



## Research Article

# ADOPTION LEVEL OF SELECTED AGRICULTURAL TECHNOLOGIES OF RICE CROP BY WARLI TRIBAL FARMERS

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**Abstract-** The present study was conducted in Thane district of Konkan region of Maharashtra state. The objective of the study was to assess adoption level of selected agricultural technologies of rice crop by Warli Tribal farmers. Out of fifteen tehsils, two tehsils were selected on the basis of higher production of rice. From each selected tehsil, six villages were selected on the basis of higher production of rice. Total twelve villages were selected randomly. From each selected village 10 rice growers were selected from each village making a total sample of 120 farmers. The data were collected through personal interview method. The result of the study showed that 58.33 per cent of the respondents had 'partially' adopted high yielding varieties like Karjat-3, Palghar-1, Ratna, Karjat-1, Sahyadri-1, Sahyadri-3. Large majority of (91.66 per cent) the respondents had 'not' adopted Use of urea bricks and about 91.66 per cent of the respondents had 'not' adopted after transplanting use of urea bricks at 7-10cm depth by hand, in square of four seedlings within same day, large majority (85 per cent) of the respondents had 'not' adopted the practice 'Releasing trichocard as egg parasite, 85.83 per cent of the respondents had 'not' adopted the practice, application of insecticides such as carbofuran, phorate or quinalphos, also the practice of at nursery stage spray quinalphos 25 E.C. @ 1600 ml/ 250 liters of water, respectively, 85 per cent of the respondents had 'not' adopted the practice of use of *Trichoderma spp* and *bacillus spp*, 81.66 per cent of the respondents had 'not' adopted the use of Pankaj puddler, 95.00 per cent of the respondents did 'not' adopted the use of husk operated Chula. Regarding extent of adoption, 70.83 per cent of the respondents had 'medium' adoption of the selected agricultural technologies of rice crop, while 15.00 per cent and 14.17 per cent of the respondents had 'high' and 'low' adoption, respectively.

**Keywords-** Adoption level, agricultural technologies, rice crop, Warli Tribal farmers.

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## Introduction

India has the second largest tribal concentration with population of 8, 43, 26,240 in the world after Africa (census 2001). There are altogether 461 tribal communities in all over India. The total population of Maharashtra, as per the 2001 Census is 96,878,627. Of this, 8,577,276 (8.9 per cent) are Scheduled Tribes (STs). The ST population of the state constitutes 5.1 per cent of the country's ST population. The growth rate of ST population of Maharashtra in the decade 1991-2001 was at 17.2 per cent is lower in comparison to the overall 22.7 per cent of the state population as a whole [1]. As per the 2001 Census, 87.3 per cent of the ST population of Maharashtra is residing in the rural areas. Among major STs, Bhil have the highest (95.2 per cent) rural population, followed by Kokna (93.4 per cent), Warli (92.7 per cent), Gond (87.5 per cent), Thakur (86.3 per cent) and Mahadev Koli (80.3 per cent). Warli population in Maharashtra is 627197 and the 65 per cent Warli population is in Dahanu and Talasari talukas of Thane district of Maharashtra [2]. The Warli is an indigenous Tribe of people who lived in the Thane District of Maharashtra for centuries. Warli Tribes are originally hunters and live in the forest, deforestation is the main reasons for the cultivation of paddy crop. The first rain in June announces the birth of a new cycle of life. The seeds are sown and the first seedling that sprouts is celebrated as a gift from Dharitri [Mother Earth] with a rite known as *Kaavali Khaane*. *Kaavali* the first plant is cooked into a curry and shared by all the family members. Transplanting of seedlings takes place after this rite has been performed. From June to September,

the Warli are busy in their fields, managing water, weeding, tightening plants that have become loose, choosing away rodents and cutting the abundance of grass and storing them for their cattle. From the month of Bhadrapaksha (September) Warli Tribes harvested the crops, but only after Saavri, the field goddess is thanked for her generosity. After harvesting, it is time to celebrate Diwali [3]. Entire clans come together under the same roof and prepare to cut the newly harvested grain for the first time. Rice is the second largest important food crop next to Jowar in Maharashtra. In Maharashtra state, rice is grown in the coastal districts of Konkan region as a main crop, as the average rainfall is about 3500 mm. it accounts 4.136 lakh hectares area with an annual rice production 15.10 lakh tonnes. The average productivity of the area is 2.56 t/ha [4]. Adoption is not a simple process as it involves sequence of thoughts and actions. The factors that influence adoption of new technology are economic, social and socio-psychological, social values of farmers also assume an important place in the adoption process.

