Knowledge and Adoption about Jaggery Preparation Practices among Sugarcane Growers

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ABSTRACT

Sugarcane is a major cash crop grown after rice in Bhandara district. Jaggery or whole sugar is made from sugarcane juice and thus contains the natural goodness of minerals and vitamins. Maharashtra is one of leading producers of jaggery apart from sugar. Preparation of jaggery from sugarcane is major cottage industry in rural areas of Maharashtra. Majority of the respondents selected for the study possessed medium level of knowledge and adoption about jaggery preparation practices. The correlation analysis revealed that independent variables, namely education, annual income, social-participation, sources of information and market orientation had positive and significant relationship with knowledge. Whereas, occupation, land holding, area under sugarcane and extension participation had non-significant relationship with knowledge. While age and experience of jaggery preparation shows negatively significant relationship with the knowledge and adoption of improved jaggery preparation practices. The variables namely education, area under sugarcane, annual income, extension participation, social participation, sources of information, market orientation and knowledge had positive significant relationship with adoption. While occupation and land holding had shows non-significant relationship with the adoption of improved jaggery preparation practices by the sugarcane growers.

Keywords: Knowledge, adoption, jaggery preparation, and sugarcane growers

INTRODUCTION

Sugarcane is one of important cash crop after cotton in India. As per Indian Institute of Sugarcane Research annual report (Anonymous 2020) Sugarcane occupies over 48.41 lakh hectares in the country with a production of 4003.7 lakh tonnes. Sugarcane in India is processed into sugar, gur, and Khandasari and undergoes considerable weight reduction during processing. Jaggery industry in India is a well-developed industry and one of the largest after textiles. It provides rural employment opportunities and plays an important role in Indian economy. Manufacture of sugar involves many technical aspects and the capital investment is also on the higher side. Compared to this, production of jaggery is very simple and the capital cost is also very limited. Due to its wide applications, the market for jaggery is continuously growing Jaggery is a traditional unrefined non-centrifugal sugar consumed in Asia, Africa & South America. It is made for direct consumption. This type of sugar is a concentrated product of cane juice without separation of the molasses and crystals, and can vary from golden brown to dark brown in colour. Jaggery is prepared in almost all parts of country where sugarcane is grown extensively. It is known by different terms in different parts of the country like Gul, Gud, Jaggery, vellum and Bella. Jaggery is made of the products of both sugarcane and the palm tree. The sugar made from the sap of the date palm is both more prized and less commonly available outside of the regions where it is made. The sago palm and coconut palm are also now tapped for producing jaggery in West Bengal, South India, Pakistan, and Sri Lanka. In Sri Lanka, syrup extracts from Caryotaurens trees are widely used for jaggery production. This is considered the best quality jaggery available in local market and is given a higher value than jaggery coming from other sources. The Indian State of Maharashtra is the largest producer and consumer of jaggery. In Maharashtra most vegetables curries and dales contain jaggery. In rural Maharashtra, water and a piece of jaggery is given when someone arrives home from working under a hot sun. Raw sugarcane juice is slowly simmered in pans & the water is progressively evaporated. Clarification is done using natural vegetable clarification. Scoop the

boiling juice from one pan to another unit the liquid states to go hard carries out this process. The complete process is hygienic, untouched by hands, and most importantly 100 per cent chemical-free.

Objectives

1. To study the knowledge and adoption of jaggery preparation practices among the sugarcane growers

2. To study the relationship of profile of sugarcane growers with their knowledge and adoption of jaggery preparation

METHODOLOGY

The present investigation was carried out in Bhandara district of Eastern Vidarbha region of Maharashtra state. Exploratory research design was used for this study. Out of the total seven tahsils of Bhandara district, Tumsartahsil was selected purposively as maximum jaggery preparation plants were present in working conditions only in

Tumsar tahsil. 12 villages were selected randomly from the selected tahsil on the basis of maximum respondents who were having jaggery preparation plants. From each of the selected villages, 10 respondents were selected by simple random sampling method from only one selected tahsil and thus total 120 jaggery making farmers were selected for the study and considered as respondents in the present study. The data were collected by personal interview with the help of pretested and well-structured interview schedule subjected to appropriate statistical analysis.

