



An Analysis of Sugarcane Farming and Jaggery Production in Narsinghpur District of Madhya Pradesh vis-a-vis Growers' Characteristics and Economic Motivations

**Prashant Singh Kourav^{a++*}, Kamini Bisht^{a#}
and P. K. Singh^{bt}**

^a Department of Extension Education, JNKVV College of Agriculture, Jabalpur, Madhya Pradesh, India.

^b ICAR-DWR, Jabalpur, Madhya Pradesh, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAEES/2022/v40i121836

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://www.sdiarticle5.com/review-history/96587>

Original Research Article

Received: 28/10/2022

Accepted: 30/12/2022

Published: 31/12/2022

ABSTRACT

The study was conducted in the Narsinghpur district of Madhya Pradesh, encompassing all five tehsils of the district. The findings of the study revealed that the majority of sugarcane growers were middle-aged and had a graduation degree. The average land holding size was medium and the

⁺⁺ Ph.D. Scholar;

[#] Assistant Professor;

[†] Principal Scientist;

*Corresponding author: E-mail: kouravprashantsingh@gmail.com;

area cultivated for sugarcane production was also 1.01 to 2.00 hectares. Sugarcane growers had medium-level experience in cultivation and processing, and the average size of their jaggery unit was medium. They earned medium income from both jaggery and sugarcane sales, and sold jaggery primarily through commission agents at the regular market yard. Approximately 67.67% of the growers had received training in sugarcane production technology, while 85.78% had received training in processing and value addition. The average jaggery unit had medium functionality and employed 15 workers. Over 80% of the growers stated that the profitability in processing sugarcane was the main reason for their diversion towards processing and value addition.

Keywords: Sugarcane growers; value addition; jaggery; processing; training.

1. INTRODUCTION

The sugar industry in India has been a focal point for socio-economic development in the rural areas by mobilizing rural resources, generating employment and enhancing farm income. In India sugar and jaggery is primarily produced from sugarcane, of the total world production, more than 70 percent of the jaggery is produced in India (<https://apeda.gov.in/>). The production of jaggery from sugarcane in India is driven by a number of economic factors, including the availability of raw materials, the demand for jaggery, and the competition in the market. Additionally, jaggery is in high demand as a natural sweetener, which adds to its economic appeal. Competition among producers is also a factor, as they seek to differentiate their products and establish a competitive advantage in the market.

Jaggery production in Madhya Pradesh, India, has been a traditional activity for farmers for many years and continues to be an important source of income and employment. Madhya Pradesh is one of the largest producers of sugarcane in India with 1.10 lakh hectares and production of 5.88 million tonnes and a productivity of 59.47 tonnes per hectare, making it a suitable location for jaggery production [1]. The production of jaggery provides opportunities for farmers to utilize surplus crops, increase their income, employment opportunities and can boost socio-economic development. Narsinghpur District covers around 65 percent of Madhya Pradesh's total sugarcane area (about 60000 ha). There are 9 sugar mills and 1548 registered jaggery units in this district, which is known as Madhya Pradesh's sugar bowl (District Trade and Industry Center, Narsinghpur).

Jaggery processing sector is still largely unorganized, with many small-scale producers and a lack of modern processing techniques. This can lead to inefficiencies and a lower quality

of jaggery compared to other regions. Additionally, the sector faces competition from other states that produce jaggery, and the sector is vulnerable to fluctuations in the price of sugarcane and jaggery. Despite these challenges, there is potential for the jaggery production sector in Madhya Pradesh to grow and develop. For example, by investing in modern processing techniques and improving the quality of jaggery, the sector can become more competitive and increase its market share. Additionally, the sector can benefit from the growing demand for organic and locally produced jaggery. By addressing these challenges and capitalizing on these opportunities, the jaggery production sector in Madhya Pradesh has the potential to contribute significantly to the development of the region.

