Assessing Farmers' Knowledge of Sugarcane Production Technology in Haryana, India

ABSTRACT

Aim: This study aims to assess the knowledge level of sugarcane growers in Haryana regarding sugarcane production technology.

Methodology: 120 sugarcane farmers from three major sugarcane growing districts of Haryana, India were interviewed. Statistical tools such as weighted mean score, correlation analysis etc. were employed to analyze the data and interpret the findings. The knowledge schedule was divided mainly into 10 components. A score of three was assigned to a fully correct answer, two to a partially correct answer, and one to an incorrect or no answer to the question.

Results: The study found that 68.34% of sugarcane growers in Haryana had medium knowledge of production technology, with significant gaps in specific areas. While 57.50% had partial knowledge about recommended cultivars, 75.80% lacked full knowledge of manure and fertilizer usage. Irrigation practices were better understood, with 55.00% having full knowledge. Key factors such as education, income, social participation, and media exposure positively correlated with the farmers' knowledge levels.

Interpretation: There are notable gaps in specific areas like fertilizer usage and pest control. Enhancing education, social participation, and access to information could significantly improve their knowledge and practices.

Key words: Knowledge level, Sugarcane production technology, Sugarcane growers

INTRODUCTION

Sugarcane (*Saccharum officinarum*) is a tall perennial grass belonging to the Poaceae family, recognized globally as one of the most significant crops due to its role in sugar production, bioenergy, and other by-products. Major sugarcane producers include Brazil, India, China, and Thailand, with India notably cultivating sugarcane on approximately 4.85 million hectares (Statistical Abstract of Haryana, 2021-22). In 2021-22, India produced 500 million metric tonnes of sugarcane and 39.4 million metric tonnes of milled sugar, also exporting 10.98 million metric tonnes, making it the world's largest producer and consumer of sugar, and the second largest exporter (PIB Delhi, 2022).

The primary use of sugarcane is sugar production, with the industry extracting sucrose and processing it into various types of sugar. By-products such as molasses and ethanol further contribute to its economic value. Despite India's significant sugarcane output, challenges remain, particularly in regions like Haryana where harsh weather conditions impede optimal production. High temperatures, dry winds, and limited irrigation lead to poor germination and reduced crop quality, impacting overall yields (Agarwal *et al*., 2024).

Several studies have investigated the knowledge levels of farmers regarding sugarcane production technology. For instance, Tandel (1993) found that 74.25% of respondents had medium knowledge, while Chaudhari (1994) reported that contact farmers generally had higher knowledge levels compared to non-contact farmers. Other studies, such as those by Prajapati

(1995) and Maraddi (2006), have similarly highlighted the prevalence of medium knowledge levels among sugarcane farmers, with only a minority possessing high levels of knowledge.

Given the critical role of knowledge in bridging the technological gap in sugarcane production, this study aims to assess the knowledge levels of sugarcane growers in Haryana regarding sugarcane production technology. Understanding these knowledge levels can inform strategies to enhance technology dissemination and utilization, ultimately improving sugarcane production and productivity in the region.

MATERIALS AND METHODS

Among the 22 districts in the state of Haryana, the study purposively chose three districts namely Yamuna Nagar, Kaithal, and Rohtak. The selection was made on the criterion of sugarcane cultivation area, with Yamuna Nagar and Rohtak being the two districts with the highest area under sugarcane cultivation. Kaithal was specifically selected due to its notable contribution to sugarcane production. One block was chosen at random from each of the three selected districts and further, two villages from each block were selected randomly. Mand Kheri and Panjeto selected from Chhachhrauli, Rasina and Sanch selected from Pundri, Rithal and Kahni selected from Rohtak block. A total of 120 farmers were selected as a sample for the present study and interviewed using a well-structured interview schedule in the year 2023.

The independent variables included in this study were age, socio-economic status, family type, family size, mass media exposure, cropping pattern, economic motivation, innovativeness, risk orientation, extension contact and extension participation of the respondent while Knowledge was taken as dependent variable for the study.