RESULTS AND DISCUSSION

Knowledge about jaggery preparation practices by the sugarcane growers

The data pertaining to the practice wise knowledge and adoption of respondents about improved jaggery preparation practices was studied and presented in Table1.

Table 1
Distribution of respondents according to their practice wise knowledge and adoption about improved jaggery preparation practices

Sl. No.	Improved Practices	Knowledge (n=120)		Adoption (n=120)		
		Yes	No	CA	PA	NA
		Freq(%)	Freq(%)	Freq(%)	Freq(%)	Freq(%)
1	**Juice Extraction**					
A	Crushing within 6-12 hrs. after harvesting	120 (100.00)	00 (00.00)	79 (65.83)	35 (29.17)	06 (05.00)
B	Use of Crusher					
	1. Three Roller Crusher	120 (100.00)	00 (00.00)	105 (87.50)	00 (00.00)	15 (12.50)
	2. Modern Gear box Roller	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)	120 (100.00)
	3. Iron	44 (36.67)	76 (63.33)	15 (12.50)	00 (00.00)	105 (87.50)
	4. Stainless steel	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)	120 (100.00)
2	**Juice Filtration**					
	1. Double Filter Assembly	120 (100.00)	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)
	2. Improved Rotary Filter	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)	120 (100.00)

	Storage of juice					
	1. Iron Storage Tank	120 (100.00)	00 (00.00)	50 (41.66)	00 (00.00)	70 (58.33)
	2. Stainless steel/ Plastic Storage	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)	120 (100.00)
	3. Cement Concrete Storage	120 (100.00)	00 (00.00)	70 (58.33)	00 (00.00)	50 (41.66)
4	**Boiling Pan**					
	1. Iron Boiling Pan	120 (100.00)	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)
	2. Stainless steel BoilingPan	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)	120 (100.00)
	3.Dimension(Diameter10.5ft. bottomand11.7ft.Upper)	80 (66.67)	40 (33.33)	73 (60.83)	00 (00.00)	47 (39.17)
	4. Thickness of pan (16 Gauge)	115 (95.83)	05 (04.17)	84 (70.00)	00 (00.00)	36 (30.00)
	5. Plastering the inner side of boiling pan with Udid Flour	95 (79.17)	25 (20.83)	20 (16.67)	55 (45.83)	45 (37.50)
5	**Fuel used for boiling juice**					
	1. Wood	120 (100.00)	00 (00.00)	00 (00.00)	48 (40.00)	72 (60.00)
	2. Sugarcane straw	120 (100.00)	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)
	3. Diesel / Furnace oil	35 (29.17)	85 (70.83)	00 (00.00)	00 (00.00)	120 (100.00)
6	**Chulan/ Furnace**					
	1. Dimension – Round (Diameter 9ft.andDepth5ft.)	70 (58.33)	50 (41.67)	42 (35.00)	25 (20.83)	53 (44.17)
	2. Airwhole4inch(5-8)	90 (75.00)	50 (41.67)	70 (58.33)	00 (00.00)	50 (41.67)
	3.Ordinary/Masonary construction	120 (100.00)	00 (00.00)	95 (79.17)	00 (00.00)	25 (20.83)
	4. Fire bricks/ Boiler Bricks.	65 (54.17)	55 (45.83)	25 (20.83)	00 (00.00)	95 (79.17)
7	**Chimani**					
	1. Ordanary /Masonary construction	120 (100.00)	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)
	2. Shape – Round or Square	120 (100.00)	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)
	3. Dimension – Diameter 6 ft. (bottom)and3ft.(Outer)and height 16ft.)	70 (58.33)	50 (41.67)	42 (35.00)	18 (15.00)	60 (50.00)
8	**Jaggery Preparation**					
	1. pH of juice 5 - 5.5	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)	120 (100.00)
	2. pH meter	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)	120 (100.00)
	3. 150-200 gm. Lime / 5 lit. water/1000 lit. juice	40 (33.33)	80 (66.67)	05 (04.17)	10 (08.33)	105 (87.50)