## Methodology

Present study was carried out in Thane district of Konkan region of Maharashtra state. Two tahsils from Thane district were randomly selected where there was concentration of Warli tribe. From each selected tahsil six villages were randomly selected, applying the criterion of maximum tribal population. Thus, total 12 villages were selected. From each selected village 10 respondents were selected

randomly. Thus, total 120 respondents were randomly selected for this study. Ex-post facto study design was used. Adoption is degree of actual use of rice cultivation practices. It was measured on three-point continuum as full adoption, partial adoption and non-adoption by assigning the score of 2, 1 and 0, respectively. The adoption score were then converted into adoption index by applying following formula,

**Adoption index= Obtained Adoption score/ Maximum Obtainable Adoption score x 100.**

The obtained final scores were categorized into three groups namely, 'Low', 'Medium' and 'High', considering the mean and standard deviation[5].

## Results and Discussion

**Table-1 Agricultural technology adopted by Warli tribal farmers.**

Sl. No	Particulars	Adoption (N = 120)		
		Full	Partial	No
<b>1</b>	<b>Use of high yielding variety</b>			
1.1	Karjat3 or Palghar or Ratna or Karjat1 or Sahydr1, or Sahydr1-3 etc.	30 (25.00)	70 (58.33)	20 (16.66)
<b>2.</b>	<b>Use of chemical fertilizers</b>			
2.1	Fertilizer dose of 100 kg N, 50 kg P and 50 kg K/ ha.	22 (18.33)	30 (25.00)	68 (56.66)
2.2	For hybrid rice fertilizer dose of 150 kg N, 50 kg P and 50 kg K/ha.	20 (16.66)	31 (25.83)	69 (57.50)
a)	Application of first dose of 40% N, and all dose of P and K/ha at the time of transplanting.	19 (15.83)	30 (25.00)	71 (59.16)
b)	Application of second dose of 40% N/ha at the time of tiller's formation.	17 (14.16)	34 (28.34)	69 (57.50)
c)	Application of third dose of 20% N at the time of flowering. OR dumping 10 tonnes Glyricidea leaves during puddling.	18 (15.00)	25 (20.83)	77 (64.16)
2.3	Use of urea bricks.	5 (4.17)	5 (4.17)	110 (91.66)
2.4	After transplanting add urea bricks at 7-10cm depth by hand, in square of four seedlings within same day.	2 (1.66)	8 (6.66)	110 (91.66)
<b>3</b>	<b>Plant protection</b>			
3.1	Deep ploughing after Kharif crop.	23 (19.16)	36 (30.00)	61 (50.83)
3.2	Collection of residues immediately after harvesting, for composting.	36 (30.00)	23 (19.16)	61 (50.83)
3.3	Early transplanting to reduce the incidence of pest.	41 (34.17)	23 (19.17)	56 (46.66)
<b>4</b>	<b>Pest control</b>			
a)	<b>Stem borer</b>			
4.1	Destructions of stubbles.	36 (30.00)	23 (19.16)	61 (50.83)
4.2	Cut the crops at ground level with the help of vaibhav sickle.	20 (16.66)	33 (27.50)	67 (55.83)
4.3	Releasing trichocard as egg parasite.	8 (6.66)	10 (8.33)	102 (85.00)
4.4	Use of stem borer resistant varieties, Ratna and IR-20.	4 (3.33)	10 (8.33)	106 (88.33)
4.5	Removal and destruction of infested plant parts.	7 (5.83)	20 (16.66)	93 (77.50)
4.6	Application of insecticides such as carbofuran or Phorate or Quinolophos.	4 (3.33)	13 (10.83)	103 (85.83)
4.7	At nursery stage spray Quinolophos 25 E.C @ 1600 ml/ 250 liters water.	4 (3.33)	13 (10.83)	103 (85.83)
b)	<b>Leaf roller.</b>			
4.8	Use monochrotophos 36 E.C or Fenetrothion 50 E.C or 50WD Carbaryl @ 700 ml, 500ml, 1kg respectively per 500 liters of water per ha.	0 (0.00)	13 (10.83)	107 (89.17)
c)	<b>Army worm</b>			
4.9	Collection and destruction of eggs and larvae.	7 (5.83)	21 (17.50)	92 (76.66)
4.10	Dusting of methyl parathion powder @ 20 kg /ha.	1 (0.83)	11 (9.17)	108 (90.00)

