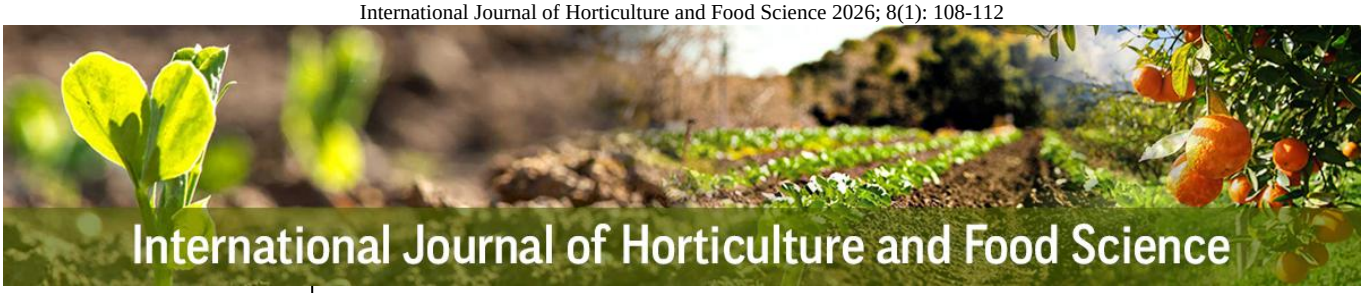

E-ISSN: 2663-1067
P-ISSN: 2663-1075
NAAS Rating (2026): 4.74
www.hortijournal.com
IJHFS 2026; 8(1): 108-112
Received: 13-11-2025
Accepted: 14-12-2025

Siddaram Awaradi S
Post Graduation Scholar, Department of Agricultural Economics, UAS, Raichur, Karnataka, India

Dr. Amrutha T Joshi
Professor and Head, Department of Agricultural Economics, UAS, Raichur, Karnataka, India

Dr. Vijayachandra Reddy S
Assistant Professor, Department of Agricultural Economics, College of Agriculture, Raichur, UAS, Raichur, Karnataka, India

Corresponding Author:
Siddaram Awaradi S
Post Graduation Scholar, Department of Agricultural Economics, UAS, Raichur, Karnataka, India

A study on costs and returns of jaggery production vis-a-vis sugarcane supply to sugar factories: An empirical evidence from Karnataka state

Siddaram Awaradi S, Amrutha T Joshi and Vijayachandra Reddy S

DOI: https://www.doi.org/10.33545/26631067.2026.v8.i1b.462

Abstract
The jaggery industry has been considered as one of the small-scale cottage industries in India. To examine the cost and returns of jaggery production and converting sugarcane processing into jaggery and also to estimate comparative economics and its break even analysis was carried out in Bidar and Belagavi Districts of Karnataka State. The primary data was collected from 60 jaggery producers and 60 sugarcane growers selling their produce to the sugar factories of Bidar and Belagavi districts during the agricultural year 2021-22. Multistage random sampling technique was used for the selection of sample respondents. Findings of the study revealed that, In Bidar district, the total cost incurred per jaggery unit during a crushing season was Rs. 6,58,317 of which, variable cost and fixed cost constituted 92.08 per cent and 7.92 per cent of the total cost, respectively, whereas in case of belgaum total cost was Rs. 1027375. The findings also estimated the Returns per rupee of investment was 2.24 which was higher than that of farmers selling their produce to sugar factories with a ratio of 1.96. Whereas in Belagavi district, returns per rupee of investment was 2.60 which was higher than farmers selling their produce to sugar factories with a ratio of 2.29. Hence the study concluded that jaggery production was a profitable business venture in the study area and suggested the need to undertake research for technology upgradation of jaggery units for increased efficiency and output.

