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Knowledge performance of sugarcane growers on recommended production technologies in Vijayapura district of Karnataka

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Abstract

The purpose of the present investigation was to assess the knowledge performance of sugarcane growers with respect to recommended sugarcane production practices in Vijayapura district of Karnataka. The study was conducted using an ex-post facto research design in two major sugarcane-growing taluks, namely Indi and Sindagi. A total sample of 120 sugarcane growers was selected through a multistage sampling technique from six villages. Data were collected through personal interviews using a structured and pre-tested interview schedule. Knowledge performance was measured using a knowledge test covering major aspects of sugarcane cultivation and farmers were categorized into low, medium and high knowledge levels based on mean and standard deviation.

The findings exposed that a majority of sugarcane growers possessed a medium level of knowledge regarding recommended sugarcane production practices. Complete knowledge was observed for basic and routinely followed practices such as recommended varieties and earthing-up operations. However, lower levels of knowledge were recorded for relatively complex and improved practices such as sett treatment, pit or trench planting, paired-row spacing, and use of biological control methods. Big farmers exhibited comparatively higher knowledge levels than small farmers, which could be attributed to better literacy, greater extension contact, higher social participation and wider exposure to information sources. The study revealed that although sugarcane has been cultivated as a major cash crop in the region for several years, notable knowledge gaps still exist in the adoption of improved technologies. The findings emphasized the need for focused extension efforts, capacity-building programmes, and practical training to enhance the knowledge performance of sugarcane growers and promote sustainable sugarcane production in the study area.

Keywords: Sugarcane growers, Knowledge Performance, Small famers, Big Farmers

Introduction

Agriculture continues to play a vital role in the Indian economy by providing food security, employment, and livelihood support to a large segment of the population. Despite structural transformation and economic diversification, agriculture remains the major source of livelihood for nearly two-thirds of India's population. The sector occupies about 43 per cent of the country's geographical area and contributes nearly 18.3 per cent to the national Gross Domestic Product (GDP) (Anonymous, 2022). Although its share in GDP has gradually declined, agriculture continues to be central to rural development, income generation, and socio-economic stability. Indian agriculture is characterized by a diversified cropping system comprising food crops, oilseeds, pulses, and

commercial crops. Among commercial crops, sugarcane holds a prominent position due to its high economic value and strong linkage with agro-based industries. Sugarcane (*Saccharum officinarum* L.), belonging to the family Poaceae, is most important industrial crops grown in tropical and sub-tropical regions. The genus *Saccharum* includes several species, of which *S. officinarum*, *S. barberi*, and *S. sinense* are cultivated, while *S. spontaneum* and *S. robustum* are wild species. Originating from New Guinea, sugarcane is one of the world's oldest commercial crops and has emerged as a major cash crop due to its assured domestic demand and wide range of by-products.

Globally, sugarcane is cultivated in more than 110 countries, with Brazil, India, China, Thailand, Mexico, and Pakistan being the major producers. Sugarcane contributes nearly 86

per cent of total sugar production worldwide, underscoring its dominance in the global sugar economy (Anonymous, 2021). Brazil ranks first in sugarcane production, followed by India, which is the second largest producer and consumer of sugar. The sugarcane industry holds immense economic importance in India, being the second largest agro-based industry after cotton. It directly and indirectly supports the livelihoods of over five crore farmers and their dependents and plays a significant role in employment generation, rural development, and foreign exchange savings.

In India, sugarcane is cultivated over an area of about 5.09 million hectares, producing approximately 430.50 million metric tonnes with an average productivity of 82.50 tonnes per hectare (Anonymous, 2021). Major sugarcane-growing states include Uttar Pradesh, Maharashtra, Karnataka, Tamil Nadu, and Bihar, which together account for nearly 90 per cent of the country's total sugar production. Uttar Pradesh ranks first in area under sugarcane, while Maharashtra ranks first in production. Karnataka occupies the third position, supported by favourable agro-climatic conditions, suitable soils, and assured irrigation facilities through rivers, reservoirs, canals, and groundwater sources.