2. MATERIALS AND METHODS

The study was conducted in Narsinghpur district of Madhya Pradesh. There are five tehsils (Narsinghpur, Kareli, Gadarwara, Tendukheda and Shridham) in Narsinghpur district. All tehsils of the district were selected for the present study. As per the list provided by District Trade and Industry Centre, Narsinghpur (MP), the total number of sugarcane growers with registered jaggery unit in Narsinghpur district are 1548. From every Tehsil 15 percent of respondents were selected. Thus, the sample size for the present study was 232. The qualitative data were interpreted in terms of percentage and quantitative data were tabulated on the basis of approved categorization method i.e. mean and standard deviation.

3. RESULTS AND DISCUSSION

3.1 Profile Attributes of Sugarcane Growers

Majority of sugarcane growers (65.52%) of the study area belonged to middle age group i.e. 36-

55 years. It could be concluded that mostly middle-aged individuals were involved in entrepreneurial activities, whereas younger generation was slowly getting attracted for an opportunity to carry out the sugarcane cultivation and engaged in jaggery enterprises. This result was in line with the findings of Rani et al. [2].

The higher percentage of sugarcane growers (34.91%) were graduates. This data reveals that over 60% of the respondents were educated up to higher secondary level or above [3]. Education can help entrepreneurs make decisions individually or by consulting with others while performing activities and can also help them interpret information.

Further it was found that most of the respondents (45.26%) belonged to medium size of land holding category possessing 4.01 to 10.00 hectare of land [4]. This might be due to agriculture is a main occupation of the study area and most of the farmers inherent land holding

from their ancestors so carry on further the farming occupation.

In case of area under sugarcane crop, the study revealed that higher percentage (35.34%) of sugarcane growers had 1.01 to 2.00 ha. and 34.92 per cent sugarcane growers had 2.01 to 4.00 ha. area cultivated under sugarcane crop [5]. This might be due to the fact that most of the farmers possessed 1.01 to 4.00 ha. category under sugarcane crop and respondents usually need other crops cultivation for avoiding the risk and uncertainty.

The study shows that majority of sugarcane growers (73.25%) had medium production of sugarcane (688.1 to 2534 quintal). The result shows that the average production of sugarcane in the study area was 608.68 quintal per hectare, which is higher than the average production of 594.70 quintal per hectare in Madhya Pradesh [1]. The probable reason could be that good climatic conditions, irrigation water availability and better fertility of soil in the study area.

Table 1. Demographic profile of sugarcane growers

Characteristics	Category	Frequency	Percentage
Age	Young (Up to 35 years)	57	24.57
	Middle (36-55 years)	152	65.52
	Old (Above 55 years)	23	09.91
Education	Illiterate	0	0
	Primary school	11	4.74
	Middle school	15	6.47
	High school	44	18.97
	Higher secondary	72	31.03
	Graduation	81	34.91
	Post graduation	09	03.88
Land holding	Marginal (up to 1 hectare)	0	0
	Small (1.01 to 2.00 ha.)	38	16.38
	Semi medium (2.01 to 4.00 ha.)	82	35.34
	Medium (4.01 to 10.00 ha.)	105	45.26
	Large (10.01 ha. and above)	07	3.02
Area under sugarcane	Up to 1.00 ha.	38	16.38
	1.01 to 2.00 ha.	82	35.34
	2.01 to 4.00 ha.	81	34.92
	4.01 to 10.00 ha.	31	13.36
	10.01 ha. and above	0	0
Production of sugarcane	Low (up to 688 quintal)	28	12.09
	Medium (688.1 to 2534 quintal)	170	73.25
	High (above 2534 quintal)	34	14.66
Experience in sugarcane cultivation	Low (up to 8 years)	42	18.11
	Medium (8.1 to 24 years)	138	59.48
	High (above 24 years)	52	22.41
Experience in sugarcane processing and value addition	Low (up to 5 years)	44	18.97
	Medium (5.1 to 15 years)	169	72.84
	High (above 15 years)	19	8.19

The study reported that more than half of the respondents (59.48%) were having medium level of experience in sugarcane cultivation i.e. 8.1 to 24 years [6]. The probable reason might be due to the involvement of the respondents in sugarcane cultivation from their young age itself.

