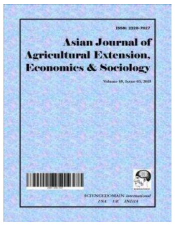

Asian Journal of Agricultural Extension, Economics & Sociology

28(3): 1-9, 2018; Article no.AJAEES.44957
ISSN: 2320-7027

Adoption of Climate Resilient Technologies by Paddy Growers

K. V. Manjunath[1], K. Shivaramu[1*] and D. K. Suresh[1]

[1]*Department of Agricultural Extension, College of Agriculture, UAS, GKVK, Bengaluru-560 065, India.*

Authors' contributions

This work was carried out in collaboration between all authors. Author KVM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors KS and DKS managed the analyses of the study. Author DKS managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAEES/2018/44957
Editor(s):
(1) Dr. Zhao Chen, Department of Biological Sciences, College of Agriculture, Forestry and Life Sciences, Clemson University, USA.
Reviewers:
(1) Barry Silamana, Institute of Environment and Agricultural Research (INERA), Burkina Faso.
(2) Mekhloufi Moulay Brahim, Nour Bachir University Center, El-Bayadh, Algeria.
(3) Irshad Ullah, Pakistan.
Complete Peer review History: http://www.sciencedomain.org/review-history/27368

Original Research Article

Received 06 September 2018
Accepted 12 November 2018
Published 23 November 2018

ABSTRACT

The present study was conducted during the year 2017-18 in the Mandya district of Karnataka state. Two villages each in Head reach and Tail end area of Krishna Raja Sagar (KRS) Dam were randomly selected. In each selected village twenty five paddy growers were randomly selected. Thus, 100 farmers constituted the sample for the study. The data was collected from the respondents using a structured interview schedule developed for the purpose. The data collected was analysed and tabulated using appropriate statistical tools. The results of the study revealed that, Majority of the Head reach farmers have low-medium adoption level, whereas Majority of the Tail end farmers has medium-high adoption. The correlation analysis indicated a positive and significant relationship at one per cent level between the independent variables such as education, risk orientation, cosmopoliteness, scientific orientation, mass media exposure, extension participation, innovative proneness, extension contact and adoption. While economic motivation had a positive and significant relationship with adoption at five per cent level. The R^2 value dipicted that all the 16 independent variables had bestowed to the extent of 63.26 per cent of the variation in adoption level of farmers towards climate resilient technologies.

**Corresponding author: E-mail: sisuasb@gmail.com;*

Keywords: Head reach area; tail end area; adoption; climate resilient technologies.

1. INTRODUCTION

Indian agriculture is highly dependent on monsoon rains, and a close link exists between climate and water resources. The effects of change in climate are global, but countries like India are more vulnerable in view of the high population depending on agriculture. In India, significant negative impact has been implied with medium-term (2010-2039) climate change, predicted to reduce yields by 4.5-9 per cent, depending on the magnitude and distribution of warming. Since agriculture makes up roughly 16% of India's GDP, a 4.5-9 per cent negative impact on production implies a cost of climate change to be roughly up to 1.5 per cent of GDP per year [1].

Climate change is a change in the statistical dispensation of weather patterns, when that change lasts for an external period of time. This may refer to alteration in average weather conditions or in the variations of weather around long – term average conditions. The productivity of most cereals would decrease due to the increase in temperature and CO2 and the decrease in water availability. There will be a projected loss of 10-40% in crop production by 2100 if no adaptation measures are taken. A degree Celsius increase in temperature may reduce yields of major food crops by 3-7% [2]. Rice production is slated to decrease by almost a ton/hectare if the temperature goes up by 2°C.

The waterlogged and warm soils of paddy make production system a large emitter of methane. Rice production is and will be affected by changes in climatic factors like irregular rainfall, long dry spells during wet season (damaging young plants), drought and floods all having an effect on yields. This has also caused outbreaks of pests and diseases, with large losses of crops and harvested products.

Number of methods and practices are being adopted to address climate change challenges by altering cropping patterns, planting dates and farm management techniques. Embankments have been built to save paddy fields from floods and drought and submergence tolerant varieties of rice are being developed and distributed by government and private organisations. The development of advanced modelling techniques, mapping the effect of climate change on rice growing regions and providing crop insurance are other examples of managing risks and reducing vulnerability. With this background the present study was undertaken with the following specific objectives;

1. To find out the extent of Adoption of Climate Resilient Agricultural Technologies by Paddy growers;
2. To find out the relationship between Adoption of Climate Resilient Agricultural Technologies with profile characteristics of Paddy growers.

