

The level of rice farmers' adoption of smart climate agriculture

Abstract

Climate change became one of the biggest developmental as well as an environmental challenge. It has been proved that climate change is already having an impact on agriculture and food security as a result of the increased prevalence of extreme events and increased unpredictability of weather patterns. In this context, the concept of climate-smart agriculture (CSA) has too much relevance. The study was conducted during 2018-19 in Dharwad district of Karnataka state. A total of 60 respondents were randomly selected and personally interviewed. The results of the study revealed that majority of the respondents from Mummigatti (86.67%) and Jodalli (66.70%) had medium level of awareness regarding climate-smart agriculture. majority of the respondents from Mummigatti (80.00%) and Jodalli (73.30%) were found in medium adaptation category. Equal percentage (20.00% each) of the respondents from both the villages belonged to the high adaptation category. The study also reveals that cent percent of the respondents from both the villages were faced constraints like lack of knowledge about adaptive practices, lack of awareness about climate change issues, non-availability of inputs in time, lack of financial resource, poor support of local and national authorities with the climate-related issue and higher cost of the agricultural inputs to cope with climatic variability. From the study, it can be concluded that providing information and local support from the authorities will be of immense use in the proper adaption of site-specific climate-smart practices. The study also suggests that suitable policies and strategies should be taken to deal with non adaptation of climate-smart practices in the villages.

Introduction:

In the present time climate change has become one of the biggest developmental as well as an environmental challenge. It has been proved that climate change is already having an impact on agriculture and food security as a result of the increased prevalence of extreme events and increased unpredictability of weather patterns. In this context, the concept of climate-smart agriculture (CSA) has too much relevance and it is not a single specific agricultural technology or practise that can be universally applied, such as conservation or organic agriculture, although either may be key components of a CSA strategy in specific locations and countries.

CSA is an approach to developing the technical, policy, and investment conditions the enabling environment to support actions aimed at achieving sustainable agricultural development for food and nutrition security under a changing climate. With this background the research study was conducted with the following objectives:

1. To study the awareness of respondents regarding climate-smart agriculture
2. To know the adaptation strategies undertaken by the respondents to deal with climate-smart agriculture
3. To identify the constraints faced by respondents during the adaptation of climate-smart agriculture

Material and methods

The study was conducted during 2018-19 in Dharwad district of Karnataka state. From Dharwad district two villages namely Mummigatti from Dharwad taluk and Jodalli from Kalaghatagi taluk were selected. A total of 60 respondents i.e., 30 from Mummigatti and 30 from Jodalli were randomly selected. To elicit the required information from the respondents, a structured interview schedule was prepared. Through informal discussions and interviews, data was collected from the respondents. The collected data was analysed with the help of suitable statistical tools like frequency, percentage, mean, standard deviation and discussed as results.

Results and discussion

The data presented in table 1 depicts the socio-economic characteristics of the respondents. The majority (66.70%) of the respondents from Jodalli village belongs to the adult age group, whereas half of the respondents from Mummigatti village belongs to adult and old category (50.00% each). Concerning education majority of the respondents from both villages i.e. 76.67 per cent from Mummigatti and 73.30 per cent from Jodalli were illiterate. None of the respondents from both the villages not completed secondary school and graduation.

The table also revealed that majority (66.70%) of the respondents from Mummigatti and half (50.00%) of the respondents from Jodalli village had medium-size family followed by large (20.00% & 26.70%) and small (13.30% & 23.30%). Majority of the respondents from Mummigatti (56.70%) and Jodalli (70.00%) had medium level of experience in the farming followed by high and low.

Concerning land holding half of the respondents from Mummigatti village had semi medium land holding followed by Small (30.00%), Medium (16.70%) and large (3.30%). Whereas 40.00 per cent of the Jodalli village respondents had Small landholdings followed by

Semi medium (33.30%), Marginal (20.00%) and Medium (26.70%) landholdings. None of the respondents from Jodalli village possessed large landholdings. Family income of the respondents revealed that 96.70 per cent of the Mummigatti respondents and cent per cent of the Jodalli respondents had low level of income.