In Karnataka, sugarcane is grown over an area of 4.23 lakh hectares, with a production of 420.9 lakh metric tonnes and an average productivity of about 96 tonnes per hectare (Anonymous, 2021). Among the major sugarcane-growing districts, Vijayapura holds a significant position. The district has a sugarcane area of 38,920 hectares and a sugar factory, producing about 4.32 lakh tonnes with an average productivity of 79 tonnes per hectare (Anonymous, 2021). Although sugarcane productivity in the district has shown an increasing trend, the magnitude of improvement has been modest, and a considerable gap persists between potential and realized yields.

The yield gap in sugarcane cultivation is influenced by a combination of environmental, technological, and socio-economic factors. Sub-optimal cropping systems, limited access to improved varieties, imbalanced fertilizer use, inadequate pest and disease management, and post-harvest constraints contribute to lower productivity. In addition, issues such as low remunerative prices, delayed payments by sugar factories, irregular power supply, scarcity of skilled labour during peak seasons, high cost and non-availability of quality planting material, and inadequate technical guidance further constrain effective adoption of recommended practices.

Despite extensive research efforts leading to the development of improved sugarcane production technologies, their adoption at the farm level remains uneven. Many recommended practices continue to remain confined to research stations and demonstration fields, resulting in lower productivity and reduced economic performance of growers. This gap between available technologies and their actual utilization highlights the importance of farmers' knowledge and performance in the adoption process.

Enhancing sugarcane productivity requires not only the availability of appropriate technologies but also adequate knowledge and effective application of those technologies by farmers. Knowledge influences farmers' decision-making, skill development, and adoption behaviour, ultimately determining farm performance. Therefore, assessing the knowledge performance of sugarcane growers is essential for

identifying gaps in awareness and practice.

Understanding the existing knowledge performance of sugarcane growers, along with the constraints they face, is crucial for designing effective extension strategies and policy interventions. Such an assessment can help strengthen technology dissemination mechanisms, improve adoption levels, and enhance productivity and profitability of sugarcane cultivation. Hence, the present study was undertaken to assess the knowledge performance of sugarcane growers in Vijayapura district of Karnataka, with a view to providing empirical evidence for targeted extension interventions and sustainable development of the sugarcane sector.

Materials and Methods

Locale of the Study

The study was conducted in Vijayapura district of Karnataka, which falls under the Northern Dry Zone of the state. Vijayapura district was purposively selected as it is one of the major sugarcane-producing districts of Karnataka, where sugarcane cultivation is practiced extensively across all taluks. The district is characterized by favourable agro-climatic conditions, suitable soils, and assured irrigation facilities, supporting commercial sugarcane cultivation.

Vijayapura district comprises five taluks, namely Vijayapura, Basavana Bagewadi, Indi, Muddebihal and Sindagi. Among these, Indi and Sindagi taluks were purposively selected for the study, as they occupied the highest area under sugarcane cultivation compared to the other taluks of the district (Fig. 1). The selection of these taluks ensured adequate representation of sugarcane growers and production practices prevalent in the region.

Research Design

An ex-post facto research design was adopted for the present investigation. This design was considered appropriate as the study aimed to assess the knowledge performance of sugarcane growers regarding recommended production technologies, wherein the independent variables had already occurred and were beyond the control of the researcher. The ex-post facto design enabled systematic empirical investigation of existing phenomena without manipulation of variables.

Selection of Villages and Respondents

A multistage sampling technique was employed for the selection of respondents. From the selected taluks of Indi and Sindagi, three sugarcane-growing villages from each taluk were purposively selected based on the extent of area under sugarcane cultivation. Thus, a total of six villages were included in the study.

