



RESEARCH PAPER

Analysis on adoption of sugarcane production technologies of UAS Dharwad by the farmers of North Karnataka

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Abstract : The present study on adoption of sugarcane production technologies of UAS Dharwad by the farmers of North Karnataka was undertaken during 2021-22. The *ex-post facto* research design was employed for the study. Among sample of 160 sugarcane growers, 20 sugarcane growers were randomly selected from each village of selected two villages from talukas viz., Athani and Gokak from Belagavi district and Jamakhandi and Mudhol from Bagalkot district. Data was collected by personal interview method using structured schedule. The major findings of the study were, 38.12 per cent of sugarcane growers observed in medium category of adoption followed by high (33.75 %) and low (28.12 %) category of adoption. With respect to adoption of individual production technologies cent per cent of growers adopted soil type, earthing up (after 110 days of planting), hand weeding and harvesting of sugarcane 10-14 months after planting. Majority of growers adopted recommended varieties, 120 cm row spacing, quantity of FYM, quality of setts, quantity of setts, flood irrigation, intercropping of maize, de trashing, spraying of post emergent herbicides, harvesting of sugarcane within two months of emergence of flower and manual harvesting.

Key Words : Adoption, Sugarcane, Production technologies

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INTRODUCTION

Sugarcane (*Saccharum officinarum*) 2n=80 belongs to family poaceae, native to warm, temperate tropical regions of India, Southeast Asia and New Guinea. It's a tall perennial grass in the genus Saccharum, tribe andropogoneae, used for sugar production. The plants are 2-6 m (6-20 ft) tall with stout, jointed, fibrous stalks that are rich in sucrose, which accumulates in the stalk internodes. The growing season should be long and warm

with adequate rainfall or irrigation, long hours of sunshine and higher relative humidity help in rapid growth of plant. The optimum temperature for cane growth is between 24 and 30°C. India is second largest sugarcane growing country after Brazil. The expansion of the sugarcane industry in India would greatly benefit the economy through foreign exchange savings, job and income generation, rural growth and living standard of rural people. In the year 2019-20 area under sugarcane is 4.60 million hectare and production was 370.50 million metric

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tonnes with the productivity of 80.4 tonnes/hectare (Anonymous, 2021). Karnataka is third largest producer of sugarcane after Uttar Pradesh and Maharashtra. In Karnataka sugarcane grown in area of 4.29 lakh hectares and the production is 381.81 lakh metric tonnes with the productivity of 89 tonnes/hectare (Department of Economics and Statistics, 2020).

University of Agricultural Sciences Dharwad, released the package of practice for sugarcane, which includes soil requirement, time of planting, sett treatment, intercultivation, intercropping, weed management, plant protection, nutrient management, time of harvesting for increasing crop productivity. To know the significant impact of these technologies there is need to study the knowledge and adoption these recommended production technologies. Hence, present study was undertaken to measure the adoption of recommended sugarcane production technologies of UAS Dharwad.

MATERIAL AND METHODS

The study was conducted during 2021-2022 to investigate the adoption of sugarcane production technologies of UAS Dharwad by the farmers of North Karnataka. The *ex-post facto* research design was used for conducting this study. The study was conducted in Belagavi and Bagalkot districts of Karnataka during 2021-2022. These districts were purposively selected keeping in view that these districts cover maximum area under sugarcane cultivation in North Karnataka. Two talukas from each district *viz.*, Athani (45,351 ha) and Gokak (44,514 ha) taluks from Belagavi district and Jamakhandi (41,816 ha), and Mudhol (29,414 ha) (Department of Economics and Statistics, 2020) from Bagalkot district were selected. Further, from each selected taluka, two villages were selected. Finally, eight villages were selected for the study. Further, from each selected villages of respective taluka 20 sugarcane growers were randomly selected to constitute a total sample of 160 sugarcane growers. Keeping in view the objectives and variables of the study, a structured interview schedule was developed by consulting experts and referring to the relevant literature. The primary data was collected from the sugarcane growers through personal interview method in an informal atmosphere.