	4. Use of Mucilage (Vegetable flocculent) Bhendi 2 kg/1000 lit. orBhendi powder 1.6 kg /1000 lit. juice	120 (100.00)	00 (00.00)	95 (79.17)	25 (20.83)	00 (00.00)
	5. Heavy scum appearance after 30-35 min. (Dhormali)	120 (100.00)	00 (00.00)	105 (87.50)	15 (12.50)	00 (00.00)
	6. Phosphoric acid 150 ml. / 1000 lit. juice	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)	00 (00.00)
	7. Removal of secondary scum (Sonmali)	120 (100.00)	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)
9	**Effects of excessuse of chemicals**					
	1. Sulphur content	15 (12.50)	105 (87.50)	00 (00.00)	00 (00.00)	120 (100.00)
	2. Sodium content	120 (100.00)	00 (00.00)	88 (73.33)	00 (00.00)	32 (26.67)
	3. Melting of jaggery	60 (50.00)	60 (50.00)	35 (29.17)	10 (08.33)	75 (62.50)
	4. Fungal growth	34 (28.33)	86 (71.67)	21 (17.50)	00 (00.00)	99 (82.50)
10	**Liquid jaggery (kakavi)**	20 (16.67)	100 (83.33)	00 (00.00)	00 (00.00)	120 (100.00)
11	**Best quality of jaggery preparation**					
	1. Use of 200 ml castor oil or sweet oil /1000 lit. at 105 -110°c Temp.	120 (100.00)	00 (00.00)	90 (75.00)	30 (25.00)	00 (00.00)
	2. Constant stirring to avoid charamelization of jaggery in boiling pan	120 (100.00)	00 (00.00)	77 (64.17)	23 (19.17)	20 (16.67)
	3. Heavy stirring in cooling pit leads to softness	120 (100.00)	00 (00.00)	89 (74.17)	31 (25.83)	00 (00.00)
	4. Jaggery striking point temperature 118 ± 0.5 °c	35 (29.16)	85 (70.83)	00 (00.00)	25 (20.83)	95 (79.17)
	5. Goli test	120 (100.00)	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)
12	**Tipping Mechanism**					
	1. Manually	120 (100.00)	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)
	2. Mechanically	41 (34.17)	79 (65.83)	00 (00.00)	00 (00.00)	120 (100.00)
	3. Semi Solid Mass Stirring in Pit (Wafa)	120 (100.00)	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)
	4. Moulding Before 76°c Temp.	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)	120 (100.00)
13	**Grading of jaggery**					
	1. Colour	120 (100.00)	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)
	2. Taste	120 (100.00)	00 (00.00)	77 (64.16)	22 (18.33)	21 (17.50)
	3. Hardness	110 (91.67)	10 (08.33)	85 (70.83)	20 (16.67)	15 (12.50)

		CA	PA	NA		
	4.Size(1,2,5,10kg)	120 (100.00)	00 (00.00)	00 (00.00)	00 (00.00)	120 (100.00)
	5.Shape(Block,Cube andModak)	40 (33.33)	80 (66.67)	00 (00.00)	00 (00.00)	120 (100.00)
14	**Storage of jaggery**					
	1. Use of Polythenebag	120 (100.00)	00 (00.00)	30 (25.00)	05 (04.17)	85 (70.83)
	2. Use of Gunnybag	120 (100.00)	00 (00.00)	96 (80.00)	00 (00.00)	24 (20.00)
	3. Use of Sugarcane trash	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)	120 (100.00)
15	**Marketing system**					
	1. Local Retail market	120 (100.00)	00 (00.00)	00 (00.00)	40 (33.33)	80 (66.67)
	2. Wholesale market	120 (100.00)	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)
	3. Mall	00 (00.00)	120 (100.00)	00 (00.00)	00 (00.00)	120 (100.00)
	4. Export	00 (00.00)	120 (120.00)	00 (00.00)	00 (00.00)	120 (100.00)