Keywords: Jaggery production, sugarcane, cost and returns, comparative economics, break-even analysis, cottage industry, Karnataka

Introduction
Sugarcane is an important cash crop grown in India. Historically the origin of Sugarcane spp. *Saccharum barberi* is India and of *Saccharum officinarum* is New Guinea. Sugarcane is known to be thriving well in Brazil, India, Australia, Cuba, USA, Philippines, Russia and Indonesia. India is the largest producer of sugarcane and the second largest consumer of sugar. It occupies around 5.06 million hectares of land with an annual sugarcane production of around 405.20 million tonnes with an average yield of 80.07 tons/ha (Anonymous, 2020) [2]. About 7.5 per cent of the rural population, covering about 45 million sugarcane farmers, their dependents and a large number of agricultural labours are involved in sugarcane cultivation, harvesting and allied activities. The sugar industry is the second largest agro-based industry, next only to textiles in the country. There are more than 700 sugar mills installed, which utilize around 4142 lakh tonnes of cane produced which is estimated to produce 33 MMT of sugar and 137 lakh tonnes of molasses (Anonymous, 2019) [1].
Sugarcane is required for sugar and jaggery production. The jaggery industry has been considered one of the small-scale and cottage industries in India. It creates jobs in rural areas and contributes significantly to the economy. It is also used as a sugar substitute in rural areas. Unlike sugar production, jaggery production is simple and does not require a huge investment; utilizes local skills and resources and gives quick returns as it involves less gestation period. It is a rural industry that can be found in traditional sugar cane-growing states such as Maharashtra, Uttar Pradesh, Gujarat, Karnataka, Tamil Nadu, *etc*.
Jaggery (Gur) is a natural, traditional sweetener made by the concentration of sugarcane juice. Consumed mostly by the rural population in India which is a natural mixture of sugar and molasses. Jaggery can be defined as a honey brown coloured raw lump of sugar. It contains all the minerals and vitamins present in sugarcane juice and that is why it is known

as the healthiest sugar.

India is the pioneer in preparation of jaggery from sugarcane juice. In India, the jaggery and khandsari industries are just as significant as the sugar sector. During 2020- 21, India produced more than 400 MMT of sugarcane, of which, roughly 80 per cent was used to make white sugar, 11.29 per cent was used to make jaggery and khandsari, and

8.80 per cent was used to make cane juice, seed cane for the following harvest, and so on. Sugar recovery in India varies from 8.89 to 11.26 per cent, whereas jaggery recovery varies from 10 to 13 per cent depending on sugarcane variety, sugarcane quality, soil texture, irrigation infrastructure, and time of cane crushing, etc. (Chougule *et al.*, 2022) [4].

Jaggery is an unrefined natural sugar that is produced without adding any chemicals. More than 70 per cent of the total world jaggery production is done in India. As the major producer of jaggery, the country has been recognized as one of the leading traders and exporters of jaggery to the world. India exported 551,716.76 MT of jaggery and confectionary products to the world for the worth of Rs. 2797.84 crores during the year 2020-21. Major export destinations are Srilanka, Sudan, Nepal, Nigeria and USA (Anonymous, 2021) [3].

Jaggery is popularly known as the medicinal sugar and is nutritionally comparable with honey. It has been used as a sweetener in ayurvedic practices as medicine for 3000 years. But jaggery also has minerals and vitamins which are lacking in refined sugar. The mineral content of jaggery includes calcium. Phosphorus, magnesium, potassium and iron and traces of zinc and copper (IISR, Lucknow, 2016). The vitamin content includes folic acid and B-complex vitamin.

Karnataka is one of the leading producers of jaggery apart from sugar. Large numbers of jaggery production units are operating in the state. In India, only Uttar Pradesh and Maharashtra produce good jaggery of export quality because they have specialized centres for jaggery production. But Karnataka does not have a such jaggery research centre for quality jaggery production. There are hardly any systematic efforts made in the study area to improve the jaggery industry which is so vital from the point of view of its importance in the economy and greater employment potential. a steady increase in the demand for jaggery since it is not only the chief source of sweetening agents for rural masses but has considerable socio-economic and cultural significance. The production of jaggery has not been able to keep pace with the increasing demand for it. As a result, the price of jaggery has increased sharply in recent years. This study is undertaken to know various aspects of production, marketing and value addition for jaggery. A study of this kind would help in identifying the extent of profitability in production of jaggery. Hence, the present study has been taken up with the following specific objective to workout costs and returns of jaggery production *vis-vis* sugarcane supply to sugar factories.

