17	2017-18 (till 28th Feb, 2018)	2017-18*
1	Sitarganj	2500	-	15.97	-	-	142915	-	-	8.95	-	-
2	Bazpur	4000	4000	21.41	35.01	35.01	204061	334730	334730	9.53	9.63	9.63
3	Nadehi	2000	2000	25.09	23.39	38.41	255815	236810	393881	10.20	10.16	10.26
4	Kichcha	4000	4000	32.47	31.38	43.58	322327	311950	435634	9.93	10.00	10.15
5	Doiwala	2500	2500	26.30	19.92	27.44	246633	184345	254321	9.38	9.17	9.42
6	Libarheri	6250	6250	68.10	57.32	83.27	718846	593551	890148	10.56	10.54	10.81
7	Iqbalpur	5500	5500	61.21	48.45	62.29	604656	473150	636134	9.88	9.96	10.22
8	Laksar	10000	10000	100.05	78.79	112.64	960001	730400	1134523	9.60	9.53	10.08
Total		36750	34250	350.6	294.26	402.64	3455254	2864936	4079371	9.64	9.74	9.98

*Projected data

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