Knowledge, defined as the understanding and awareness of agricultural, technological, and management practices, is essential for improving agricultural productivity and rural livelihoods. This study aimed to assess the knowledge level of sugarcane growers in Haryana. A knowledge assessment schedule, developed in collaboration with experts, covered ten key components: recommended cultivars, seed rate, time of planting, planting distance, manure and fertilizers, time and method of fertilizer application, intercultural operations, irrigation, insects-pests and their control, and diseases and their control. Respondents' answers were scored as fully correct (three points), partially correct (two points), or incorrect/no answer (one point). The total scores of different responses were calculated for each category. Afterwards, the mean and standard deviation were used to categorize the farmers into low, medium, and high levels of knowledge. This methodology provided a quantitative measure of the farmers' knowledge, highlighting areas for improvement in knowledge dissemination and technology adoption. The variables were further administered for correlation analysis to make further interpretation regarding the relationship between independent variables and knowledge level of the farmers regarding sugarcane production technology.

RESULTS AND DISCUSSION

Fig. 1 reveals that a significant proportion of the respondents, 68.34 per cent, exhibited a medium level of knowledge, while 14.16 per cent demonstrated a low level of knowledge and 17.50 per cent displayed a high level of knowledge. These results indicated a need for targeted interventions to address the knowledge gaps among sugarcane growers. The probable reason behind the distribution of knowledge levels could be attributed to various factors such as access to agricultural information and extension services, limited access to comprehensive and specialized training programs, educational background, socioeconomic status, and previous

farming experience etc. The results are in line with Prajapati (1995), Patel & Vyas (2014), Jaiswal & Tiwari (2014) and Godara *et al.* (2020).

Fig. 1: Distribution of respondents based on overall knowledge about recommended sugarcane production technology

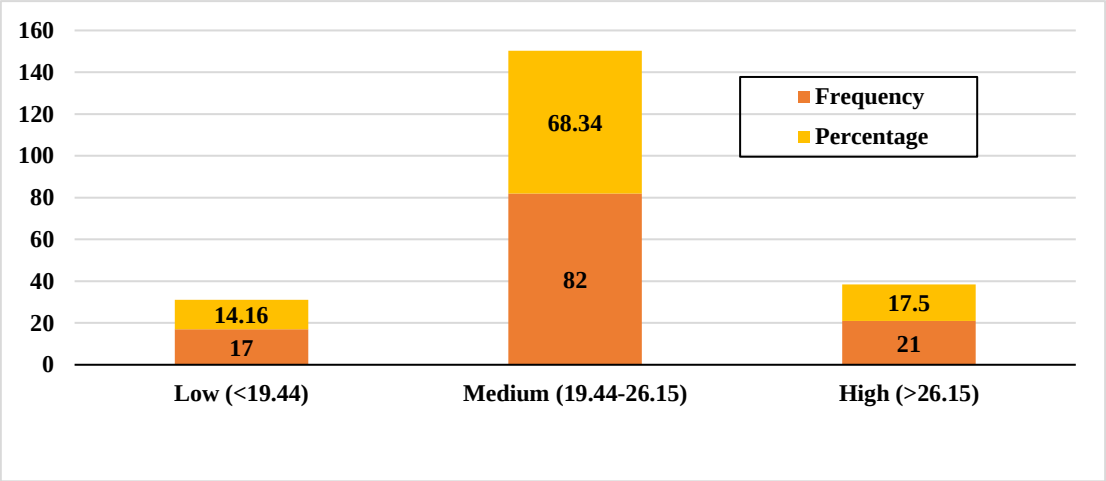

Table 1 shows that the relatively higher knowledge level (79.72%) regarding recommended cultivars of sugarcane can be attributed to the availability of information through agricultural extension services, farmer training programs, and the involvement of local sugarcane cooperatives. These initiatives likely emphasize the importance of using recommended cultivars that are known for their high yield, disease resistance, and suitability to the local agro-climatic conditions. Regarding seed rate, knowledge level was found 80.55 per cent among the respondents. This knowledge may be attributed to traditional farming practices and the exchange of knowledge among local farmers.

Table 1: Knowledge level about the recommended package of practices for sugarcane production technology (n=120)

S. No.	Practices	Knowledge level			Total weighted score	Weighted mean score	Mean percent score	Rank order
		Full	Partial	Nil				
1	Recommended cultivars	49 (40.80)	69 (57.50)	02 (01.70)	287	2.39	79.72	IV
2	Seed rate	54 (45.00)	62 (51.70)	04 (03.30)	290	2.42	80.55	II