The recommended production technologies in sugarcane cultivation were finalized after discussion with the specialists and referring the package of practices. Accordingly, 44 recommended production technologies

such as time of sowing, seed rate, spacing, nutrient management etc., were studied under sub heading of adoption of 31 agronomic practices and 9 recommended plant protection measures and 4 recommended harvesting technologies such as manual and mechanical harvesting studied under adoption of harvesting operations to constitute a total of 44 recommended production technologies of sugarcane. The adoption of the practices was tabulated by using frequency and percentage.

Respondents were asked questions to know whether they have adopted each of the recommended production technologies in sugarcane or not. The answers elicited from the growers were quantified by giving “1” score to adoption and “0” to non-adoption. The total score was calculated after summing the scores obtained in the recommended practices, thus one could get the maximum score of 44 and minimum score of 0. Based on the total score, the respondents were grouped into three categories namely, ‘low’, ‘medium’ and ‘high’ using mean and standard deviation as a measure of check.

RESULTS AND DISCUSSION

The experimental findings obtained from the present study have been discussed in following heads:

Adoption of agronomic practices by sugarcane growers :

The detailed analysis on adoption of agronomic practices (Table 1) shows that, cent per cent of sugarcane growers adopted recommended soil type suitable for sugarcane crop followed by recommended varieties (91.88 %), flood method of irrigation (84.38 %), quality of setts (81.25 %), 120 cm row spacing (78.12 %), quantity of planting material (70.63 %), planting time of June-Sept (60.00 %), drip irrigation (53.13 %), planting time of January- February (41.25 %) frequency of irrigation (39.38 %). Whereas, paired row method (21.88 %), row spacing of 150cm and pit/trench method of planting was observed in very less extent (19.38 and 2.50 %), respectively. The possible reason for growing of sugarcane in black soil as sugarcane require huge amount of water so it is necessary to grow sugarcane in soil with good moisture holding capacity, black soil have good moisture holding capacity. 120 cm row spacing was adopted by majority of the growers the possible reason might be practicing of inter-cultivation practices like earthing up and hand weeding. The possible reason for planting in June- Sept might be coincidence of monsoon

Table 1 : Adoption of agronomic practices by sugarcane growers		(n=160)	
Sr. No.	Recommended production technologies of sugarcane	Adoption	
		f	%
1.	Soil type suitable for sugarcane growing : Sandy loam soil, Black soil, Red soil, Sandy soil	160	100.00
2.	Varieties		
	Recommended sugarcane varieties: Co18024, CoM0265, SNK 9227, Co-86032, SNK-632	147	91.88
	Other than recommended varieties: VSI 08005, MS 10001	53	33.12
3.	Planting time		
	As recommended		
	June- September	96	60.00
	January- February	66	41.25
	Other than recommended: April- May	34	21.25
4.	Spacing		
	As recommended:		
	120 cm row spacing	125	78.12
	150 cm row spacing	31	19.38
	Paired row method	35	21.88
	Pit/trench method	4	2.50
	Other than recommended: 90-105 cm row spacing	38	23.75
5.	Nutrient management		
a.	Application of organic manures		
	As recommended: FYM 10 tones/acre or vermicompost 1 tone/acre or composted press mud enriched with microbes 5 tones/acre	118	73.75
	Other than recommended: Application of liquid press mud	30	18.75
b.	Application of chemical fertilizers		
	As recommended: N:P:K=100:30:90 kg/acre	35	21.88
	More than recommended: N:P:K= 150:46:100 kg/acre	121	75.62
	Natural farming	4	2.50
6.	Time of chemical fertilizer application		
	As recommended: 20% of N and K, full quantity of P fertilizers applied during planting and after 2 months on interval of 1 month application of 20% each N and K.	49	30.63
	Other than recommended: 20% of N and full quantity of P fertilizers applied during planting and after two months 50% of N and 50% of K fertilizers then during earthing up 30% of N and 50% of K fertilizers application.	107	66.88
7.	Quality of setts/planting material (8-10 months aged, free from disease and pest with 2-3 healthy buds)	130	81.25
8.	Quantity of planting material		
	As recommended: 1-2 tons/acre	113	70.63
	Other than recommended: 2.5-3.5 tons/acre	47	29.37
9.	Sett treatment		
	As recommended: Treatment of setts in 100 lit of water with 200gm Bavistin + 200ml of Chlorpyrifos 20EC + 200gm of Urea and treat setts for 10 mins	18	11.25
	Other than recommended: Setts soaking in 0.4% lime solution	13	8.12
10.	Growing of green manure crops (sunhemp, dhaincha, Cowpea, nectar/navadhanya)	75	46.88

Table 1 : Contd.....