2. MATERIALS AND METHODS

The study was conducted in Mandya district of Karnataka state. Two villages each in Tail end area and Head reach area of Krishna Raja Sagar (KRS) Dam were randomly selected. In each selected village 25 paddy growing farmers were randomly selected. Thus 100 farmers (50 each in head reach and tail end area) constituted the sample for the study. The selected respondents were personally interviewed using pre-tested interviewed schedule. The data was tabulated and analysed using percentages and 't' test, correlation and regression.

3. RESULTS AND DISCUSSION

3.1 Overall Adoption of Climate Resilient Agricultural Technologies by Paddy Growers

The results presented in Table 1 reveals that in the Head reach area, two fifth (40.00%) of the respondents had low adoption level followed by medium (36.00%) and high adoption level (24.00%). Whereas in the Tail end area, two fifth (40.00%) of the respondents had medium adoption level followed by the high (32.00%) and low level (28.00%) of adoption.

The Tail end area farmers had medium-high adoption level as compared to the Head reach farmers who had low-medium adoption level which may be due to the situational factors like acute water shortage, more extension contact and extension participation motivated them to adopt climate resilient technologies.

The above findings are in line with the finding of Alagesan and Budhar [3], Shnakara [4], Shivaramu and Murthy [5], Shivaramu et al. [6], Muttanna [7] and Rane [8].

3.2 Adoption of Specific Climate Resilient Agricultural Technologies by Paddy Growers

The adoption of specific Climate Resilient technologies by paddy growers is presented in the Table 2. In both the Head reach and Tail end area majority of the respondents have adopted the practices like summer ploughing, puddling at the right time, pregermination of the paddy seeds, trimming of top of the aged seedlings before transplanting during late planting, maintaining closer spacing of aged seedlings, increasing number of aged seedling per hill due to the reason that these practices are simple, easy to follow, involves less cost and also these are the practices that are being followed by them from many years.

In both the Head reach and Tail end area only a notable number of respondents have partially adopted the technologies like field sanitation, improved land leveling as they don't have the time and labour availability to carry out these practices. Maintaining thin film of water for suppression of weeds is also adopted partially because the respondents don't have correct knowledge on depth of water to be maintained. Use of organic manures, green leaf and green manure, applying recommended quantity of fertilisers, application of neem coated urea are also adopted partially as these fertilisers and manures require lot of investment to purchase and again respondents don't have the knowledge on recommended quantity as a result of which they have applied either excess or less than what is recommended.

In both the Head reach and Tail end area significant number of respondents have non adopted the technologies like; and

i. application of pre and post emergent herbicide due to the reason as expressed by the respondents that herbicides will kill the earthworms which are being regarded as farmers friendly which plays a vital role in decomposition of organic matter and maintaining soil fertility and also due to the reason that farmers don't have knowledge on herbicide application, which also involves investment to purchase.
ii. seed treatment with salt water because of the reason that the farmers instead of using their own grown seeds for next crop they are purchasing the hybrid and improved verities seeds from Raitha Samparka Kendras (RSK's) and Krishi Vigyan Kendras (KVK's) and seed companies which doesn't require salt water treatment.
iii. contingency crop planning and crop rotation with pulses due to the fact that the paddy being the predominant crop in study area, due to water availability, and lack of knowledge on these practices led to non-adoption and
iv. Use of bio fertilisers, nitrogen application based on leaf colour chart, rice straw incorporation under mechanical harvesting, fertigation, drip irrigation, sprinkler irrigation, seed treatment with fungicide/bioagents, pest and disease tolerant varieties, use of pheromone traps and light traps, alternate wetting & drying, more spacing to control Brown Plant Hopper (BPH), pulling of rope to dislodge paddy caseworm, destruction of rice stubbles and vector host plants to avoid pathogen build up as these technologies are difficult to understand, complex, requires skill to use, involves cost(drip & sprinkler), and also due to lack of awareness, training, guidance on how to adopt these practices to the farmers by the extension agency and agricultural officers.