From each selected village, 20 sugarcane growers were selected using random sampling, comprising 10 small farmers and 10 large farmers. This classification ensured representation of different farm size categories. Accordingly, the total sample size consisted of 120 sugarcane growers drawn from two taluks and six villages.

Measurement of Knowledge Performance

Knowledge performance of sugarcane growers was considered as the dependent variable of the study. It was operationally defined as the extent of correct knowledge

possessed by the growers regarding recommended sugarcane production technologies.

A structured knowledge test was used to measure the knowledge performance of respondents. The scale developed by Shwetha (2016) was adopted with suitable modifications to suit the objectives and local conditions of the study. The items for the knowledge test were developed based on an extensive review of literature, including package of practices for sugarcane, research journals, extension publications, and technical bulletins.

The knowledge test covered major aspects of sugarcane production technology such as land preparation, varieties, planting methods, nutrient management, irrigation practices, pest and disease management, and harvesting practices. Responses were recorded on a two-point continuum, namely correct knowledge and incorrect knowledge.

Scoring and Categorization

For scoring, a score of '1' was assigned for each correct response and '0' for each incorrect response. The total knowledge performance score for each respondent was obtained by summing the scores of all items. Based on the mean and standard deviation of the scores, respondents were classified into three categories as follows:

Category	Criteria
Low	< (Mean - ½ SD)
Medium	(Mean ± ½ SD)
High	> (Mean + ½ SD)

This method of classification facilitated meaningful interpretation of the levels of knowledge performance among sugarcane growers.

Data Collection and Analysis

Primary data were collected through personal interviews using a pre-tested structured interview schedule. The interview schedule was finalized after consultation with subject matter specialists and extension experts to ensure content validity. The collected data were coded, tabulated, and analyzed using appropriate descriptive statistical tools such as frequency, percentage, mean, and standard deviation.

Results

Technology wise knowledge performance of small sugarcane growers

The respondents were asked to indicate their knowledge on two-point continuum Yes or No. In this regard, a glance at Table 1 showed that technology wise knowledge performance of sugarcane growers, in case of small farmers cent per cent of respondents had knowledge about Recommended varieties, Recommended planting season, Furrow irrigation, earthing up and Harvesting time, followed by majority (96.66 %) of respondents had knowledge on 120 cm row spacing, Recommended setts rate (86.66 %), 150 cm wide row spacing (85.00 %), Frequency of irrigation (83.34 %), Recommended dose of NPK (80.00 %), significant percent (71.66 %) of respondents had knowledge about chemical weed management, Root grub and early shoot borer management equally, Recommended quantity of FYM (70.00 %), Grassy shoot management (66.66 %), Intercropping (60.00 %), Detrashing (58.34 %), smut management (56.66 %), woolly aphid management (53.34 %), Green manure crops (41.66 %),

Less than one third (30.00 %) of small farmers had knowledge on paired row method followed by drip irrigation

(23.34 %), setts treatment (18.33 %), soil testing (16.66 %) and 15.00 per cent of small farmers had knowledge about pit/trench method and propping practices equally.

Here the author(s) should be presented the clear and concise findings of the experiment/study. It should be written in past tense. The results should be given here without any references.

Technology wise knowledge performance of big sugarcane growers

Table 2 revealed that Cent percent of big farmers had knowledge about recommended variety, planting season, furrow irrigation method, earthing up and harvesting time of sugarcane, followed by majority (93.34 %) and (90.00 %) of respondents had knowledge about 120 cm row spacing and recommended setts rate, 150 cm row spacing and recommended dose of NPK fertilizers (88.34 %), recommended quantity of FYM and frequency of irrigation (85.00 %), root grub management (83.34 %), early shoot borer management (81.66 %), intercropping and chemical weed management (78.34 %), grassy shoot management (75.00 %), smut disease management (70.00 %), woolly aphid management (68.33 %), Detrashing (60.00 %), green manure crops (46.66 %), drip irrigation (41.66 %).