CA –Completely adopted   PA–Partially adopted   NA –Not adopted

1. Juice extraction

It was noticed that all the respondents had knowledge about crushing the cane within 6-12 hours after harvesting and use of iron three roller and only 36.67 per cent respondents had knowledge about iron crusher for crushing the sugarcane, while no one respondents had knowledge about modern gear box roller and stainless steel crusher. It was noticed that nearly two-third (65.83%) of the respondents had completely adopted about crushing the cane within 6-12 hours after harvesting. Whereas, 29.17 per cent partially and only 05.00 per cent of the respondents were not adopted crushing cane within 6-12 hrs. after harvesting with the help of iron three roller crusher. While 12.50 per cent of the respondents were crushing the with iron crusher and no one adopted stainless steel crusher and modern gear box.

2. Juice filtration

It was observed that all the respondents had knowledge about filtration of juice with local double filter assembly. Whereas, all the respondents had no knowledge about improved rotatory filter. It was observed that 100 per cent of the respondents had completely adopted the filtration of juice with local double filter assembly. Whereas, no one adopted improved rotatory filter.

3. Storage of juice

It was noticed that 100 per cent respondents had knowledge about storage of juice in iron and cement storage tank. But no one had knowledge about stainless steel or plastic storage. It was noticed that 58.33 per cent of the respondents had completely adopted cement storage tank for storage of juice. While 41.66 per cent of the respondents were completely adopted iron storage tank for storage of juice and no one had used stainless steel or plastic storage tank for storage of juice.

4. Boiling of juice

It was observed that 100 per cent respondents had knowledge about boiling of juice in iron boiling pan and all the respondents had no knowledge about stainless steel boiling pan. It was noticed that majority (79.17%) of the respondents had knowledge about plastering the boiling pan with Udid/ Black gram flour. It was observed that 100 per cent respondents had completely used iron boiling pan for boiling of juice. stainless steel boiling pan.

It was concluded that majority of the

respondents had partially plastering the boiling pan with Udid/ Black gram flour and only 16.67 per of the respondents were completely plastering boiling pan with udid flour.

5. Fuel used for boiling juice

It was observed that 100 per cent of the respondents had knowledge about use of sugarcane trash and wood for boiling juice.

It was also noticed that only 29.17 per cent of the respondents had knowledge about use of diesel for boiling of juice. It was observed that 100 per cent of the respondents had completely used of sugarcane trash and wood for boiling juice. Only 40.00 per cent of the respondents were used wood partially.

6. Furnace/Chulan

It was observed that 100 per cent of the respondents had knowledge about construction by Ordinary / Masnary and 54.17 per cent respondents had knowledge about use of fire bricks for chulan construction. Majority of the respondents 58.33 and 75 per cent had knowledge about dimension –round with diameter 9 ft. and depth 5 ft. and air whole 4 inch (5-8) respectively. It was observed that 79.17 per cent of the respondents had completely adopted construction by Ordinary / Masnary and 58.33 per cent of respondents had use of fire bricks for chulan construction. Majority of the respondents were adopted air whole 4 inch (5-8) and 41.67 per of the respondents were not adopted air whole 4 inch (5-8).

7. Chimani

It was noticed that 100 per cent of the respondents had knowledge about ordinary / masonary construction of chimani with shape round or square. It was noticed that 100 per cent of the respondents had adopted all dimension for construction of chimani by ordinary / masonry construction with shape round or square.

8. Removal of scum

It was observed that   100 per cent of the respondents had no knowledge about maintain the pH of juice 5-5.5 and also all the respondents had no knowledge about use of pH meter for checking pH. It

was noticed that 100 per cent respondents had knowledge about use of vegetable mucilage (Flocculants) i.e. crushed bhendi plant 2 kg/1000 lit. for removing heavy scum (Dhormali).

It was observed that 100 per cent of the respondents had knowledge about heavy scum appearance after 30-35 min. (Dhormali). And only 33.33 per cent of the respondents had knowledge about use of lime after removal of heavy scum for secondary scum (Sonmali). It was observed that 100 per cent of the respondents did not check the pH of juice 5-5.5 by pH meter. It was noticed that majority of the respondents i.e. 79.17 per cent were used vegetable mucilage (Flocculants) i.e. crushed bhendi plant 2 kg/1000 lit. for removing heavy scum (Dhormali) while only 20.83 per cent respondents were used partially.