The water saving climate resilient technologies like SRI method, drum seeding, aerobic paddy, direct seeded paddy and alternate wetting and drying were adopted by slightly more number of tail end farmers when compared to head reach respondents due to water shortage, non-release and untimely release of canal water, more extension contact and demonstrations and training programmes conducted by the KVK, Mandya.

The above findings are in live with the finding of Alagesan and Budhar [3], Shnakara [4], Shivaramu and Murthy [5], Shivaramu et al. [6], Thiyagarajan [9], Jamadar [10], Mahato [11] and Rane [8].

3.3 Test of Significance between Tail end and Head Reach Paddy Growers with Respect to Extent of Adoption of Climate Resilient Agricultural Technologies

Table 3 depicts the mean scores of adoption levels of Head reach and Tail end farmers. As it is evident that, the farmers in Head reach area had obtained a relatively lesser mean score of 23.99, while the farmers in Tail end area had a mean score of 30.61. Further, the t-value showed the significant difference between adoption level of head reach and tail end farmers at 5 per cent level of probability.

This significant difference in adoption level between these two regions may be due to situational factors like acute water shortage, more extension contact, most of the farmers were quite enthusiastic and interested in knowing and learning about climate resilient technologies. So whenever they got the chance attended the training programmes conducted by the department of agriculture and KVK, they have participated actively.

The above findings are in live with the finding of Alagesan and Budhar [3], Shnakara [4], Shivaramu and Murthy [5], Shivaramu et al. [6], Thiyagarajan [9], Jamadar [10] and Rane [8].

3.4 Relationship between Independent Variables and Adoption Level of Paddy Growers on Climate Resilient Agricultural Technologies

The data in the Table 4 reveals the relationship between independent variables and adoption level of paddy growers on climate resilient technologies. The correlation analysis indicated a positive and significant relationship at one per cent level between the independent variables such as education, risk orientation, cosmopoliteness, scientific orientation, mass media exposure, extension participation, innovative proneness, extension contact and adoption. While economic motivation had positive and significant relationship with adoption at five per cent level. The remaining variables viz., age, type of family, family size, farming experience, land holding, annual income, and social participation had non-significant relationship with adoption.

This may be due to the fact that education enhances the knowledge level of the farmers and helps them to acquire latest technical knowhow about new ways of cultivation. Education helps them to find out the cause and effect of the specific constraints and enable them to address the constraints efficiently. Thus, a farmer develops a favorable attitude towards recommended technology after getting awareness and how-to knowledge and decides to adopt the technology. Risk taking is the ability to take the right decision during uncertainties; these uncertainties are nothing but the constraints. The farmer who is willing to take calculated risks during constraint situation will gain better results. Accordingly the risk orientation was positively related with the adoption. It is inferred that the farmers with more cosmopoliteness are having more exposure towards new technologies and greater cosmopoliteness is associated with greater adoption. Therefore, in view of this functional role of mass media, the farmer's exposure to mass media would acquire information regarding climate resilient technologies in their farming etc., besides knowing about developmental programmes thereby increasing their adoption of climate resilient technologies. Such individuals would be ready to accept the practices, when compared to others who do not have mass media exposure. Innovativeness is associated with the individuals' earliness in the use of new practices. Innovative farmers will always be experimenters. During any constraint situation farmers with high levels of innovativeness will experiment the new ways of doing things to change the existing situation.

The above findings are in live with the finding of Alagesan and Budhar [3], Shnakara [4], Shivaramu and Murthy [5], Shivaramu et al. [6], Thiyagarajan [9], Jamadar [10], Mahato [11] and Rane [8].

3.5 Extent of Contribution of Profile Characteristics on Adoption of Climate Resilient Agricultural Technologies by Paddy Growers

An attempt has been made to find out the amount of contribution made by the profile characteristics of paddy growers in explaining the variation in the dependent variable namely adoption towards climate resilient technologies in paddy cultivation. The findings in the Table 5 reveals that seven out of sixteen independent

Table 1. Overall adoption of climate resilient agricultural technologies by paddy growers

Adoption level	Head reach (n=50)		Tail end (n=50)		Total (n=100)	
	No.	%	No.	%	No.	%
Low	20	40.00	14	28.00	34	34.00
Medium	18	36.00	20	40.00	38	38.00
High	12	24.00	16	32.00	28	28.00
Total	50	100.00	50	100.00	100	100.00