Less than one third (31.66 %) of big farmers had poor knowledge on soil testing, setts treatment, propping practices and paired row method (30.00 %) and 15.00 per cent of respondents had knowledge on pit or trench method. The data with respect to sugarcane growers shows that, cent percent of them had knowledge about recommended variety and planting season, Furrow irrigation, earthing up and harvesting time, followed by 120 cm row spacing (95.00 %), recommended setts rate (88.34 %), 150 cm wide row spacing (86.67 %), recommended dose of NPK and frequency of irrigation (84.16 %), root grub management and recommended quantity of FYM (77.50 %), early shoot borer management (76.66 %), chemical weed management (75.00 %), grassy shoot management (70.83 %), intercropping (69.16 %), smut (63.34 %) and woolly aphid management (60.84 %), Detrashing (59.16 %), green manuring (44.16 %). 32.50 per cent of respondents had knowledge about drip irrigation, paired row method (30.00 %), setts treatment (24.17 %), propping (22.50%) and pit or trench method (15.00 %), majority of sugarcane growers had poor knowledge on these recommended technologies.

Cent per cent of the sugarcane growers had knowledge of the recommended varieties, which could be attributed to their long-term cultivation and wide diffusion in the study area. As sugarcane was a major cash crop, growers actively sought knowledge on basic practices such as planting time, spacing, irrigation and earthing-up, resulting in complete awareness of these operations. A majority of the growers possessed knowledge of nutrient management practices, as nutrient application was considered a core component for achieving higher yields. Nearly three-fourths of the growers had knowledge of weed management, as ineffective weed control was known to cause substantial yield losses. Regarding pest management, growers exhibited higher knowledge of the control measures for commonly occurring pests such as woolly aphid and root grub, owing to their frequent incidence. However, knowledge of sett treatment and biocontrol methods was relatively low, possibly due to the technical complexity of these practices and limited exposure to training programmes. In disease management, more than three-fifths of the growers had knowledge of grassy shoot and

smut management, with grassy shoot being widely recognized due to its prevalence in the area. In contrast, practices such as sett treatment, propping, pit or trench planting, and paired-row spacing were associated with lower knowledge levels, which might be attributed to their complexity and limited extension emphasis.

Knowledge performance of sugarcane growers

Table 3 indicated that half (50.00%) of the small farmers possessed a medium level of knowledge regarding recommended sugarcane practices, followed by low (35.00%) and high (15.00%) knowledge levels. This trend could be attributed to moderate extension contact, extension participation, and scientific orientation among small sugarcane growers. In the case of big farmers, more than half (53.34%) exhibited a medium level of knowledge, followed

by high (33.33%) and low (13.33%) knowledge levels. The relatively higher knowledge among big farmers might be due to better literacy status, long-term experience in sugarcane cultivation, higher social participation, greater extension contact and wider exposure to mass media.

Overall, a majority (51.67%) of sugarcane growers had a medium level of knowledge performance, followed by high (24.17%) and low (24.16%) levels. This pattern could be attributed to sugarcane being a long-established and economically important cash crop in North Karnataka, which motivated growers to acquire information on improved production practices. However, lower knowledge levels among a section of growers might be due to continued reliance on traditional practices, limited participation in extension activities, and relatively less farming experience.