4.11	Conservation of frog population in field.	16 (13.33)	27 (22.50)	77 (64.17)
4.12	Use of pheromone trap to control population of army worm	5 (4.17)	14 (11.67)	101 (84.16)
<b>5</b>	<b>Disease control</b>			
a)	<b>Cultural practices.</b>			
5.1	For controlling the blast, use disease free seed for next planting.	12 (10.00)	28 (23.33)	80 (66.66)
b)	<b>Biological control</b>			
5.2	Use of Trichoderma spp and bacillus spp.	3 (2.50)	15 (12.50)	102 (85.00)
5.3	Use of Tulsi and Eucalyptus leaf extract for controlling blast.	5 (4.17)	21 (17.50)	94 (78.33)
5.4	Spray 1 gm. Carbendazim with water for controlling blast and leaf blight.	3 (2.50)	13 (10.83)	104 (86.66)
c)	<b>Disease resistance varieties.</b>			
5.5	For blast-karjat 1/ karjat 5/ sahydr1 4/ Ratnagiri- 1/ Ratnagiri-711/ IR-8.	12 (10.00)	33 (27.50)	75 (62.50)
5.6	For bacterial blight- karjat-1/ Ratnagiri-711/ sahydr1-3/ IT-4141/ IT-8585.	14 (11.66)	34 (28.33)	72 (60.00)
a)	<b>Blast</b>			
5.7	Use of chemicals to control blast and leaf blight seed treatment application of 3gm thirum/ kg seed.	9 (7.50)	23 (19.16)	88 (73.33)
	OR			
5.8	Use of 3% brine water solution for seed treatment	8 (6.66)	21 (17.50)	91 (75.83)
5.9	Spraying of 1% Edifenphos or 1gm Carbendazim per liter of water.	10 (8.33)	22 (18.33)	88 (73.33)
b)	<b>False smut</b>			
5.10	As a preventive measures spraying 2.5gm Mancozeb (Dithane M-45) or 3gm Zineb (Dithane Z-78) per liter of water.	7 (5.83)	27 (22.50)	86 (71.66)
<b>6</b>	<b>Use of improved tools and implements</b>			
6.1	Vaibhav sickle	20 (16.66)	33 (27.50)	67 (55.83)
6.2	Pankaj puddler	8 (6.66)	14 (11.66)	98 (81.66)
6.3	Stubbles remover	29 (24.16)	49 (40.83)	42 (35.00)
6.4	Dry land weeder	10 (8.33)	19 (15.83)	91 (75.83)
6.5	Husk operated Chula.	2 (1.66)	4 (3.33)	114 (95.00)
6.6	Motor operated rice thresher	20 (16.66)	39 (32.50)	61 (50.83)
6.7	Conoweeder	7 (5.83)	36 (30.00)	77 (64.16)

### Use of high yielding variety

It is observed from the [Table-1] that majority (58.33 per cent) of the respondents had 'partially' adopted high yielding varieties like Karjat-3, Palghar-1, Ratna, Karjat-1, Sahydr1, Sahydr1-3 etc. [6].

### Use of chemical fertilizers

It is evident from [Table-1] that majority (56.66 per cent) of the respondents did 'not' adopted application of fertilizer dose of 100 kg N, 50 kg P and 50 kg K/ ha. Secondly 57.5 per cent of the respondents had not adopted the application of Fertilizer doses for hybrid rice of 150 kg N, 50 kg P and 50 kg K/ha. While 59.16 per cent of the respondents had 'not' adopted application of first dose of 40% N, P and K fertilizer/ha at the time of transplanting. In all 57.50 per cent of the respondents had 'not' adopted application of second dose of 40% N fertilizer/ha at the time of tillers formation. Majority (64.16 per cent) of the respondents had 'not' adopted application of third dose of 20% N at the time of flowering. Large number of (91.66 per cent) of the respondents had 'not' adopted Use of urea bricks and about 91.66 per cent of the respondents had 'not' adopted after transplanting use of urea bricks at 7-10cm depth by hand, in square of four seedlings within same day.

### Plant protection

It is observed from [Table-1] that 50.83 per cent of the respondents had 'not'