Table 2. Specific adoption of climate resilient agricultural technologies by paddy growers (n=100)

Sl. no.	Technologies	Full adoption						Partial adoption						Non adoption					
		Head reach		Tail end		Total		Head reach		Tail end		Total		Head reach		Tail end		Total	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
I	AGRONOMIC PRACTICES																		
1	Summer ploughing	42	84.00	45	90.00	87	87.00	00	00.00	00	00.00	00	00.00	8	16.00	5	10.00	13	13.00
2	Field sanitation; Bund trimming, cleaning and proper disposal of waste	30	60.00	28	56.00	58	58.00	20	40.00	22	44.00	42	42.00	00	00.00	00	00.00	00	00.00
3	Improved land leveling practices	23	46.00	22	44.00	45	45.00	27	54.00	28	56.00	55	55.00	00	00.00	00	00.00	00	00.00
4	Puddling at the right time to manage weeds and to retain water	29	58.00	30	60.00	59	59.00	21	42.00	20	40.00	41	41.00	00	00.00	00	00.00	00	00.00
5	Application of pre and post emergent herbicides	21	42.00	19	38.00	40	40.00	00	00.00	00	00.00	00	00.00	29	58.00	31	62.00	60	60.00
6	Selection of good seeds through salt water treatment	2	4.00	3	6.00	5	5.00	00	00.00	00	00.00	00	00.00	48	96.00	47	94.00	95	95.00
7	Pregermination of paddy seeds	47	94.00	48	96.00	95	95.00	00	00.00	00	00.00	00	00.00	3	6.00	2	4.00	5	5.00
8	Direct seeded paddy	3	6.00	9	18.00	12	12.00	00	00.00	00	00.00	00	00.00	47	94.00	41	82.00	88	88.00
9	Drum seeding of paddy	9	18.00	26	52.00	35	35.00	00	00.00	00	00.00	00	00.00	41	82.00	24	48.00	65	65.00
10	System of Rice intensification(SRI)method of paddy	18	36.00	30	60.00	48	48.00	00	00.00	00	00.00	00	00.00	32	64.00	20	40.00	52	52.00
11	Aerobic paddy	4	8.00	18	36.00	22	22.00	00	00.00	00	00.00	00	00.00	46	92.00	32	64.00	78	78.00
12	Trimming of top of the aged seedlings before transplanting during late planting	30	60.00	33	66.00	63	63.00	00	00.00	00	00.00	00	00.00	20	40.00	17	34.00	37	37.00
13	Maintaining closer spacing of aged seedlings	28	56.00	31	62.00	59	59.00	00	00.00	00	00.00	00	00.00	22	44.00	19	38.00	41	41.00
14	Increasing number of aged seedlings per hill	31	62.00	30	60.00	61	61.00	00	00.00	00	00.00	00	00.00	19	38.00	20	40.00	39	39.00
15	Use of rotary weeder for weed management	11	22.00	13	26.00	24	24.00	00	00.00	00	00.00	00	00.00	39	78.00	37	74.00	76	76.00
16	Maintaining thin film of water for suppression of weeds	17	34.00	14	28.00	31	31.00	33	66.00	36	72.00	69	69.00	00	00.00	00	00.00	00	00.00
17	Contingency crop planning	14	28.00	18	36.00	32	32.00	00	00.00	00	00.00	00	00.00	36	72.00	32	64.00	68	68.00
18	Crop rotation with pulses	16	32.00	26	52.00	42	42.00	00	00.00	00	00.00	00	00.00	34	68.00	24	48.00	58	58.00
II	**Soil Fertility Management**																		
19	Soil testing, soil test based fertiliser application	14	28.00	20	40.00	34	34.00	00	00.00	00	00.00	00	00.00	36	72.00	30	60.00	66	66.00
20	Use of Biofertilisers																		
i)	use of azolla	5	10.00	2	4.00	7	7.00	00	00.00	00	00.00	00	00.00	45	90.00	48	96.00	93	93.00
ii)	use of azospirillum	2	4.00	1	2.00	3	3.00	0	00.00	0	00.00	00	00.00	48	96.00	49	98.00	97	97.00