Methodology

Multistage random sampling technique was adopted in selecting the sample farmers. In the first stage, Bidar and Belagavi districts were selected. In the next statge three taluks were selected from each district. The required 120 samples were collected from three taluks of each districts of which, 60 were those farmers supplying sugarcane to factories and the remaining 60 were jaggery producers.

The primary data were collected from jaggery producers regarding the labour cost, material costs, *etc*., as well as farmers supplying sugarcane to sugar factories. The relevant information on other aspects like fixed assets yields and returns, quantity sold, price realized in production were also collected from the respondents.

The tabular presentation was employed to study cost and returns of jaggery making unit. The data were summarized with the aid of statistical tools like percentages, averages, *etc*., to draw meaningful inferences. Further, Descriptive statistics technique was used for estimating costs and returns. The average cost and returns per jaggery processing unit were computed and compared. Similarly, the cost per unit of jaggery processing was also estimated. Appropriate percentages were worked out for comparison.

Results and Discussion

Cost and returns of jaggery unit

The information furnished in Table 1 reveals the total cost and returns of jaggery units in the study area. The total cost incurred by jaggery units during a crushing season was Rs. 6,58,317 in Bidar and Rs. 10,91,194 in Belagavi, which have been discussed under two categories namely, fixed costs and variable costs. The different items of costs as a percentage of total cost provides relative importance to each cost.

The total variable cost in Bidar was Rs. 6, 06,176 which was 92.08 per cent of the total cost. The total quantity of sugarcane crushed during the season was 327.83 tons. Considering the average cost of production of sugarcane as Rs. 1,175 per tonne, the total cost of sugarcane used for crushing was worked out to be Rs. 3, 85, 204.17 which constituted about 58.51 per cent of the total cost, followed by labour cost (Rs. 1, 65,219.20) which was 25.09 per cent of the total cost.

Operation-wise labour used depicts that cutting and crushing operations require on average 123 and 114 man-days, respectively. Whereas fuel feeding, juice stirring+waste removal and moulding require on average 57 man-days each. Thus it can be concluded that cutting and crushing operation requires high labour requirement than other operations. Among different operations moulding requires a skilled person to judge the endpoint while boiling, hence the person performing this activity received more wages (Rs. 450/day) compare to other labours (Rs. 388.08, 373.91, 424.54 for cutting, crushing and fuel feeding respectively).

The average total cost of major chemicals/ additives used in jaggery production was Rs. 16392.30. Which included hydrous powder (Rs. 11856), Bhendi powder (Rs. 1677.33), lime (Rs. 1246), castor oil (Rs. 827.33) and colouring material (785.63). Among these, the major share was the cost incurred for hydrous powder followed by Bhendi powder and lime. Fuel and electricity charges were Rs. 25,000 which constituted 4.22 per cent of total input costs.

In the Belagavi district, the total variable cost was Rs. 10, 91,194 which constituted 94.15 per cent of the total cost. The total quantity of sugarcane crushed during the season

was 626 tonnes. Considering the average cost of production of sugarcane was 1,035 per tonne, the total cost of sugarcane used for crushing was worked out to be Rs. 6, 47,910 which constituted about 59.37 per cent of the total cost, followed by labour cost (Rs. 2, 91,076.34) which was 26.67 per cent of total input cost used. The results are in line with the results of Sandesh (2009) [7] in their study.