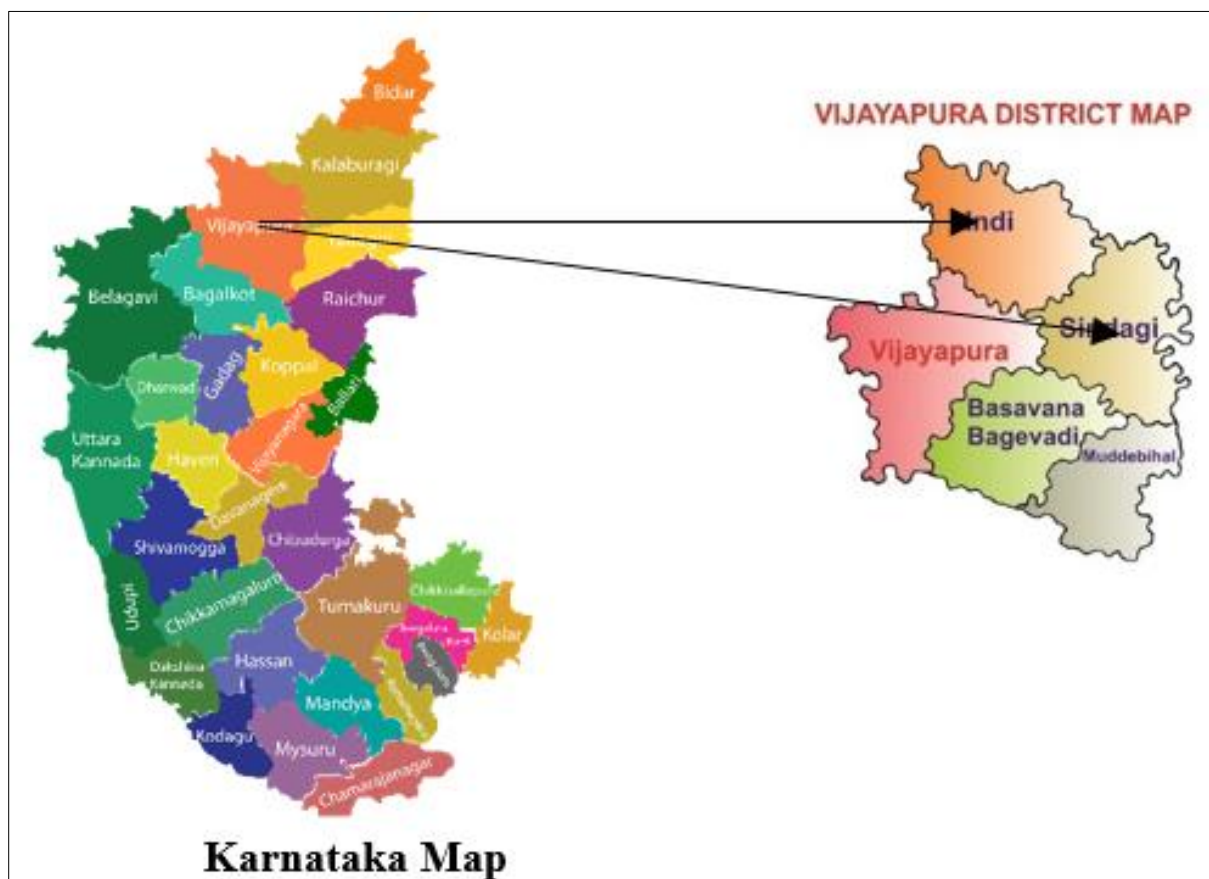


Fig 1: Map showing study area

Table 1: Technology wise knowledge performance of small sugarcane growers

Sl. No.	Recommended Practices	Small sugarcane growers (n=60)			
		Correct Knowledge		Incorrect Knowledge	
		No.	%	No.	%
1	Soil testing	10	16.66	50	83.34
2	Recommended varieties	60	100.00	00	0.00
3	Recommended planting season	60	100.00	00	0.00
4	Setts treatment	11	18.33	49	81.67
5	Recommended spacing				
	120 cm row spacing	58	96.66	02	3.34
	150cm wide row spacing	51	85.00	09	15.00
	Paired row method	18	30.00	42	70.00
	Pit/trench method	09	15.00	51	85.00
6	Recommended setts rate	52	86.66	08	13.34
7	Recommended quantity of FYM	42	70.00	18	30.00