It was observed that 100 per cent of the respondents were removed heavy scum appearance after 30-35 min. (Dhormali). No one respondents were used phosphoric acid to removal of secondary scum. And only 04.17 and 08.33 per cent of the respondents were completely and partially used lime for removal of heavy scum for secondary scum (Sonmali), respectively.

9. Effect of excess use of chemicals

It was revealed that the 100 per cent of respondents had knowledge of effect of excess of use chemical like sodium content and 50.00, 28.33 and 12.50 per cent of the respondents had knowledge of effect of excess of use of chemical like melting of jaggery, fungal growth and Sulphur content, respectively. It was concluded that 73.33 and 29.17 and 17.50 per cent of respondents had completely adoption of excess use of sodium content, melting of jaggery and fungal growth, respectively. While, 82.50 per cent and 62.50 per cent of the respondents had no adoption excess of use of chemicals causes of fungal growth and melting of jaggery, respectively. Only 22.67 per cent had no adoption of sodium content by the excess use of chemicals.

10. Liquid jaggery (Kakavi)

It was noticed that majority of the respondents 83.33 per cent had no knowledge about

liquid jaggery (Kakavi). Only 16.67 per of respondents had knowledge of liquid jaggery. It was noticed that all of the respondents were not prepared liquid jaggery (kakavi).

11. Striking point

It was observed that 100 per cent of the respondents had knowledge about use of castor oil or sweet oil 200 ml /1000 lit. but had no knowledge about adding of castor oil exactly at 105-110 C. temp. All the respondents were use it at approximately at 105-110 C. temp.

It was also noticed that 100 per cent of respondents had knowledge about Goli test and heavy stirring in cooling pit leads to softness, respectively. It was observed that 100 per cent of the respondents were used of castor oil or sweet oil 200 ml /1000 lit. Majority of the respondents (64.17%) had adoption of constant stirring to avoid charmelization in boiling pan. While 19.17 and 16.67 per cent were partially and no adoption of constant stirring in boiling pan.

It was also noticed that 100 per cent and 74.17 per cent of respondents had check goli test and heavy stirring in cooling pit leads to softness.

12. Tipping mechanism

It was observed that 100 per cent of the respondents had knowledge about maintain temperature of juice for avoid charmelization use tipping by manually and also 100 per cent of the respondents had knowledge about semi solid mass stirring in pit (wafa). It was observed that 100 per cent of the respondents had used tipping mechanism manually. and also 100 per cent of the respondents had adoption of semi solid mass stirring in pit (wafa).

13. Grading of jaggery

It was noticed that 100 per of the respondents had knowledge about grading of jaggery on the basis of colour, taste and size. 91.67 and 33.33 per of the respondents had knowledge about grading of jaggery to their hardness and shape (Block, Cube and Modak), respectively. It was noticed that 100 per of the respondents had graded jaggery on the basis of colour. While 70.83 and 64.16 per cent of the respondents were grading of jaggey on the basis of hardness and taste.

14. Storage of jaggery

It was observed that 100 per cent of the respondents had knowledge about temporary storage of jaggery by using polythene bag and gunny bag but no one had knowledge about storage of jaggery by using sugarcane trash. It was observed that 80 per cent of the respondents had completely adopted storing of jaggery by using the gunny bag. Whereas, 25.00 per cent and 04.00 per cent of respondents were completely and partially storing of jaggery by using polythene bag, respectively.

15. Marketing system

It was also observed that 100 per cent of the respondents had knowledge about marketing of jaggery in local retail and wholesale market. All the respondents had no knowledge about marketing of jaggery in malls and export. It was also observed that 100 per cent of the respondents had sold the jaggery in wholesale market whereas, 33.33 per cent of respondents were sold it partially in the local market.