Operation wise labour used depicts that cutting and crushing operations require on average 218 and 163 man-days, respectively. Whereas fuel feeding, juice stirring+waste removal and moulding require on average 109 man-days each. The average total cost of major chemicals/ additives used in jaggery production was Rs. 26065.91. Which included hydrous powder (Rs. 18720), Bhendi powder (Rs. 2496), lime (Rs. 1736), castor oil (Rs. 1313) and colouring material (1800). Among these, the major share was the cost incurred for hydrous powder followed by Bhendi powder and lime. The average fuel and electricity charges were Rs. 37500 which constitutes 3.43 per cent of total input costs in the Belagavi district.

The total fixed cost in Bidar was Rs. 52,141 which was 7.91 per cent of the total cost whereas, in Belagavi, the total fixed cost was Rs. 63,819 which was 5.83 per cent of the total cost. Among the fixed costs, amortized costs accounted for a major share in both districts. Because of the high amount of initial investment in establishing the jaggery unit.

The quantities of inputs utilized by jaggery producers indicated that there existed much difference between the two districts of the study area. The average input cost of jaggery units in the Belagavi district was almost double the cost of jaggery units in the Bidar district. It was mainly because of higher number of crushing days and quantity of sugarcane crushed which was 91.43 per cent more in Belagavi compared to Bidar district. This in turn leads to an increase in usage of other inputs like labour, chemical, fuel and electricity.

The total quantity of jaggery produced was 405 qtls. and 795 qtls. in Bidar and Belagavi, districts, respectively. The net returns obtained by jaggery producers in Bidar was Rs. 7,99,683 (at Rs. 3600/q) and in Belagavi it was Rs. 17,90,681 (at Rs. 3625/q) which was almost double the returns of jaggery producers in the Bidar district. Returns per rupee of investment were 2.22 and 2.64 in Bidar and Belagavi, districts respectively.

Net returns of jaggery producers of Belagavi district were higher than that of Bidar district, It was mainly due to the quantity of sugarcane crushed per jaggery unit which was higher in Belagavi district. Returns per rupee of investment were also more in Belagavi, which was mainly due to higher sugarcane productivity in Belagavi. Which in turn reduced per tonne production cost of sugarcane used as raw material for crushing that in turn reduced the overall cost of jaggery production.

Table 2 indicates the cost and returns per tonne of sugarcane processed into jaggery in the study area. On average processing of one-tonne sugarcane yields 1.24 quintals and 1.27 quintals of jaggery in the Bidar and Belagavi districts, respectively. It was revealed from the table that the cost incurred for processing one tonne of sugarcane was Rs. 2008 and Rs. 1743 in Bidar and Belagavi districts, respectively. The cost of sugarcane and labour were the major components of the total cost, contributing 58.51 per cent and 25.10 per cent in Bidar and 59.37 per cent and 26.68 per cent in Belagavi. Gross returns received from the processing of one-tonne sugarcane was Rs. 4464 and Rs. 4603, and net returns were Rs. 2455 and Rs. 2860 in Bidar and Belagavi districts, respectively.

Net returns per quintal of jaggery produced were 16.49 per cent higher in Belagavi district than in Bidar district which in turn increased the returns per rupee of investment (2.64) of jaggery producers of Belagavi because of the lower cost of production of sugarcane used as a raw material due to higher yields of sugarcane per acre which was 69.48 tonnes in case of Belagavi, whereas in Bidar it was 50.13 tonnes per acre and the higher jaggery recovery rate in Belagavi district (1.27) than Bidar district (1.24). Also, the output produced per jaggery making unit in Belagavi was more hence economies of scale operated which decreased the per quintal cost incurred in the production of jaggery.

Comparative economics of sugarcane supply to sugar factories *vis-à-vis* jaggery production

Sugarcane growers in the study area either go for jaggery production or sell sugarcane to sugar factories. The profitability of cane supply to sugar factories *vis-a-vis* jaggery production in the study area was worked out based on returns per rupee of investment. The results were presented in Table 03.

