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Knowledge level of recommended rice cultivation practices among the cultivators

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Abstract
The study was conducted in randomly selected Bhandara District of Vidarbha region. In Bhandara District there are seven talukas. Out of these three talukas Lakhani, Lakhandur and Sakoli were selected. The study revealed that respondents were middle-aged, Majority of farmers 24.17 percent, had completed middle school, 45.00 percent were small farmers, It was found that 68.34 percent of farmers had an annual income that ranged from Rs.46,632 to Rs.1,113.35. It was determined that, 43.34 percent of the farmers were small farmers who cultivated rice, around 57.51 percent of farmers had medium farming experience, 56.66 percent, had a medium level of social participation, 56.66 percent of the respondents had medium extension contacts, majority 48.33 percent of farmers were found to have a medium level of cosmopoliteness. 55.83 percent had a medium level of innovativeness and knowledge of rice production technology revealed that 53.33 percent of farmers had a medium level of knowledge, 24.17 percent had a high level of knowledge and 22.50 percent had a poor level or low level of knowledge about rice production.

Keywords: Knowledge level, rice cultivation, recommended practices, cultivators

Introduction
Rice (*Oryza sativa*) is the most widely consumed stable food, accounting for more than half of the world's population. The significance of rice as a primary food source stems from the realization that rice-based industry systems are critical for food security, poverty alleviation and improved livelihood. Rice is grown in India during cropping seasons winter and summer. Rice accounts for 20 percent of the world's dietary energy supply, while wheat accounts for 19 percent and maize (corn) accounts for 5 percent. Rice is the most important food crop in terms of human nutrition and caloric intake, accounting for more than one-fifth of all calories consumed globally by humans. Rice, a monocot, is typically grown as an annual plant, but it can survive as a perennial plant in tropical areas. Rice plants can grow to be 1-1.8m (3-6 ft.) tall, sometimes more depending on variety and soil fertility.

It is grown on an area of 164.19 million hectares worldwide, with an annual production of approximately 505.4 million tons. Asia is the world's largest continent, producing and consuming more than 90% of the world's rice.

Maharashtra is a significant rice producing state in central India. Cultivation is almost entirely mono-crop, with rice accounting for approximately 97 percent of food grain production and approximately 80 percent of total cropped area. The state has 14.99 lakh hectares of rice land, producing 32.37 lakh tons with a productivity of 2.01 tons per acre in 2020-21. (Statistical Abstract, Maharashtra, 2021).When compared to the national average, Maharashtra's rice productivity is very low.

The area (7.32 lakh ha) of rice crop is more in Vidarbha region. The highest productivity was observed in konkan region, the average productivity of rice crop is lowest. i.e.0.41t/ha. Around 7 lakh hectares comes under rice production in the Vidarbha region in the districts of Nagpur, Gondia, Gadchiroli, Bhandara and Chandrapur. Resulting in a yield of 14 lakhs (m/t).

In Bhandara district around 175403 area (ha) under rice cultivation, with production of 239775 (MT) and productivity of 13.67 (Qt/ha). (2021-22) In this area Alfisols (Reddish brown) soil is present with PH of 6.5 to 7.5, Medium water holding capacity and low in available nutrient.

The low rice productivity can be attributed to a number of factors. It would be preferable to raise productivity. The development of high yielding and resistant varieties alone will not result in a rapid increase in rice production. Rice yield potential can be realized when farmers are aware of a set of practices recommended by scientists. Farmers must have correct, reliable,

and sufficient knowledge about the rice crop package of practices because assimilation of technological knowledge and its actual adoption are the basic inputs for achieving higher yield. Knowledge of innovation is essential because it motivates people to use technology. With the following objectives the study was conducted.

Objectives

1. To study the profile of rice cultivators.
2. To know the extent of knowledge level of recommended rice cultivation practices among the cultivators.