Table 2
Distribution of respondents according to their overall knowledge index about jiggery preparation practices

Sl. No.	Knowledge Index level	Respondents (n=120)	
		Frequency	Percentage
1	Low (Up to 33.33)	06	05.00
2	Medium (33.34 to 66.67)	62	51.67
3	High (above 66.67)	52	43.33
	Total	120	100.00

Thus, it was concluded that, majority of the respondents belonged to medium knowledge level followed by high and low knowledge level, respectively. These findings are in line with those of

Itawdiya (2011), Kadam *et al*. (2010), Anuse (2013), Singh (2013), Kumar *et al*. (2018) and Suganya *et al*. (2018).

Table 3
Distribution of respondents according to their overall adoption index level

Sl. No.	Adoption Index level	Respondents (n=120)	
		Frequency	Percentage
1.	Low (up to 33.33)	07	05.84
2.	Medium (33.34 to 66.67)	100	83.33
3.	High (above 66.67)	13	10.83
	Total	**120**	**100.00**

The distribution of the respondents about adoption of improved jaggery preparation practices indicates that Table 3 majority of respondents (83.33%) had adoption of jaggery preparation practices to a medium level and the proportion of respondents appeared in both high and low categories was relatively (10.83%) and (05.84%), respectively. It could thus be inferred that maximum of the respondents were medium in adoption of jaggery preparation practices. Thus, it was concluded that, majority of the respondents belonged to medium adoption level followed by high and low adoption level. Similar findings were

reported by Chouhan *t al.* (2013), Padwal *et al.* (2018), and Rathod *et al.* (2018) stated that medium level of adoption by the farmers.

Relational analysis

On critical examination in Table 4 revealed that amongst selected eleven variables education and market orientation had positive and highly significant correlation with extent of knowledge possessed by the respondents at 0.01 level of probability. Where as age and experience of jaggery preparation were highly significant but negatively correlated with knowledge at 0.01 level of

Table 4
Correlation coefficient of independent variables with their knowledge level

Sl. No.	Variables	"r"values
1	Age	-0.3968**
2	Education	0.3269**
3	Occupation	0.0665 NS
4	Land holding	0.0577 NS
5	Area under sugarcane	0.1671 NS
6	Annual income	0.2137*
7	Experience of jaggery preparation	-0.3804**
8	Extension participation	0.0195 NS
9	Social participation	0.1948*
10	Sources of information	0.1753*
11	Market orientation	0.5857**

*** Significant at 0.01 level of probability   * Significant at 0.05 level of probability   NS- Non significant*

On critical examination in Table 4 revealed that amongst selected eleven variables education and market orientation had positive and highly significant correlation with extent of knowledge possessed by the respondents at 0.01 level of probability. Whereas age and experience of jaggery preparation were highly significant but negatively correlated with knowledge at 0.01 level of probability. Annual income, sources of information and social participation had positive and significant correlation with knowledge of improved jaggery preparation practices by sugarcane growers, but at 0.05 level of probability. Therefore, the null hypothesis was therefore, accepted for these characteristics and stating that there is significant relationship between these characteristics and the knowledge possessed by respondents about improved jaggery preparation practices.

These findings are in conformity with the findings of Naik (2005), Maraddi *et al.,* (2007), Pawar (2008), Pillegowda *et al.,* (2010), Sawale (2011), Anuse (2013), Sarveshkumar *et al.* (2014), Shete (2014), Aglave (2015), Rathod (2017) and Ambavane (2014) were reported that education, annual income, social participation and market orientation were positively significant with knowledge of the respondents. Hence, the hypothesis regarding of these variables is accepted. Shete (2014) observed that farming experience had negative, but significantly related with knowledge. Anuse (2013) and Aglave (2015) showed that age had negative, but significantly related with knowledge. This indicate that knowledge of the respondents was not influenced by the age of the respondents thus, the hypothesis was rejected. The remaining variables such as occupation, land holding, area under sugarcane and extension participation were non-significantly correlated with knowledge about jaggery preparation practices. Hence, hypothesis (H_0) regarding these variables was rejected. These findings were supported by Jadhav (2013), Kajal Bhaltilak (2017), Maraddi *et al.* (2007), Ambavane (2014) and Raviya (2017). The extension participation had non-significant relationship with knowledge about improved jaggery preparation practices, the reason was the majority of the farmers belonged to middle age to old age group which was in an interior area and demonstration on jaggery preparation was not done in the present study area. Hence, the extension participation is very less in that area.