3	Time of planting	60 (50.00)	49 (40.80)	11 (09.20)	289	2.41	80.28	III
4	Planting distance	46 (38.30)	71 (59.20)	03 (02.50)	283	2.36	78.61	V
5	Manure and fertilizers and their quantity	26 (21.70)	91 (75.80)	03 (02.50)	263	2.19	73.05	VII
6	Time and method of application of fertilizer	23 (19.20)	88 (73.30)	09 (07.50)	254	2.12	70.55	VIII
7	Intercultural operations	40 (33.30)	71 (59.20)	09 (07.50)	271	2.26	75.27	VI
8	Irrigation	66 (55.00)	54 (45.00)	00 (00.00)	306	2.55	85.00	I
9	Insects-pests and their control	12 (10.00)	99 (82.50)	09 (07.50)	243	2.02	67.50	X
10	Diseases and their control	22 (18.30)	86 (71.70)	12 (10.00)	250	2.08	69.44	IX

The knowledge level of 80.28 per cent regarding the time of planting sugarcane suggests that farmers are familiar with the optimal timing for initiating the planting process. Local agricultural calendars, advice from experienced farmers, and extension services could play a role in disseminating knowledge about the suitable period for planting sugarcane, considering factors such as temperature, rainfall patterns, and crop cycles. Regarding planting distance i.e., 60-75 cm (flat planting), knowledge level was 78.61 per cent. This knowledge may be passed down through generations and reinforced by local agricultural practices, cooperative societies, and extension services. It was observed that the relatively low knowledge level i.e., 73.05 per cent was found for manures and fertilizers among the respondents. Recommendation of urea is

130 kg /acre (195 kg/acre for ratoon crop), SSP is 125 kg /acre, and MOP is 35 kg/acre according to package of practices. Also, the knowledge level regarding time and method of fertilizer application was only 70.55 per cent. This may be due to limited exposure to extension services or agricultural training programs. In case of intercultural operations such as weeding, knowledge level was found 75.27 per cent among the respondents because respondents lacked a bit in the knowledge of chemical dose and method recommended for sugarcane which is 1.6 kg Atrazine 50 WP in 250-300 L water 2-3 days after planting. In case of irrigation, highest knowledge level 85.00 per cent was found among the respondents because farmers recognize the significance of providing adequate water to ensure optimal growth and yield. With regard to insects–pest and their control, knowledge level was found the lowest i.e., 67.50 per cent, most common insects-pests were top borer, early shoot borer, termites and root borer in the study area. There should be training programmes for plant protection. In sugarcane, most common disease was red rot and knowledge level regarding control of red rot was 69.44 per cent found among the respondents because farmers have very low knowledge about the diseases. The findings were found similar to some extent with Singh (2006), Garg (2008) & Godara *et al.* (2020) who also found that highest knowledge level was found for irrigation and it also showed that difference in knowledge of modern technology is affected by the socio-economic status and in turn effect the knowledge level about recommended package and practices.

The correlational analysis (Table 2) revealed that several independent variables had significant positive relationships with the knowledge level of farmers regarding sugarcane production technology. Education, annual family income, social participation, land holding, material possession, cropping pattern, extension contact, mass media exposure, risk orientation, economic motivation, innovativeness, and extension participation were all positively correlated with knowledge levels. This indicates that farmers with higher education, greater income, larger land holdings, more social and extension interactions, and better access to information and innovation tend to have higher knowledge levels. Conversely, variables such as age, caste, occupation, family type, and family size showed no significant correlation, suggesting these factors do not substantially impact the knowledge levels of the farmers.

Table 2: Correlation between various independent variables and farmers' knowledge level

S. No	Independent variables	Correlation coefficient
1	Age	0.045^{NS}
2	Caste	0.016^{NS}
3	Education	0.198^{*}
4	Occupation	0.164^{NS}
5	Annual family income	0.488^{**}
6	Social participation	0.237^{**}
7	Land holding	0.414^{**}

8	Material possession	0.257**
9	Family type	0.023 NS
10	Family size	0.006 NS
11	Cropping pattern	0.240**
12	Extension contact	0.356**
13	Mass media exposure	0.404**
14	Risk orientation	0.486**
15	Economic motivation	0.306**
16	Innovativeness	0.255**
17	Extension participation	0.385**

Conclusion

The study reveals the need for targeted educational and extension programs to improve sugarcane farmers' knowledge in Haryana. Enhancing access to information, increasing social participation, and using media effectively can significantly boost farmers' understanding of key production practices, leading to better productivity and sustainability in sugarcane farming.

Data availability: Data would be made available on request.

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