The data on social participation revealed that majority of the respondents from Mummigatti village had a medium level of social participation followed by low and high social participation. Table 1 also revealed that majority of the respondents from both the villages had a medium level of extension contact followed by low extension contact and none of them found in the high category. Data on mass media exposure showed that equal per cent (56.70% each) of the respondents from both the villages had medium exposure to mass media.

Table 1: Socio-economic characteristics of the respondents

Sl. No.	Characteristics		(n=60)			
			Mummigatti (n ₁ =30)		Jodalli (n ₂ =30)	
			F	%	F	%
1.	Age	Young	-	-	02	06.70
		Adults	15	50.00	20	66.70
		Old	15	50.00	08	26.40
2.	Education	Functional	02	06.70	03	10.00
		Illiterate	23	76.67	22	73.30
		Primary	04	16.70	05	16.70
		Middle	01	03.30	-	-
		Secondary	-	-	-	-
		Graduation and Above	-	-	-	-
3.	Family size	Small	04	13.30	07	23.30
		Medium	20	66.70	15	50.00
		Large	06	20.00	08	26.70
4.	Farming Experience	Low (Years)	05	16.70	05	16.70
		Medium (Years)	17	56.70	21	70.00
		High (Years)	08	26.70	04	13.30
5.	Land Holding	Marginal	-	-	6	20.00
		Small	09	30.00	12	40.00
		Semi Medium	15	50.00	10	33.30
		Medium	05	16.70	08	26.70
		Large	01	03.30	-	-
6.	Family Income	Low	29	96.70	30	100.00
		Medium	01	03.30	-	-
		High	-	-	-	-

7	Social Participation	Low	08	26.70	28	93.33
		Medium	17	56.70	02	06.67
		High	05	16.60	-	-
8	Extension Contact	Low	22	73.30	23	76.67
		Medium	08	26.70	07	23.33
		High	-	-	-	-
9	Mass media Exposure	Low	08	26.70	05	16.70
		Medium	17	56.70	17	56.70
		High	05	16.60	08	26.70

The data in table 2 reveals that cent percent of the respondents from both the villages had awareness about short-duration varieties. But they possess less awareness about disease and pest resistant varieties, drought-tolerant varieties. None of them had awareness about direct-seeded rice.

With respect, agro diversification cent percent of the respondents from Mummigatti and Jodalli villages had awareness about the crop-tree system, crop-livestock system, cropping pattern and calendar of planting, mixed cropping, crop rotation, crop-tree-livestock system. None of the respondents from both villages had awareness regarding reduced tillage and cultivation of paddy through SRI technique.

The data about water management reveals that majority of the respondents had awareness about irrigation scheduling (80.00% & 60.00%) and water harvesting (60.00% & 40.00%). whereas with respect to other water management aspects like water-efficient crops (20.00% & 10.00%), irrigation methods (40.00% & 20.00%), drainage 16.70% & 3.30%) and judicious use of underground water (3.30% each) they possessed less awareness.

About soil conservation and management aspect cent percent of them had awareness about plantation trees, compost and animal manure. Whereas less percent of the respondents had awareness about cover crops, mulching, bio-fertiliser and integrated nutrient management.