Methodology

The present study was conducted in Lakhani, Sakoli and Lakhandur talukas of Bhandara District in Vidarbha region of Maharashtra. The study was conducted in randomly selected Bhandara District of Vidarbha region. Out of seven talukas three talukas i.e Lakhani, Lakhandur and Sakoli were selected as area and rice production was more in these regions. The names of village which come under the selected talukas were collected from secondary source and also obtain the desired no of respondents of village.

The interview was designed around the objectives in order to collect data from respondents. After reviewing relevant literature and consulting with advisory committee, the schedule was finalized. The information was gathered through face-to-face contact with the farmers who were chosen. the assistance of local leaders, Gramsevak, Talathi, Agricultural Assistants from the State Department of Agriculture, and Revenue offers was sought. The data collected from respondents using the personal interview schedule was processed by creating primary and secondary tables. The qualitative information was converted into quantitative form, and scores were computed for each of the independent and dependent variables.

The statistical tests used in the present study for analysis of data were Frequency, Percentage, Mean, Standard deviation and Coefficient of correlation

Results and Discussion

The results are presented under the following major heads.

1. Profile of rice cultivators.
2. Extent of knowledge level of recommended rice cultivation practices among the cultivators.

Profile of rice cultivators

1. Age

Table 1: Distribution of respondents according to their age.

Sr. No	Category	Frequency	Percent
1	Young (Up to 37 years)	25	20.83
2	Middle (38 to 57 years)	67	55.83
3	Old (Above 57 years)	28	23.34
	Total	120	100.00

The data presented in Table1indicated that majority (55.83%) of the rice cultivators belonged to middle age group, followed by old and young age (23.34%) and (20.83%) groups, respectively.

It is concluded that half (55.83%) of the rice respondents belonged to middle age group. The probable reason might be that this age is considered to be an actively working age of the rice cultivators and being responsible for maintaining their families.

These similar findings were also reported by Maida (2015), Prajapati (2016) [16] and Kushwah (2016) [14].

2. Education

Table 2: Distribution of respondents according to their education

Sr. No	Category	Frequency	Percent
1	Illiterate	8	6.69
2	Can read only	10	8.33
3	Can read and write only	14	11.66
4	Primary	23	19.17
5	Middle	29	24.17
6	High School	21	17.50
7	Graduate	15	12.50
	Total	120	100.00

With regard to educational qualification, it is evident from Table 2 that 24.17 percent of farmers were educated up to middle school, followed by 19.17 percent of farmers were educated up to primary school and 17.50 percent were educated up to high school, whereas 12.50 percent of farmers were educated up to graduation level, while 11.66, 8.33, 6.69 percent of farmers were can read and write only, can read only and illiterate, respectively.

The most likely reason is that most of the village's educational facilities were available only up to the primary level, and it was not possible for them to complete higher education due to their family income level. Furthermore, for graduation level education, they must travel to tahsil headquarters or other nearby locations, increasing the financial burden on the family.

These findings were similar with Deshmukh (2014) [3] and Shinde (2014) [21].

3. Land holding

Table 3: Distribution of respondents according to their size of land holding

Sr. No	Land holding	Frequency	Percent
1	Marginal farmers	34	28.35
2	Small farmers	54	45.00
3	Semi-medium farmers	26	21.66
4	Medium farmers	5	04.16
5	Large farmers	1	00.83
	Total	120	100.00

As regard land holding of the farmers, it is observed from Table 3 that 45.00 percent of farmers were small farmers (1.01 to 2.00 ha), followed by 28.35 percent of farmers were marginal farmers (up to 1.00 ha), 21.66 percent of farmers were Semi-medium farmers (2.02 to 4.00 ha), followed by 04.16 percent of farmers were medium farmers (4.01 to 10 ha) and 00.83 percent of farmers were large farmers (above 10 ha).

The most likely reason is that land holdings are shrinking day by day due to fragmentation of land, which is caused by family division. The size of land holdings is shrinking due to increased population pressure and partition could be the cause of the small land holding.

These observations were similar with findings of Khupse (2012) [3] and Ekale *et.al.* (2015) [5].