Relationship of selected characteristics of respondents with their adoption.

The correlation coefficients of adoption with personal, socio-economic and psychological characteristics of the respondents have been furnished in Table 5.

Table 5
Correlation coefficients of independent variables with their adoption level

Sl. No.	Variables	"r"values
1	Age	-0.4322**
2	Education	0.4019**
3	Occupation	0.0382 NS
4	Land holding	0.1398 NS
5	Area under sugarcane	0.2453**
6	Annual income	0.2930**
7	Experience of jaggery preparation	-0.4293**
8	Extension participation	0.1770*
9	Social participation	0.2069*
10	Sources of information	0.1868*
11	Market orientation	0.5492**
12	Knowledge	0.8136**

** Significant at 0.01 level of probability   * significant at 0.05 per cent level of probability   NS- Non significant

It is clearly evident from the Table 5, out of 12 the selected variables such education, area under sugarcane, annual income and market orientation were found to be positively and significantly correlated with adoption of improved jaggery preparation practices by the respondents at 0.01 level of probability. Whereas only two variables namely age and experience of jaggery preparation found to have negative, but significant correlation with adoption of improved jiggery preparation practicesby the respondents. While extension participation, social participation and sources of information had positively and significantly correlated with adoption at 0.05 level of probability Therefore, the null hypothesis, was accepted for these characteristics.

These findings are in conformity with the findings of Naik (2005), Rathod (2005), Maraddi *et al.* (2007), Sawale (2011), Lahoti *et al.* (2012), Anuse (2013), Chouhan *et al.* (2013), Shete (2014), Aglave (2015), Bharkhade (2015), Rathod (2017), Joshi (2004), Dhakane (2005), Himadri *et al.* (2018) were revealed that education, area under sugarcane, annual income, extension participation, social participation, sources of information and market orientation were positive and significantly correlated with adoption of improved jaggery preparation practices. Mule (2012), Anuse (2013), Aglave (2015), Barkhade (2015), reported that relationship between age and adoption level was negative and significant. Shete (2014) observed that farming experience was significant and negatively correlated with adoption of the respondents. The remaining characteristics such as occupation and land holding were non significantly correlated with the adoption of improved jaggery preparation practices. Hence, hypothesis regarding these variables are rejected.

These findings are similar to the findings of Jadhav (2013) and Maraddi *et al.* (2007) were revealed that the occupation and land holding of the respondent was non-significant, respectively. Knowledge was found to be positive and significantly correlated with adoption of improved jaggery preparation practices by the respondents by at 0.01 level of probability. It indicated that possession of better knowledge of respondents about improved jaggery preparation practices had its adoption to a greater extent. Because knowledge is a prerequisite to adoption when the individual possesses the knowledge about practices, he adopts it to a greater extent.

CONCLUSION

It was very clear from the study that majority of the jaggery producers had medium level of knowledge and adoption hence, in order to attain higher level of adoption, respondents need be more aware about the improved jaggery preparation practices. Therefore, it can be said that the extension agencies have to focus more on different productive programmes and activities to convert the knowledge of the jaggery producers into the decision of adoption.

Among the selected variables education and market orientation had positive and highly significant relationship with knowledge of the respondents regarding recommended package of practices at 0.01 per cent level of probability, Whereas, annual income, social participation and sources of information had positive and significant relationship with knowledge of respondents regarding recommended package of practices at 0.05 per cent level of probability.

The selected characteristics of respondents like education, area under sugarcane, annual income, market orientation and knowledge were positive and highly significant correlation with the adoption of improved jaggery preparation practices at 0.01 level of probability. Extension participation, social participation, sources of information was significant correlation with the adoption of improved jaggery preparation practices at 0.05 level of probability.

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