Table 2: Awareness of respondents regarding climate smart agriculture

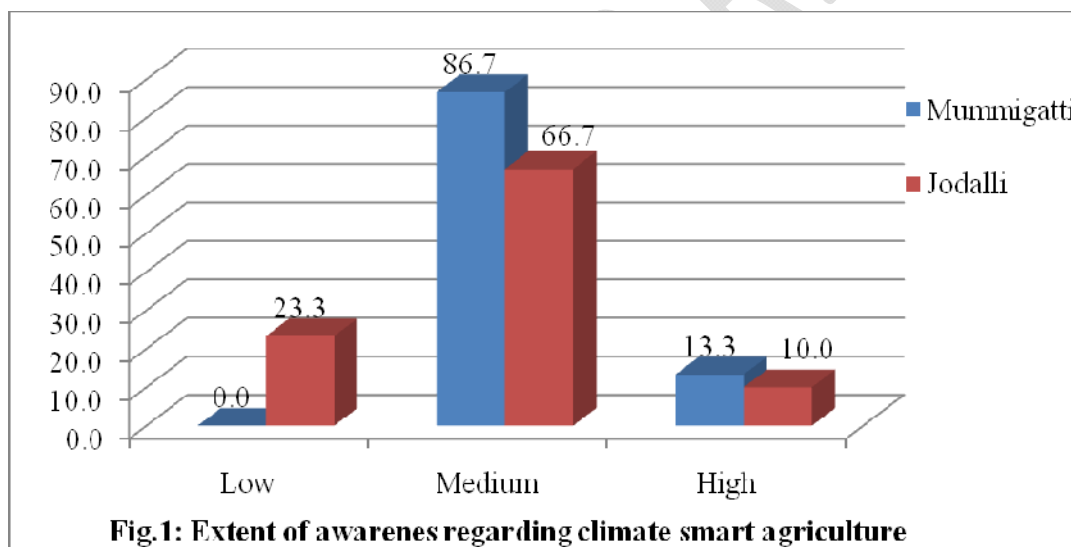
		(n=60)	
Sl.No	Items	Mummigatti (n ₁ =30)	Jodalli (n ₂ =30)
	Varieties		
1	Awareness regarding short duration varieties	100.00	100.00
2	Awareness regarding benefit of direct-seeded rice	0.00	0.00
3	Awareness regarding disease-resistant varieties	16.70	13.30
4	Awareness regarding insect-pest resistant varieties	16.70	13.30
5	Awareness regarding drought tolerant varieties	16.70	13.30
	Agro-diversification		

6	Awareness regarding crop-tree system	100.00	100.00
7	Awareness regarding the crop-livestock system	100.00	100.00
8	Awareness regarding change in cropping pattern and calendar of planting	100.00	100.00
9	Awareness regarding mixed cropping	100.00	100.00
10	Awareness regarding crop rotation	100.00	100.00
11	Awareness regarding reduced tillage	0.00	0.00
12	Awareness regarding crop tree livestock system	100.00	100.00
13	Awareness regarding fallow land	100.00	100.00
14	Awareness regarding judicious use of insecticides and pesticides	60.00	20.00
15	Awareness regarding the integrated farming system model	100.00	60.00
16	Awareness regarding spacing between rows/plants	100.00	100.00
17	Awareness regarding the cultivation of paddy through SRI technique	0.00	0.00
	Water management		
18	Awareness regarding irrigation scheduling	80.0	60.00
19	Awareness regarding water-efficient crops	20.00	10.00
20	Awareness regarding the choice of irrigation methods	40.00	20.00
21	Awareness regarding micro irrigation	60.00	40.00
22	Awareness regarding contour farming	60.00	20.00
23	Awareness regarding water harvesting	80.00	60.00
24	Awareness regarding drainage	16.70	3.30
25	Awareness regarding judicious use of underground water	3.30	3.30
	Soil conservation		
26	Awareness regarding use of cover crops	3.30	0.00
27	Awareness regarding mulching	3.30	0.00
28	Awareness regarding live barriers/fence	60.00	40.00
29	Awareness regarding plantation trees	100.00	100.00
	Soil management		
30	Awareness regarding organic fertilizer	60.00	60.00
31	Awareness regarding legumes and green manure	60.00	40.00
32	Awareness regarding use of compost	100.00	100.00
33	Awareness regarding use of animal manure	100.00	100.00

34	Awareness regarding bio-fertilizer	3.30	0.00
35	Awareness regarding integrated nutrient management	3.30	0.00
36	Awareness regarding scheduled fertilizer	3.30	0.00
	Mean	2.13	1.86
	SD	0.34	0.57
	t-value	2.18*	

Note: SD-Standard Deviation, *- Significant at 0.05% level

The data presented in the fig.1 reveals that majority of the respondents from Mummigatti (86.67%) and Jodalli (66.70) had medium level of awareness regarding climate-smart agriculture. The reason might be farming experience and local cosmopolite nature of the respondents. Whereas, 13.30 per cent and 10.00 per cent them possessed a high level of awareness respectively. None of the respondents from Mummigatti village belongs to low level of awareness but 23.30 per cent of the respondents from Jodalli village had low level of awareness regarding climate-smart agriculture.