4. Annual income

Table 4: Distribution of respondents according to their annual income

Sr. No	Annual income	Frequency	Percent
1	Low	21	17.50
2	Medium	82	68.34
3	High	17	14.16
	Total	120	100.00

The data present in Table 4 indicated that 68.34 percent of the farmers were having medium annual income between (Rs. 46,632 to Rs. 1,11,335/-) However, 17.50 percent of farmer were having low annual income (up to 46,631), while 14.16 percent of farmers were having high annual income category (above 1,11,335).

This could be because farming is the primary source of income for the majority of respondents. They must rely primarily on their medium land holdings, whereas productivity is low for one reason or another and marketing facilities are also inadequate.

These observations were same as Jamadar (2012) [10], Godale (2013) [7], Deshmukh (2014) [21], Ekale *et al.* (2015) [5] and Ghuge (2015) [6].

5. Area under rice cultivation

Table 5: Distribution of respondents according to their area under rice cultivation

Sr. No	Category	Frequency	Percent
1	Marginal farmers	39	32.50
2	Small farmers	52	43.34
3	Semi-medium farmers	24	20.00
4	Medium farmers	5	04.16
5	Large farmers	0	00.00
	Total	120	100.00

It was seen from Table 5 that, 43.34 percent were small farmers (1.01 to 2.00 ha), while 32.50 percent were marginal farmers (up to 1.00 ha), 20.00 percent were semi-medium farmers having (2.02 to 4.00 ha), however 04.16 percent were medium farmers (4.01 to 10 ha), and large farmers have no area under rice cultivation.

This observation is similar to Dhenge (2013) [4].

6. Farming Experience

Table 6: Distribution of respondents according to their farming experience

Sr. No	Farming Experience	Frequency	Percent
1	Low	25	20.83
2	Medium	69	57.51
3	High	26	21.66
	Total	120	100.00

It revealed that from Table 6 that about 57.51 percent of farmers were having medium farming experience (14 to 30 years), followed by 21.66 percent of farmers were having high farming experience (above 30) and 20.83 percent of farmers were having low farming experience (up to 13). The findings seem too obvious that increasing the experience in any occupation better is the knowledge and mastery over skills and there by better adoption.

This finding was similar as, Onojah *et al.* (2013) [17] and Jamdhade *et al.* (2016) [11].

7. Social Participation

Table 7: Distribution of respondents according to their social participation

Sr. No	Social Participation	Frequency	Percent
1	Low	24	20.00
2	Medium	68	56.66
3	High	26	23.34
	Total	120	100.00

It is noticed from Table 7 that higher proportion of farmers 56.66 percent were having medium level of social participation, followed by high level of social participation (23.34%), while 20.00 percent of the farmers were having low level of social participation.

The most likely explanation for these is that the majority of them were members of only a few organisations, such as cooperative societies, Gram panchayats, milk cooperative societies, and so on. Another reason for medium social participation could be a reluctance to participate in formal and non-formal organisations due to the dominance of higher caste, higher income groups, and higher socioeconomic status people, as well as a lack of time to participate in various organisations. Low levels of social participation were caused by a lack of interest and time, as well as a lack of perceived benefits and local politics.

The findings of the study were similar with Hipparkar (2015) [8] and Kadam (2016) [2].

8. Extension Contact

Table 8: Distribution of respondents according to their extension contact.

Sr. No	Extension Contact	Frequency	Percent
1	Low	23	19.17
2	Medium	68	56.66
3	High	29	24.17
	Total	120	100.00

From Table 8 clearly indicates that, 56.66 percent of them had medium extension contact, followed by 24.17 percent having high extension contact and 19.17 percent respondents were having low extension contact.

The probable reason for the majority of respondents falling in to medium category of extension contact is their eagerness to solve their problems with Gram sevak, agriculture assistants, and good contact with various technical officers, as well as their interest in and good contact with extension workers. Respondents received more information about rice production practices from relatives, friends, Agriculture Assistants, Agriculture Officers, KVKs, and NGOs, allowing them to increase their extension contact.