In case of experience in sugarcane processing and value addition, the study shows that more than seventy per cent of the respondents (72.84%) were having medium experience of sugarcane processing and value addition i.e. 5.1 to 15 year [7]. The probable reason might be they want to adopt new processing technology but they faced some ground level problems like marketing, labour cost etc. when starting the processing and value addition and gain confidence after watching the adoption of same by the innovators.

3.2 Economic Profile of Sugarcane Growers

The results indicated that most of the sugarcane growers (77.16%) had medium size of jaggery unit as the unit had produced 1.4 to 3.7 quintal of jaggery per day [8]. This is likely due to the cottage industry nature of jaggery processing, with less capital investment and medium-length operational period of unit. Production also depends on unit capacity, weather conditions, and sugarcane supply.

Result showed that higher percentage of respondents (76.12%) were having medium income from jaggery sale (Rs. 1.5 to 6.5 lakh) followed by 14.66 per cent were in high income (Rs. 6.5 to 11.5 lakh) categories from jaggery sale [9]. The probable reason might be due to the jaggery manufacturing is one of the important sources of income and also found that jaggery manufacturing is profitable business in the study area. There is lot of scope to enhance the income under jaggery making in the study area.

As evident from the result 60.78 per cent sugarcane growers usually sell some portion of their sugarcane produce directly to sugar mills and higher percentage of sugarcane growers (68.79%) were having medium income (Rs. 61195.1 to 181571) from sugarcane sale followed by 14.66 per cent were in low income (up to Rs. 61195.0) from sugarcane sale. The probable reason might be that all the respondents are involved in jaggery manufacturing and also the price fluctuation of sugarcane is high.

Nearly sixty percent of the sugarcane growers (62.50%) had medium income (Rs. 2.05 to 7.52 lakh) level [10]. Variation of total income directly attributed with the income from jaggery, sugarcane sale and other source, so the respondents with medium level income from jaggery and sugarcane sale having similar level of total income.

In case of marketing of jaggery, the study shows that majority of the respondents (79.31%) sold jaggery to wholesalers through commission agents in the regular market yard. Meanwhile, 72.41% of sugarcane growers sell their jaggery directly to merchants [11]. This is likely due to several reasons: the limited storage capacity of jaggery and its by-products, the need for immediate cash, and the respondents' indebtedness to traders.

Nearly half of the sugarcane growers (54.31%) were having medium duration of functionality of jaggery unit i.e. 43 to 94 days/year [9]. It might be due to the fact that sugarcane crop is harvested after attending maturity, generally it starts from the month of November and continue till the month of March. Other reasons may be duration of functionality of jaggery unit directly attributed with the area under sugarcane crop respondents with 1.01 to 4.00 ha. category so the similar level of duration of functionality of jaggery unit.

Regarding employment provided in jaggery units, result showed that in jaggery units out of total 4039 employees, 25.13 per cent skilled and 74.87 per cent unskilled people were working in jaggery units and each jaggery unit provided employment to total 15 employees (i.e. 4 skilled and 11 unskilled people) in jaggery units [12]. It might be due to the fact that unskilled labour mostly engaged in activities such as cane crushing, juice transfer, bagasse drying and charging, whereas, skilled labour generally engaged in juice concentration, monitoring, cooling and moulding of the prepared jaggery.

3.3 Training in Sugarcane Production and Processing

Training is important for farmers in the sugarcane production and processing as it helps them improve crop yields and quality, increase efficiency and profitability. This leads to the success and sustainability of their enterprise in a competitive market. The study indicates that 157 sugarcane growers (67.67%) have received

training in sugarcane production technology and 199 sugarcane growers (85.78%) had received training in sugarcane processing and value addition.