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11.	Method of irrigation		
	Drip irrigation	85	53.13
	Flood irrigation	135	84.38
12.	Frequency of irrigation		
	Once in week during germination and growth stage, once in 10 days during tillering stage and once in 15 days during ripening stage	63	39.38
13.	Intercropping in sugarcane		
	Sugarcane + Onion (1:2)	40	25.00
	Sugarcane + Groundnut (1:2)	49	30.63
	Sugarcane + Green gram (1:1)	16	10.00
	Sugarcane + Chickpea (1:1)	35	21.88
	Sugarcane + Vegetables (1:1)	88	55.00
	Sugarcane + Maize (1:1)	142	88.75
14.	After cultivation practices		
	Earthing up: after 100-110 days of planting	160	100.00
	De trashing: after 150-180 days of planting	125	78.12
	Propping: tying the cane together using dry leaves	78	48.75
15.	Weed management		
a.	Chemical method of weed control		
	Pre-emergent herbicide Pendimethaline 30 EC or 38.7 CS @1kg/acre.	21	13.13
	Post emergent herbicide 2,4 D @2gm/lit + Metribuzin 70%WP @1 gm/lit.	126	78.75
b.	Hand weeding		
	Hand weeding 45-60 and 90 days after planting	160	100.00
16.	Striga weed management		
	High application of organic manure, heavy inundation of water/flooding type of irrigation or uprooting of weed before seed set	46	28.75

(Note: Multiple responses elicited) f- Frequency % - Percentage

with tillering stage will assure good crop stand.

With regard to nutrient management majority (73.75 %) of the sugarcane growers adopted application of recommended quantity of FYM followed by growing of green manure crops prior to sugarcane planting (46.88 %), time of chemical fertilizers application (30.63 %) and application of recommended quantity of chemical fertilizers (21.88 %). Whereas, adoption of sett treatment was observed in 11.25 per cent of growers. It is not possible to apply FYM every year and growers perceives that higher application of chemical fertilizer is necessary to get maximum yield so they apply more than recommended.

In case of intercropping in sugarcane large majority (88.75 %) of sugarcane growers practicing intercropping of maize followed by vegetable (55.00 %). The reason for adopting intercrops was they gain additional income by selling their vegetables in the local market.

With respect to after cultivation practices, earthing up after 100-110 days of planting was observed in cent per cent of sugarcane growers followed by de trashing (78.12 %) and propping (48.75 %). In case of weed management cent per cent of sugarcane growers adopted hand weeding after 45 days and 90 days followed by spraying of post emergent herbicides (78.75 %), methods of striga weed management (35.00 %) and spraying of pre-emergent herbicides (21.88 %).

Adoption of plant protection measures by sugarcane growers :

The results on adoption of plant protection measures as shown in Table 2 emphasise that, recommended method of controlling woolly aphid was adopted by 53.75 per cent of sugarcane growers. The possible reason might be easy identification and severity of the pest. With respect to management of root grub majority (63.12 %)

of the sugarcane growers adopted drenching chlorpyriphos followed by sett treatment with chlorpyriphos (11.25 %) and drenching of Fipronil+ Imidacloprid (lesenta) (9.38 %). The reason given by the growers during investigation was it cause severe impact on plant growth and yield of the crop so they wanted to control the pest in initial stage.

Recommended method for management of early shoot borer was adopted by 57.50 per cent of sugarcane growers. The reason was, it infests during germination stage kills the mother shoot resulting in drying up of the entire clump creating gaps in the field and affect the crop stand, so they try to control immediately.

With regard to control of diseases majority (76.25 %) of the sugarcane growers adopted recommended method of grassy shoot management, the reason might be it can be control by himself and less severity of

disease, while least (3.12 %) of growers adopted smut controlling measure.

Adoption of harvest operation by sugarcane growers :

The Table 3 reveals that, cent per cent of sugarcane growers adopted harvesting of sugarcane at age of 10 to 14 months followed by manual harvesting (93.13 %) and harvesting of sugarcane within two months of emergence of arrow (86.88 %). Whereas, 9.38 per cent of sugarcane growers adopted mechanical harvesting.