This finding is favours to the finding of Mahatab (2010) [15].

9. Cosmopoliteness

Table 9: Distribution of respondents according to their Cosmopoliteness

Sr. No	Cosmopoliteness	Frequency	Percent
1	Low	39	32.50
2	Medium	58	48.33
3	High	23	19.17
	Total	120	100.00

It is observed from Table 9 that majority (48.33%) of farmers had medium level of cosmopoliteness, whereas 32.50 percent of farmers had low level of cosmopoliteness, followed by 19.17 percent of the farmers were having high level of cosmopoliteness.

Majority of the respondents have medium level of education, so that they had less contact with any information centers. Also their relative lives in village, so that they having less contact with other external commodities.

This finding was same as Chandregowda (1997) [2].

10. Innovativeness

Table 10: Distribution of respondents according to their innovativeness

Sr. No	Innovativeness	Frequency	Percent
1	Low	24	20.00
2	Medium	67	55.83
3	High	29	24.17
	Total	120	100.00

It is revealed from Table 10 that majority 55.83 percent of the respondents had medium level of innovativeness, followed by high 24.17 percent and low level of innovativeness 20.00 percent. Thus, it can be concluded that a more of the rice cultivators had medium level of innovativeness.

The possible reason for this trend might be that the cultivators with higher education were able to update their knowledge and skills time to time and are ready to accept the new technologies in their farming. On the other side, the illiterates and resource poor cultivators might be lacking the knowledge to adopt such technologies.

This finding was in line with the findings reported by Mahatab (2010) [15] and Arathy (2011) [1].

Extent of knowledge level of recommended rice cultivation practices among the cultivators.

Knowledge is an important variable which determine the use and application of agricultural technology.

Table 11: Distribution of respondents according to their knowledge about rice production technology

Sr. No	Particulars	Frequency	Percent
(A)	**Preparatory tillage**		
1	Selection of soil	108	90.00
2	Application of FYM/ compost (10 tonnes/ha)	104	86.67
3	Green manure in puddling (10 tonnes/ha).	110	91.67
4	Application of (dhaincha/boru) during puddling process	117	97.50
(B)	**Seed**		
5	Recommended variety for rice cultivation	97	80.83
6	Seed rate (100kg/ha)	117	97.50
(C)	**Seed treatment**		
7	Seed treatment with azatobacter (25g/kg)	79	65.83
(D)	**Sowing**		
8	Most commonly recommended method for rice cultivation	118	98.33
9	Method of nursery planting preparation	115	95.83
(E)	**Application of biofertilizer (organic fertilizer)**		
10	Application of biofertilizer for rice cultivation	89	74.16
11	Application of Blue green algae after rice planting (8 to 10 DAS)	68	56.66
12	Application of organic fertilizer (vermicompost/manure)	101	84.17
(F)	**Application of Chemical fertilizer**		
13	Recommended dose of fertilizer (NPK 100: 50: 50 kg/ha)	80	66.67
14	Application of fertilizer at the time of sowing	112	93.33
15	Application of fertilizer in standing rice crop	98	81.67
(G)	**Irrigation management**		
16	Recommended water level in rice field (5cm)	94	78.33
(H)	**Weed management**		
17	Most weed found on rice cultivation	54	45.00
18	Recommended weedicide (Butachlor 3.75 lit/ha)	67	55.83
19	Recommended machine for weed remover	40	33.33
(I)	**Plant protection measure**		
20	Major pest of rice (Nephotettixvirence)	102	85.00
21	Pesticide for (Nephotettixvirence) Quinalphos 5%	98	81.67
22	Major disease of rice (*Xanthomonas campestris* pv *oryzae*)	106	88.33
23	Insecticide for (*Xanthomonas campestris* pv *oryzae*) Tricyclazole 75WP	97	80.83
(J)	**Harvesting Threshing and yeild**		
24	Proper stage of threshing after harvesting	87	72.50
25	Grain storage	120	100.00
26	Average yield 20 to 25 (Qtl/ha)	107	89.17

(A) Preparatory tillage
It was observed from the Table 11 that 90.00 percent of respondent had knowledge about suitable soil for cultivation of rice crop, 86.67 percent of respondent had knowledge of application of FYM/ compost, 91.67 percent of respondent had knowledge about Green manure in puddling and 97.50 percent of respondent had knowledge about application of (dhaincha/boru) during puddling process.