Table 2. Distribution of respondents on basis of economic profile

Characteristics	Category	Frequency	Percentage
Size of jaggery unit	Small unit (up to 1.3 q/ day)	22	09.48
	Medium unit (1.4 to 3.7 q/ day)	179	77.16
	Large unit (above 3.8 q/ day)	31	13.36
Income from jaggery sale	Low (up to Rs. 151810)	20	8.62
	Medium (Rs. 151810.1 to 658855)	178	76.72
	High (above Rs.658855)	34	14.66
Income from sugarcane sale	Low (up to Rs. 61195)	23	16.32
	Medium (Rs. 61195.1 to 181571)	97	68.79
	High (above Rs. 181571)	21	14.89
Total income	Low (up to Rs. 205620)	54	23.28
	Medium (Rs. 205620.1 to 752586)	145	62.50
	High (above Rs. 752586)	33	14.22
Marketing of jaggery	Wholesalers through commission agents	184	79.31
	Direct to merchants	168	72.41
	Ancillary industries	111	47.84
	Directly to consumers	69	29.74
Duration of functionality of jaggery unit	Up to 42 days	63	27.16
	Between 43 to 94 days	126	54.31
	95 days and above	43	18.53
Employment in jaggery units	Skilled	1015	25.13
	Unskilled	3024	74.87