The finding of past research studies conducted by Chouhan *et al.* (2011) noticed that, 80.84 per cent of sugarcane growers adopted recommended soil type followed by field preparation (62.50 %), seed rate (61.67 %), spacing (56.67 %), earthing up (35.00 %), seed selection (26.67 %) and quantity of organic manure

Table 2 : Adoption of plant protection measures by sugarcane growers (n=160)

Sr. No.	Recommended production technologies of sugarcane	Adoption of practices	
		f	%
I	Insect pest management		
1.	Woolly aphid		
	Spray malathion 50EC @2ml/lit or chlorpyriphos 50EC @2ml/lit or Acephate 75WP @2ml/lit	86	53.75
2.	Root grub		
	As recommended	18	11.25
	Sett treatment with Chlorpyriphos 50EC		
	Drenching of Chlorpyriphos 50EC @2lit in 400 litres of water or heavy inundation of water	101	63.12
	Drenching of Lesenta (Fipronil+Imidacloprid) @150gm/acre.	15	9.38
	Other than recommended:		
	Soil application of tobacco leaf residues	19	11.88
3	Early shoot borer		
	Spray Chlorantraniliprole (Coragen) 18.5 SC @0.5ml/lit	92	57.50
II	Disease management		
1.	Grassy shoot		
	Rough out infected plants or uproot and burn	122	76.25
2.	Smut		
	Sett treatment with Carbendazim 50WP @1gm/lit or Benomyl 50WP @1gm/ lit.	5	3.12

(Note: Multiple responses elicited) f- Frequency % - Percentage

Table 3 : Adoption of harvest operation by sugarcane growers (n=160)

Sr. No.	Recommended production technologies of sugarcane	Adoption of practices	
		f	%
1.	Harvesting of sugarcane 10 to 14 months after planting	160	100.00
2.	Harvesting of sugarcane within two months of emergence of flower	139	86.88
3.	Manual	149	93.13
4.	Mechanical	15	9.38

(Note: Multiple responses elicited) f- Frequency % - Percentage

Table 4 : Distribution of sugarcane growers based on their overall adoption of recommended production technologies (n=160)

Sr. No.	Category	Sugarcane growers	
		f	%
1.	Low (<19.68)	45	28.13
2.	Medium (19.68-22.52)	61	38.12
3.	High (>22.52)	54	33.75
	Total	160	100.00
	Mean		21.10
	SD		3.34

f- Frequency

% - Percentage

application (25.83 %). Neethi and Sailaja (2013), Singh *et al.* (2013), Hadiya *et al.* (2014), Khandre (2015), Singh *et al.* (2017) and Sharda *et al.* (2018) observed similar to the present findings.

Overall adoption level of sugarcane growers about recommended production technologies :

The distribution of sugarcane growers in overall adoption of recommended sugarcane production technologies as shown in Table 4 highlighted that, nearly two fifth of growers (38.12%) belonged to medium category followed by high and low category (33.75% and 28.13%), respectively. The reason may be due to higher level of education and extension participation of sugarcane growers which results in acquiring better knowledge of production technologies, and also possession of more farm resource availability with growers found to be supporting the medium adoption level.

The distribution of farmers in different categories of adoption was also witnessed in the studies of Singh *et al.* (2017) revealed that, 82.50 per cent of black gram farmers belonged to medium category followed by low and high (9.17 % and 8.33 %), respectively. The studies of Netam *et al.* (2018), Sharda *et al.* (2018) and Chauhan *et al.* (2021) also found the similar results.

Conclusion :

It can be concluded from the above findings that 38.12 per cent of the sugarcane growers belonged to medium adoption level category. With respect to adoption of recommended production technology, majority of the respondents are adopted soil type, recommended varieties, hand weeding, earthing up, quality of planting material and quantity of planting material. Comparatively low proportion of the growers adopted 150 cm row spacing, pit/trench method of planting and sett treatment there is enough scope to promote improved sugarcane

production technologies by using mass contact methods and concerned transfer of technology centres. Thus, the efforts should be made to deliver the required knowledge and skills through training programmes and demonstrations and conduct study tours to observe the profitable cultivation of sugarcane in other states and districts.

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