8	Recommended dose of NPK fertilizer	48	80.00	12	20.00
9	Green manures crops	25	41.66	35	58.34
10	Method of irrigation				
	Drip irrigation	14	23.34	46	76.66
	Furrow Irrigation	60	100.00	00	0.00
11	Frequency of irrigation	50	83.34	10	16.66
12	Intercropping	36	60.00	24	40.00
13	Intercultural practices				
	Earthing up	60	100.00	00	0.00
	Detrashing	35	58.34	25	41.66
	Propping	09	15.00	51	85.00
14	Chemical weed management	43	71.66	17	28.34
15	Pest management				
	Woolly aphid	32	53.34	28	46.66
	Root grub	43	71.66	17	28.34
	Early shoot borer	43	71.66	17	28.34
16	Disease management				
	Grassy shoot	40	66.66	20	33.34
	Smut	34	56.66	26	43.34
17	Harvesting time	60	100.00	00	0.00

Table 2: Technology wise knowledge performance of big sugarcane growers

Sl. No.	Recommended Practices	Big sugarcane farmers (n=60)			
		Correct Knowledge		Incorrect Knowledge	
		No.	%	No.	%
1	Soil testing	19	31.66	41	68.34
2	Recommended varieties	60	100.00	00	0.00
3	Recommended planting season	60	100.00	00	0.00
4	Setts treatment	18	30.00	42	70.00
5	Recommended spacing				
	120 cm row spacing	56	93.34	04	6.66
	150cm wide row spacing	53	88.33	07	11.67
	Paired row method	18	30.00	42	70.00
	Pit/trench method	09	15.00	51	85.00
6	Recommended setts rate	54	90.00	06	10.00
7	Recommended quantity of FYM	51	85.00	09	15.00
8	Recommended dose of NPK fertilizer	53	88.34	07	11.66
9	Green manures crops	28	46.66	32	53.34
10	Method of irrigation				
	Drip irrigation	25	41.66	35	58.34
	Furrow Irrigation	60	100.00	00	0.00
11	Frequency of irrigation	51	85.00	09	15.00
12	Intercropping	47	78.34	13	21.66
13	Intercultural practices				
	Earthing up	60	100.00	00	0.00
	Detrashing	36	60.00	24	40.00
	Propping	18	30.00	42	70.00
14	Chemical weed management	47	78.34	13	21.66
15	Pest management				
	Woolly aphid	41	68.33	19	31.67
	Root grub	50	83.34	10	16.66
	Early shoot borer	49	81.66	11	18.34
16	Disease management				
	Grassy shoot	45	75.00	15	25.00
	Smut	42	70.00	18	30.00
17	Harvesting time	60	100.00	00	0.00

Table 3: Knowledge performance of Sugarcane growers (n=120)

Category	Small farmers (n1=60)		Big farmers (n2=60)		Sugarcane growers (n=120)	
	No.	%	No.	%	No.	%
Low (< 16.21)	21	35.00	08	13.33	29	24.16
Medium (16.21-19.00)	30	50.00	32	53.34	62	51.67
High (> 19.00)	09	15.00	20	33.33	29	24.17

Mean= 17.60 SD = 2.79

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The authors declare that there is no conflict of interest associated with this research.

Conclusion

The study revealed that the majority of sugarcane growers possessed a medium level of knowledge performance regarding recommended sugarcane production practices. While complete knowledge was observed for basic and routinely practiced operations such as recommended varieties and earthing-up, relatively lower knowledge was recorded for complex and improved practices including sett treatment, pit or trench planting, paired-row spacing, and use of biocontrol agents. Big farmers exhibited comparatively higher knowledge levels than small farmers, which could be attributed to better literacy, greater extension contact, higher social participation, and wider exposure to mass media. The findings indicated that long-term cultivation of sugarcane as a major cash crop contributed to moderate knowledge levels among growers; however, gaps persisted due to reliance on traditional practices and limited participation in extension activities. The study underscored the need for focused extension interventions, capacity-building programmes, and practical training on improved and knowledge-intensive technologies to enhance the overall knowledge performance of sugarcane growers in the study area.

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