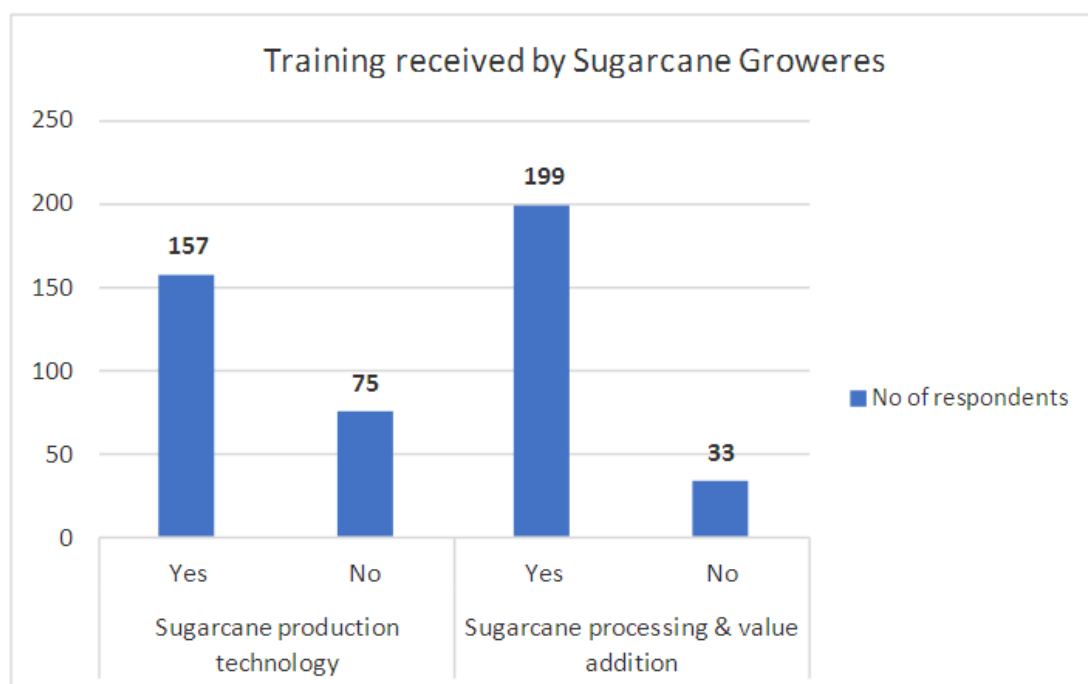


Fig. 1. Training received by Sugarcane Groweres

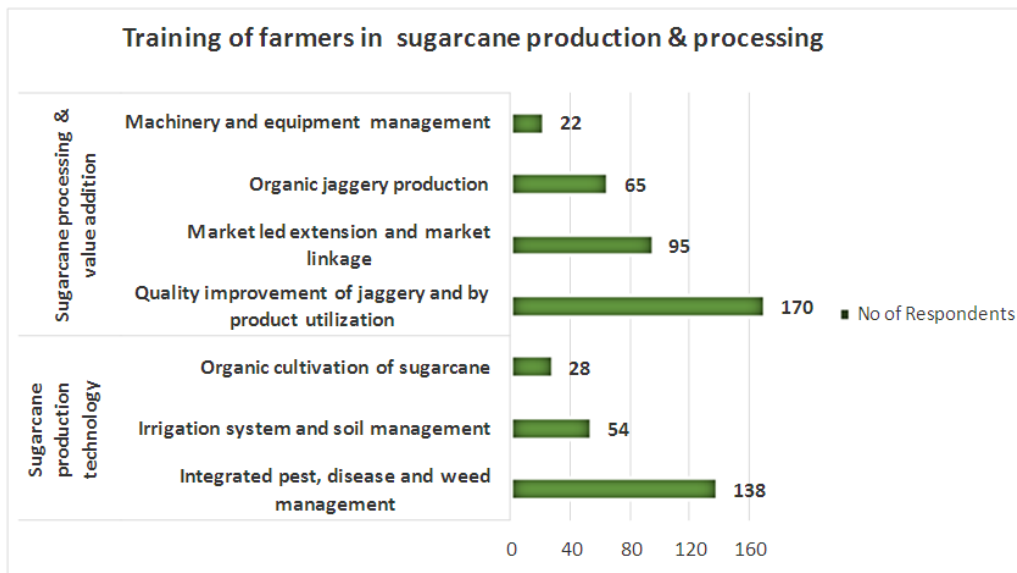


Fig. 2. Training of farmers in sugarcane production & processing

The study evaluated the areas of training that sugarcane growers received. The area of Integrated pest, disease, and weed management was the most popular, with 138 respondents (87.90%) receiving training in this area. Irrigation system and soil management training was also offered, with 54 respondents (34.39%) receiving this type of training. Lastly, 28 respondents (17.83%) received training in organic cultivation of sugarcane. These results show the importance placed on training in various aspects of sugarcane production and management. This is likely due to the importance of training in keeping the respondents updated with the latest information, new production technology, and essential skills necessary for effective management.

With regard to training in areas of sugarcane processing and value addition the results revealed that most popular training was in the area of quality improvement of jaggery and by-product utilization, with 170 respondents (85.42%) receiving this type of training. Market-led extension and market linkage was also an area of focus, with 95 respondents (47.74%) receiving training in this area. Organic jaggery production was another topic of training, with 65 respondents (32.66%) receiving training in this area. Finally, 22 respondents (11.06%) received training in machinery and equipment management. These results highlight the importance of training in improving the

processing and value addition of sugarcane products. The reason behind this is the provision of sufficient training programme in sugarcane processing and value addition by the District Trade and Industry Centre, Krishi Vigyan Kendra and other agencies and non-government organizations.

Training is an essential aspect of successful sugarcane production and processing for farmers. In order to improve the quality and efficiency of their operations, farmers need training in various areas. Some of the key areas of training include best agricultural practices for sugarcane cultivation, harvesting and post-harvest handling, processing techniques, marketing and sales, financial management, and health and safety. In terms of agriculture, farmers need to be trained on aspects such as soil preparation, seed selection, planting and maintenance, pest and disease management, and irrigation. For processing, farmers need to be trained on different processing methods, equipment, and quality control procedures. In addition to these technical skills, farmers also need training in marketing and sales, financial management, and health and safety. By providing training in these areas, farmers can improve the quality of their products, increase their efficiency and profitability, and ensure the sustainability of their operations. The similar findings were reported by [7] and [13].