The cost involved in the production of one tonne of sugarcane was Rs. 1,285 and Rs. 1,109 in Bidar and Belagavi districts, respectively. The Fair and Remunerative Price (FRP) of sugarcane was Rs. 3050 per tonne. By deducting harvesting and transport charges, sugar factories paid an average price of Rs. 2300 and Rs. 2375 per tonne in Bidar and Belagavi districts. The price difference was due to the presence of more number of factories which leads to competition among them in Belagavi. Returns per rupee of investment of farmers supplying cane to sugar factories were 1.79 and 2.14 in Bidar and Belagavi districts, respectively. Whereas in the case of jaggery producers, this ratio was 2.22 and 2.64 in Bidar and Belagavi, which was higher than that of farmers supplying cane to factories. Hence jaggery production is a profitable business venture. Similar results were reported by Rithesh (2013) [5] studied the comparative cost and returns of sugarcane processed for sugar and jaggery

Break-even analysis of jaggery unit

The Break-even analysis technique was used to determine the level of output at which the business makes neither a profit nor a loss (the "break-even point"). Table 4 indicates the break-even output level of jaggery-making units in the study area. The break-even level of output on average was worked to be 271 quintals and 283 quintals in Bidar and Belagavi, respectively which was reached within a year. Similar results were reported by Ramarao (2011) [6] in their study on Economic Appraisal of Manufacturing and Marketing of Jaggery in Andhra Pradesh state, India.

Table 1: Cost and returns of jaggery production (Rs./jaggery unit)

Sl. No.	Particular	Bidar				Belagavi			
		Quantity	Price/ unit	Amount	%	Quantity	Price/ unit	Amount	%
I	**Variable cost**								
A	Sugarcane (tonnes)	327.83	*1175	385204.17	58.51	626	*1035	647910.00	59.37
B	**Labour (operation wise)**								
a.	Cane cutting	123.33	388.08	47860.60	7.27	218.89	375.22	82133.84	7.52
b.	Cane crushing	114.56	373.91	42834.00	6.50	163.89	404.79	66340.60	6.07
c.	Fuel feeding	57.37	424.54	24354.60	3.69	109.46	426.42	46673.50	4.27
d.	Stirring of juice	57.37	424.54	24354.60	3.69	109.46	426.42	46673.57	4.27
e.	Moulding	57.37	450.00	25815.40	3.92	109.46	450.00	49254.93	4.51
Sub total		410	402.99	165219.20	25.09	711.15	409.30	291076.34	26.67
C	**Chemicals / Additives (kg)**								
a.	Lime	89.00	14.00	1246.00	0.21	124.00	14.00	1736.00	0.15
b.	Bhendi powder	3.78	443.35	1677.33	0.25	5.67	440.60	2496.74	0.22
c.	Castor oil (lit.)	39.50	20.95	827.33	0.12	62.10	21.14	1313.16	0.12
d.	Hydrous powder	76.00	156.00	11856	1.80	120.00	156.00	18720.08	1.71
e.	Colouring material	2.62	299.48	785.63	0.11	5.62	320.47	1800.03	0.16
Sub total		210.91	77.72	16392.29	2.48	317.38	82.13	26065.91	2.38
D	Fuel and electricity	25000			3.79	37500			3.43
E	Interest on working capital (7%)	14360			2.18	24824			2.27
Total variable cost		606176			92.08	1027375			94.15
II	**Fixed cost**								
	Land Rent	7000			1.06	8500			0.77
	Depreciation	3167			0.48	3635			0.33
	Amortized cost	41974			6.37	51684			4.73
Total fixed cost		52141			7.91	63819			5.83
III	Total Cost	658317			100	1091194			100
IV	**Returns**								
a.	Jaggery (qs)	405				795			
b.	Price per quintal	3600				3625			
c.	Gross returns	1458000				2881875			
d.	Net returns	799683				1790681			
e.	Returns per rupee of investment	2.22				2.64			