adopted the practice deep ploughing after Kharif crop. However, 50.83 per cent of the respondents had 'not' adopted the practice of collection of residues immediately after harvesting, for composting. Maximum number (46.66 per cent) of the respondents had 'not' adopted the practice of early transplanting to reduce the incidence of pest. One half (50.83 per cent) of the respondents had 'not' adopted the practice removal and destructions of stubbles, about 55.83 per cent of the respondents had 'not' adopted the practice, cut the crops at ground level with the help of vaibhav sickle. Large majority (85 per cent) of the respondents had 'not' adopted the practice 'Releasing trichocard as egg parasite'. 88.33 per cent of the respondents had 'not' adopted the practice, use of stem borer resistance varieties, like Ratna and IR-20, about 77.5 per cent of the respondents had 'not' adopted the practices removal and destruction of infested plant parts. Large majority (85.83 per cent) of the respondents had 'not' adopted the practice, application of insecticides such as carbofuran, phorate or quinolphos, also the practice of at nursery stage spray quinolphos 25 E.C @ 1600 ml/ 250 liters of water, respectively. Large majority (89.17 per cent) of the respondents had 'not' adopted the practice of application of any one insecticide like monochrotophos 36 E.C or Fenetrothion 50 E.C or Carbaryl 50W use at the rate 700 ml, 500ml, 1kg per 500 liters of water per ha, respectively, for controlling leaf roller. Large majority (76.66 per cent) of the respondent had 'not' adopted the practice of Collection and destruction of eggs and larvae, the 90 per cent of the respondents had 'not' adopted the practice of application of dusting of methyl parathion powder @ 20 kg / ha. The 64.17 Per cent of the respondents had 'not' adopted the practice of conservation of frog population in field. The 84.16 per cent of the respondents had 'not' adopted the practice of use of pheromone trap to control population of army worm. Two third (66.66 per cent) of the respondents had 'not' adopted the practice of controlling the blast by using disease free seed for next planting. Large majority (85 per cent) of the respondents had 'not' adopted the practice of use of *Trichoderma spp* and *bacillus spp*, while 78.33 per cent of the respondents had 'not' adopted the practice of Use of Tulsi and Eucalyptus leaf extract for controlling blast, whereas 86.66 per cent of the respondents had 'not' adopted the practice of, Spraying 1 gm. Carbendazim with water for controlling blast and leaf blight. Majority (62.50 per cent) of the respondents had 'not' adopted the practice of use of disease resistance varieties'. For blast disease, those were karjat 1/karjat 5/ Sahydri 4/ Ratnagiri- 1/ Ratnagiri-711/ IR-8, while 60 per cent of the respondents had not adopted the practice of use of disease resistance varieties. For Bacterial blight that is Karjat-1/Ratnagiri-711/ Sahydri-3/ IT-4141/ IT-8585. Majority (73.33 per cent) of the respondents had 'not' adopted the practice of, application of 3gm thirum/ kg seed, or 75.83 per cent of the respondents did not use of 3% brine water solution as seed treatment and 73.33 per cent of the respondents had 'not' adopted the practice of spraying of 1% Edifenphos or 1gm Carbendazim per liter of water. Majority (71.66 per cent) of the respondents had 'not' adopted the practice of, application of preventive measure spray that is 2.5gm Mancozeb (Dithane M-45) or 3 gm. Zineb (Dithane Z-78)/ liter of water.

### Use of improved tools and implements

Little more than 55.83 per cent of the respondents were not using vaibhav sickle, majority (81.66 per cent) of the respondents had 'not' adopted the use of Pankaj puddler, 40.83 per cent of the respondents had 'partially' adopted the use of stubbles remover, the 75.83 per cent of the respondents had 'not' adopted the use of dry land weeder, while 95.00 per cent of the respondents did 'not' adopted the use of husk operated Chula. exactly one half 50.83 per cent of the respondents did 'not' adopted the use of motor operated rice threshers and 64.16 per cent of the respondent had 'not' adopted the use of Conoweeder[7].

### Adoption Index

**Table-2** Distribution of the respondents according to their overall adoption of the selected agricultural technologies of rice crop.

Sl. No	Adoption index (Per cent)	Respondents( N=120)	
		Number	Percentage
1	Low (up to 16.00)	17	14.17
2	Medium(16.01 to 25.00)	85	70.83
3	High (25.01 and above)	18	15.00
Mean:21.10		Total	120
			100.00

It is noticed from [Table-2] that 70.83 per cent of the respondents had 'medium' adoption of the selected agricultural technologies of rice crop, while 15.00 per cent and 14.17 per cent of the respondents had 'high' and 'low' adoption, respectively. The average adoption score was 21.10[8-10].

### Conclusion

It can be concluded from these findings, extent of adoption of recommended rice cultivation technology by the Warli tribal farmers was at medium level. The study has clearly indicated the practices which were fully and partially adopted as well as not adopted by the Warli tribal farmers. There is many wide scope to increase the adoption by way of educating and motivating the farmers along with arrangements for supply of required inputs and also conducting demonstrations and trainings on rice technology need to be taken massively by concerned extension and development agencies in these areas.

### Application of research:

It is helpful for identifying the adoption gap in rice cultivation practices.

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### Abbreviations:

E.C.: Emulsifiable Concentrate  
ST: Schedule Tribe,  
Kg: Kilo-gram

**Conflict of Interest:** None declared

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