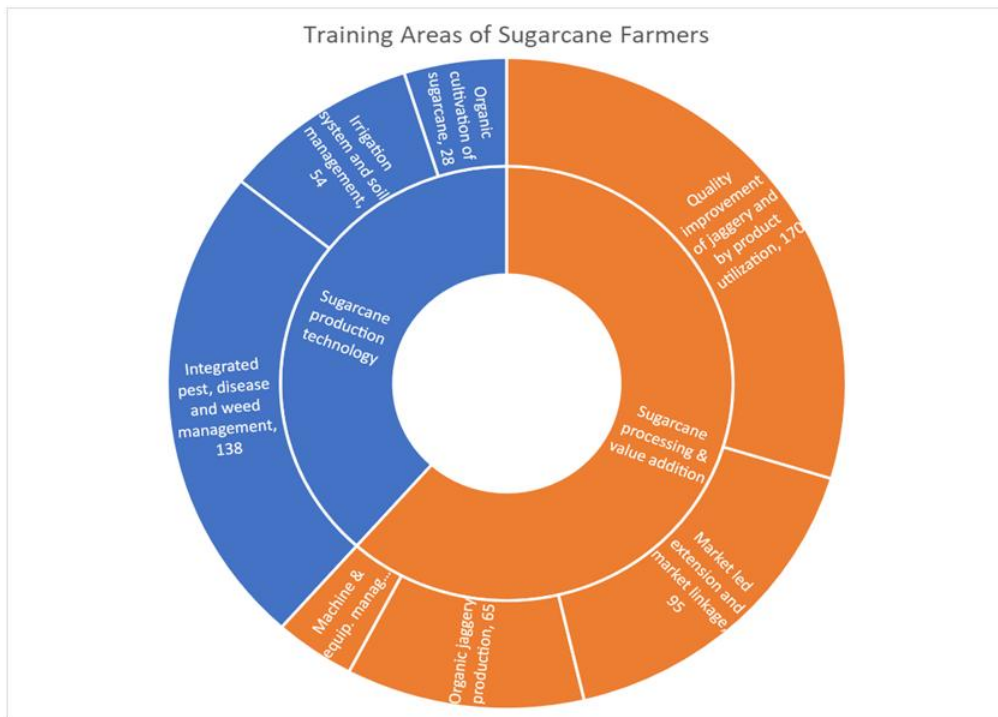


Fig. 3. Training Areas of Sugarcane Farmers

Table 3. Reasons for diversion of sugarcane growers towards processing and value addition of sugarcane

S.No.	Reasons for diversion	Frequency	Percentage	Rank
1.	Processing of sugarcane is more profitable than direct sale	195	84.05	I
2.	No timely payment by the sugar mills	160	68.97	II
3.	Low cost involved in production of jaggery	135	58.19	III
4.	Easy market availability of jaggery and by products	115	49.57	IV
5.	Drudgery and high transportation cost	95	40.95	V
6.	Increased demand of jaggery after one district one product scheme	80	34.48	VI
7.	Difficult rules and parameter of sugar mills	45	19.40	VII

3.4 Reasons for Diversion of Sugarcane Growers towards Processing and Value Addition of Sugarcane at Farm Level

Regarding diversion of sugarcane growers towards processing and value addition of sugarcane more than 80 per cent of sugarcane growers opined that main reason for their diversion towards processing and value addition of sugarcane was the profitability in processing of sugarcane than direct selling followed by no timely payment by the sugar mills (68.97%), low cost involved in production of jaggery and by-

products (58.19%), easy market availability of jaggery and by-products, drudgery and high transportation cost, increased demand of jaggery after one district one product scheme, difficult rules and parameter of sugar mills.

The study findings reveal that there are several reasons why sugarcane growers are diverting towards processing and value addition of sugarcane at the farm-level. One of the key reasons is improved profitability. By processing sugarcane into jaggery or other value-added products, growers can earn a higher profit margin compared to selling raw sugarcane. Another

reason is reduced dependence on middlemen. By processing sugarcane on-farm, farmers easily bypass hassle of selling cane to sugar mill and sell their products directly to consumers or traders, improving their bargaining power and increasing their profits. Additionally, farmers can negotiate better prices for their value-added products compared to selling raw sugarcane, resulting in better price realization. Diversification of products and markets is another reason for the shift towards processing and value addition. By processing sugarcane into various value-added products, growers can diversify their product portfolio and reach new markets, reducing their dependence on a single product or market. Moreover, processing sugarcane into jaggery or other value-added products can reduce post-harvest losses, as the products have a longer shelf-life. Finally, by processing sugarcane on-farm, growers can better control the quality of their products and ensure that they meet the standards of their customers. These reasons demonstrate the potential benefits of processing and value addition of sugarcane at the farm-level and highlight why many sugarcane growers are choosing to divert towards this approach. The similar findings were reported by Nath et al. [14] and Chouksey et al [9].