Table 2: Cost and returns of sugarcane processing into jiggery

Sl. No.	Particulars	Bidar		Belagavi	
		Cost (Rs./tonne)	%	Cost (Rs./tonne)	%
I	Fixed cost	159	7.92	101	5.85
II	Variable cost	1849	92.08	1641	94.15
a	Sugarcane	1175	58.51	1035	59.37
b	Labour cost	503	25.10	464	26.68
c	Chemical charges	50	2.49	41	2.39
d	Fuel and electricity	76	3.80	59	3.44
e	Interest on working capital	43	2.19	39	2.27
IV	Total cost	2008	100	1743	100
V	Jaggery produced (q)	1.24		1.27	
VI	Price (Rs./q)	3600		3625	
VII	Gross returns	4464		4603	
VIII	Net returns	2455		2860	
IX	Returns per rupee of investment	2.22		2.64	

Table 3: Comparative economics of jaggery production and sugarcane supplying to sugar factories
(Rs./tonne)

Sl. No.	Particulars	Sugarcane processed into jaggery		Sugarcane supply to factory	
		Bidar	Belagavi	Bidar	Belagavi
1	Cost of sugarcane production	1175	1035	1285	1109
2	Processing cost	834	708	-	-
3	Total cost	2009	1743	-	-
4	Gross returns	4464	4603	2300	2375
5	Net returns	2455	2860	1015	1266
6	Returns per rupee of investment	2.22	2.64	1.79	2.14

Table 4: Break-even analysis of jaggery production

Sl. No.	Particulars	Bidar	Belagavi
1	Establishment cost (Rs.)	532516	655696
2	Variable cost (Rs./q)	1642	1313
3	Price of output(Rs./q)	3600	3625
4	Break even output (q)	271	283

Summary and Conclusion

The average cost incurred by jaggery unit during a crushing season was found to be higher in Belagavi district (Rs. 10,91,194) compared to Bidar district (Rs. 6,58,317) due to more number of crushing days and higher quantity of sugarcane crushed in Belagavi district. Further, the cost of sugarcane constituted around 60 per cent of total inputs cost used in jaggery production unit. However, the cost incurred per tonne of sugarcane processed into jaggery was Rs. 2008 and in Bidar district and Rs. 1743 in Belagavi district which was lower compare to Bidar due to lower input cost and economies of scale. Returns per rupee of investment of jaggery producers were found to be 2.22 and 2.64 in Bidar and Belagavi districts, respectively. Whereas in case of of farmers supplying cane to sugar factories this ratio was 1.79 and 2.24 in Bidar and Belagavi districts, respectively. Hence, jaggery production was more profitable compare to supplying cane to sugar factories. Whereas the findings of Break-even output level was almost similar in both districts, even though fixed cost was more in Belagavi, as the unit variable cost was low due to more quantity of output produced. Hence the study concludes that, jaggery production was a profitable business venture in the study area and suggested the need to undertake research for technology upgradation of jaggery units for increased efficiency and output.

References

1. Anonymous. Indian Sugar Mills Association. New Delhi: Indian Sugar Mills Association; 2019. Available from: www.indiansugar.com
2. Anonymous. Area, production and productivity of sugarcane in India. New Delhi: Indiastat; 2020. Available from: www.indiastat.com
3. Anonymous. Jaggery and confectionery products. New Delhi: Agricultural and Processed Food Products Export Development Authority; 2021. Available from: www.apeda.gov.in
4. Chougule SB, Shirke VS, Giri PR, Dhadwad MB. Constraints faced by jaggery producers regarding production of quality jaggery in western Maharashtra. The Pharma Innovation Journal. 2022;11(2):484-486.
5. Rithesh S. Comparative economics of sugarcane processed for sugar and jaggery. Dharwad (Karnataka): University of Agricultural Sciences; 2013. p. 1-156.
6. Ramarao IVY. An economic appraisal of manufacturing and marketing of jaggery in Andhra Pradesh state. Sugar Technology. 2011;13(3):236-244.
7. Sandesh KC. Production and export competitiveness of jaggery in Karnataka. Dharwad (Karnataka): University of Agricultural Sciences; 2009. p. 1-142.