(B) Seed
It is observed from Table 11 that 80.83 percent of respondent had knowledge of variety for rice cultivation, while 97.50 percent of respondent had knowledge about seed rate of rice cultivation.

(C) Seed treatment
It was noticed Table 11 that 65.83 percent of respondent had knowledge of seed treatment with azatobacter.

(D) Sowing
Regarding sowing it was revealed from Table 11 that 98.33 percent of respondent had knowledge about method for rice cultivation and 95.83 percent of respondent had knowledge of method of nursery planting preparation.

(E) Application of biofertilizer
It is observed from Table 11 that 74.16 percent of respondent had knowledge of application of biofertilizer for rice cultivation, while 56.66 percent of respondent had knowledge about application of Blue green algae after rice and 84.17 percent of respondent had knowledge about application of organic fertilizer.

(F) Application of Chemical fertilizer
It was also observed Table 11 that 66.67 percent of respondent had knowledge about recommended dose of fertilizer, 93.33 percent of respondent had knowledge of application of fertilizer at the time of sowing while 81.67 percent of respondent had knowledge about application of fertilizer in standing rice crop.

(G) Irrigation management
It was observed from Table 11 that 78.33 percent of respondent had knowledge about recommended water level in rice field.

(H) Weed management
It was noticed Table 11 that 45.00 percent of respondent had knowledge of weed found on rice cultivation, while 55.83 percent of respondent had knowledge about recommended weedicide for rice cultivation and 33.33 percent of respondent had knowledge of recommended machine for weed remover for rice cultivation

(I) Plant protection measure
It was clearly revealed Table 11 that 85.00 percent of respondent had knowledge about major pest of rice, while 81.67 percent of respondent had knowledge of Pesticide for rice cultivation, 88.33 percent of respondent had knowledge about major disease of rice and 80.83 percent of respondent had knowledge of Insecticide for rice cultivation.

(J) Harvesting Threshing and yield
Further it was noticed from Table 11 that 72.50 percent of respondent had knowledge about proper stage of threshing after harvesting, while 100.00 percent of respondent had knowledge of grain storage and 89.17 percent of respondent had knowledge about yield of rice per hectare.

Overall knowledge level

Table 12: Distribution of respondents according to their level of overall knowledge about rice production technology

Sr. No	Category	Frequency	Percent
1	Low (up to 16)	27	22.50
2	Medium (17 to 19)	64	53.33
3	High (above 19)	29	24.17
	Total	120	100.00

From Table 12 it was observed that majority 53.33 percent of farmers had possessed medium level of knowledge followed by 24.17 percent of respondents had high and 22.50 percent had low level of knowledge about rice production technology. From above observation finding showed similarity with Dhenge (2013) [4], Prodhan, *et al.* (2017) [20], Prashanth *et al.* (2018) [19]

Conclusions
The study conducted that respondents were middle-aged, Majority of farmers 24.17 percent, had completed middle school, 45.00 percent were small farmers, It was found that 68.34 percent of farmers had an annual income that ranged from Rs.46,632 to Rs.1,113.35. It was determined that, 43.34 percent of the farmers were small farmers who cultivated rice, around 57.51 percent of farmers had medium farming experience, 56.66 percent, had a medium level of social participation, 56.66 percent of the respondents had medium extension contacts, majority 48.33 percent of farmers were found to have a medium level of cosmopoliteness. 55.83 percent had a medium level of innovativeness.
Knowledge of rice production technology revealed that 53.33 percent of farmers had a medium level of knowledge, 24.17 percent had a high level of knowledge and 22.50 percent had a poor level or low level of knowledge about rice production technology.

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