4. CONCLUSION

The findings revealed that jaggery production has several benefits for farmers, including increased income, utilization of surplus crops, a local market, and employment opportunities which can have a positive impact on the rural economy. The socio-personal profile of farmers, such as age, education, landholding, and training, can impact the processing of sugarcane for jaggery production. For example, older farmers who have been producing sugarcane for many years may have more experience in the processing and production of jaggery, while younger farmers may need more training and support. Farmers with higher levels of education may have a better understanding of modern processing techniques and be able to improve their production processes. By producing jaggery, farmers have access to an additional source of income, helping them to diversify their sources of livelihood. The production of jaggery can create a local market for the product, providing farmers with a stable outlet for their produce. In addition, jaggery production can create employment opportunities in rural areas, particularly during the peak production season. Empirical knowledge derived out of this study

was expected to be directly useful in designing effective extension strategies to improve up on the entrepreneurial behaviour of sugarcane growers. It could be concluded that cultivation of sugarcane and jaggery production is the profitable and there is chance of enhancing the profit with the level of jaggery production. Overall, the socio-personal profile of farmers can play a role in the success of jaggery production in Madhya Pradesh and the impact it has on their livelihoods.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Ahuja M. Agricultural statistics at a glance 2021. Government of India; 2022. Available: www.agricoop.nic.in
2. Rani K, Preethi V and Prassana PK. A study on socio-economic conditions of sugarcane farmers in Aggichenupalli, Chittoor district, Andhra Pradesh. *International Journal of Creative Research Thoughts*. 2021;9(12):119-141.
3. Pal AK, Katiyar R, Singh HC, Rajmani. Socio-Economic Profile of Sugarcane Growers in District Moradabad, Uttar Pradesh, India. *International Journal of Current Microbiology and Applied Sciences*. 2017;6(9):1217-1229.
4. Chavhan MR, Bhartilak KB, Bodake TA. Constraints faced by the sugarcane growers in Yavatmal district. *Journal of Pharmacognosy and Phytochemistry*. 2018b;7(1): 2606-2610.
5. Bor GK, Kalaivani S, Balasubramaniam P and Balaji P. Knowledge and utilization of information and communication technology tools among sugarcane farmers in Erode district, Tamil Nadu. *International Journal of Agriculture Science and Research*. 2020;10(2): 81-90.
6. Dhakad K. A study on entrepreneurial behavior of sugarcane growers of Guna district (M.P.). M.Sc. (Ag) thesis. Rajmata Vijayraje Scindia Krishi Vishwa Vidyalaya Gwalior, Madhya Pradesh; 2018.
7. Shankar MA. Evaluation of RKVY project "establishment of jaggery park in Southern Karnataka" department of agriculture (2008-09 to 2012-13). Karnataka Evaluation Authority. 2017;81& 134.

8. MSME. A Study report on khandsari sugar and jaggery. Ministry of MSME, New Delhi, MSME Development Institute Kanpur; 2018.
Available: <http://msmedikanpur.gov.in/>
9. Chouksey P, Kashyap Y and Sarawgi AK. Economic analysis of gur (jaggery) production in Narsinghpur district of Madhya Pradesh. Bulletin of Environment, Pharmacology and Life Sciences. 2019;8(5):26-30.
10. Raj HPL, Askri SG. Entrepreneurial behaviour of sugarcane growers in Northern Karnataka. Agriculture Update. 2019;14(4):330-333.
11. Shivakumar MT. 2015. Bitter days for jaggery units, workers in Mandya, Karnataka. The Hindu. Available: <https://www.thehindu.com/news/national/karnataka/>
12. Malkunje NM, Lembhe JV and Kharat HV. Marketing analysis of organic and inorganic jaggery in Kolhapur district of Maharashtra. International Journal of Commerce and Business Management . 2017;10(2):129-138.
13. Kamatar D, Bose DK and Iliger KS. Profile characteristics of progressive and non-progressive sugarcane growers. The Pharma Innovation Journal. 2021;10(10): 555-559.
14. Nath A, Dutta D, Kumar P and Singh JP. Review on recent advances in value addition of jaggery based products. Journal of Food Process Technology. 2015;6(4): 1-4.

© 2022 Kourav et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

*The peer review history for this paper can be accessed here:
<https://www.sdiarticle5.com/review-history/96587>*