An analysis of data presented in table 3 depicts that cent per cent of the respondents were adapted to short duration crops like maize, rice, jowar, brinjal, soya, tomato etc... in their field. High majority of the respondents from Mummigatti adapted disease and pest resistant varieties (80.00% each) to cope with extreme climatic changes, whereas the same strategies were adapted by 50.00 percent of the Jodalli respondents.

The table also reveals the adaptation strategies followed by respondents concerning agro diversification. Which includes crop-livestock system, change in cropping pattern, calendar of planting, mixed cropping, crop rotation, spacing between rows/plants and change in cropping

pattern & calendar of planting. Whereas less percent of the respondents from both the villages adopted strategies like judicious use of insecticides and pesticides, fallow land, crop-tree system, crop-tree-livestock system and integrated farming model. None of the respondents from both villages not adapted reduced tillage and cultivation of rice through SRI technique. Because they don't possess awareness and knowledge about the specified practices.

Concerning water management, majority of the respondents from Mummigatti (60.00%) and Jodalli (40.00%) adapted irrigation scheduling, as they were aware of the time and stages of irrigation. Less percent of the respondents from both village (ranging from-3.33% to 20.00%) adapted strategies like water-efficient crops, choice of irrigation methods, contour farming and water harvesting. None of the respondents from both the villages adapted strategies like water-efficient crops, micro irrigation, drainage and judicious use of underground water. Lack of awareness, financial resources and less landholding were the major reasons for non-adaptation of particular strategies.

Less percentage (ranging from 3.33% to 20.00%) of the respondents from both villages adapted strategies like use of cover crops, mulching, live barriers/fence, plantation trees, organic fertilizer, use of compost, use of animal manure and scheduled fertilizer. None of the respondents from both villages adapted strategies like use of cover crops, legumes& green manure, bio-fertilizer and integrated nutrient management. Lack of awareness about adaptive practices might be the reason for non-adaptation of strategies.

Table 3: Adaptation strategies regarding climate-smart agriculture (n=60)

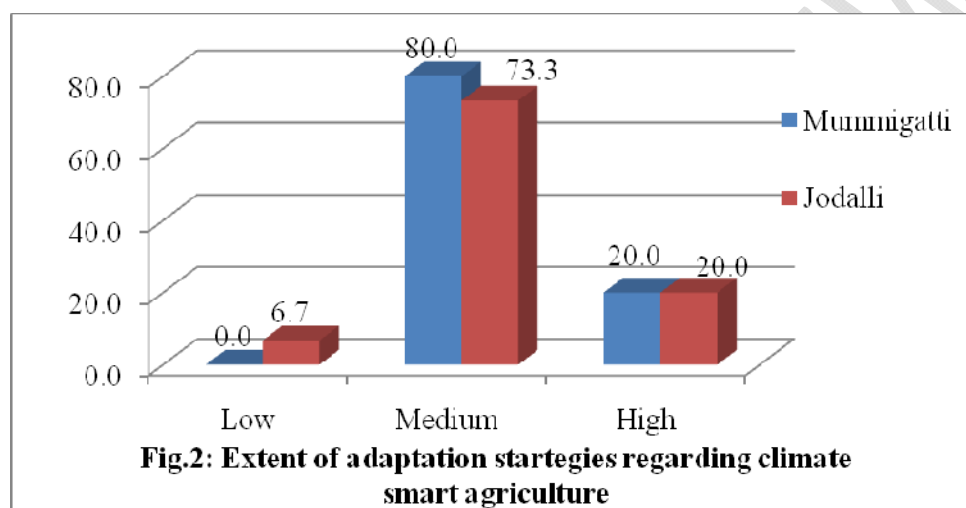
Sl. No	Items	Mummigatti (n ₁ =30)	Jodalli (n ₂ =30)
Varieties			
1	Short duration varieties	100.00	100.00
2	Direct seeded rice	00.00	00.00
3	Disease resistant varieties	80.00	50.00
4	Insect-pest resistant varieties	80.00	50.00
5	Awareness regarding drought tolerant varieties	00.00	00.00
Agro-diversification			
6	Crop-tree system	20.00	20.00
7	Crop-livestock system	100.00	100.00
8	Change in cropping pattern and calendar of planting	60.00	60.00

9	Mixed cropping	100.00	100.00
10	Crop rotation	100.00	100.00
11	Reduced tillage	00.00	00.00
12	Crop tree livestock system	20.00	20.00
13	Fallow land	10.00	10.00
14	Judicious use of insecticides and pesticides	40.00	20.00
15	Integrated farming system model	20.00	20.00
16	Spacing between rows/plants	100.00	100.00
17	Cultivation of paddy through SRI technique	0.00	0.00
Water management			
18	Irrigation scheduling	60.00	40.00
19	Water efficient crops	00.00	00.00
20	Choice of irrigation methods	20.00	20.00
21	Micro irrigation	00.00	00.00
22	Contour farming	20.00	10.00
23	Water harvesting	20.00	10.00
24	Drainage	00.00	00.00
25	Judicious use of underground water	00.00	00.00
Soil conservation			
26	Use of cover crops	20.00	00.00
27	Mulching	20.00	03.33
28	Live barriers/fence	20.00	03.33
29	Plantation trees	20.00	03.33
Soil management			
30	Organic fertilizer	20.00	10.00
31	Legumes and green manure	00.00	00.00
32	Use of compost	20.00	13.33
33	Use of animal manure	20.00	13.33
34	Bio-fertilizer	00.00	00.00
35	Integrated nutrient management	00.00	00.00
36	Scheduled fertilizer	20.00	13.33
	Mean	2.20	2.13
	SD	0.40	0.50

	t-value	0.56NS
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Note: SD-Standard Deviation, NS-Non Significant

Observations from the fig.2 reveal that majority of the respondents from Mummigatti (80.00%) and Jodalli (73.30%) were found in medium adaptation category. Equal percentage (20.00% each) of the respondents from both the villages belonged to high adaptation category. None of the respondents from Mummigatti village were found in low adaptation category, whereas 6.70 per cent of the Jodalli respondents belonged to low adaptation category.



The data from the table 4 depicts that cent percent of the respondents from both the villages were faced constraints like lack of knowledge about adaptive practices, Lack of awareness about climate change issues, non-availability of inputs in time, lack of financial resource, poor support of local and national authorities with climate-related issue and higher cost of the agricultural inputs. Other constraints faced by the respondents include Lack of knowledge about post harvest technologies, lack of improved communication facility, Unavailability of new technologies, Migration of youth

Table 4: Constraints faced by respondents during adaptation

Sl.No	Constraint	Rank	
		Mummigatti	Jodalli
1.	Lack of knowledge about adaptive practices	100.00	100.00
2.	Lack of awareness about climate change issues	100.00	100.00
3.	Non availability of inputs in time	100.00	100.00
4.	Lack of improved communication facility	26.70	60.70

5.	Lack of financial resource	100.00	100.00
6.	Poor support of local and national authorities with climate related issue	100.00	100.00
7.	Unavailability of new technologies	23.30	60.70
8.	Migration of youth	16.70	36.70
9.	Lack of knowledge about post harvest technologies	30.00	100.00
10.	Higher cost of the agricultural inputs	100.00	100.00

Conclusion

Providing information and local support from the authorities will be of immense use in the proper adaption of site-specific climate smart practices as majority of the respondents had medium level of awareness about climate-smart agriculture and its relevance in the future implications. Suitable policies and strategies should be taken in order to deal with non adaptation of climate-smart practices in the villages which helps the small land holders to adapt to climate change without any obstructions.

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