Sl. no.	Technologies	Full adoption						Partial adoption						Non adoption					
		Head reach		Tail end		Total		Head reach		Tail end		Total		Head reach		Tail end		Total	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
21	Application of organic manure at right time	6	12.00	9	18.00	15	15.00	43	86.00	39	78.00	82	82.00	1	2.00	2	4.00	3	3.00
22	Use of green manure and green leaf manure	7	14.00	6	12.00	13	13.00	30	60.00	27	54.00	57	57.00	13	26.00	17	34.00	30	30.00
23	Application of recommended quantity of fertilisers	8	16.00	9	18.00	17	17.00	42	84.00	41	82.00	83	83.00	00	00.00	00	00.00	00	00.00
24	Application of neem coated urea	11	22.00	19	38.00	30	30.00	39	78.00	31	62.00	70	70.00	00	00.00	00	00.00	00	00.00
25	N application based on leaf colour chart	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00	100	100.00	100	100.0	100	100.00
26	Rice straw incorporation under mechanical harvesting	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00	50	100.00	50	100.00	100	100.00
27	Fertigation	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00	50	100.00	50	100.00	100	100.00
III	WATER MANAGEMENT																		
28	Drain out excess water(aerobic & SRI)	11	22.00	18	36.00	29	29.00	00	00.00	00	00.00	00	00.00	39	78.00	32	64.00	71	71.00
29	Avoid standing water under low lying area to prevent salinity and alkalinity	9	18.00	00	00.00	9	9.00	00	00.00	00	00.00	00	00.00	41	82.00	50	100.00	91	91.00
30	Alternate wetting and drying	21	42.00	26	52.00	47	47.00	00	00.00	00	00.00	00	00.00	29	58.00	24	48.00	53	53.00
31	Drip irrigation	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00	50	100.00	50	100.00	100	100.00
32	Sprinkler irrigation	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00	50	100.00	50	100.00	100	100.00
IV	PEST AND DISEASE MANAGEMENT																		
33	Raising healthy seedlings	18	36.00	19	38.00	37	37.00	32	64.00	31	62.00	63	63.00	00	00.00	00	00.00	00	00.00
34	Seed treatment with fungicide/bioagents (Trichoderma, Azosprillum)	10	20.00	12	24.00	22	22.00	00	00.00	00	00.00	00	00.00	40	80.00	38	76.00	78	78.00
35	Pest and disease tolerant varieties	11	22.00	14	28.00	25	25.00	00	00.00	00	00.00	00	00.00	39	78.00	36	72.00	75	75.00
36	Use of pheromone traps to control stem borer attack	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00	00	00.00	50	100.00	50	100.00	100	100.00
37	Alternate wetting & drying, more spacing to control BPH	6	12.00	8	16.00	14	14.00	00	00.00	00	00.00	00	00.00	44	88.00	42	84.00	86	86.00
38	Pulling of rope to dislodge paddy caseworm	1	2.00	2	4.00	3	3.00	00	00.00	00	00.00	00	00.00	49	98.00	48	96.00	97	97.00
39	Use of light traps for nocturnal, sucking pests	2	4.00	1	2.00	3	3.00	00	00.00	00	00.00	00	00.00	48	96.00	49	98.00	97	97.00
40	Clipping of rice seedlings for management of rice stem borer	9	18.00	8	16.00	17	17.00	00	00.00	00	00.00	00	00.00	41	82.00	42	84.00	83	83.00
41	Destruction of rice stubbles and vector host plants to avoid pathogen build up	3	6.00	4	8.00	7	7.00	00	00.00	00	00.00	00	00.00	47	94..00	46	92.00	93	93.00
V	OTHERS																		
42	Growing of Drought tolerant varieties	4	8.00	19	38.00	23	23.00	00	00.00	00	00.00	00	00.00	46	92.00	31	62.00	77	77.00
43	Growing saline soil tolerant varieties	2	4.00	00	00.00	2	2.00	00	00.00	00	00.00	00	00.00	48	96.00	50	100.00	98	98.00
44	Growing recommended varieties suitable for different sowing period	18	36.00	17	34.00	35	35.00	00	00.00	00	00.00	00	00.00	32	64.00	33	66.00	65	65.00

variables such as education, risk orientation, scientific orientation, mass media exposure, extension participation, innovative proneness, extension contact had contributed significantly towards adoption of climate resilient technologies by paddy growers. The remaining variables had not contributed significantly towards variability in adoption level. The R2 value indicated that all the 16 independent variables had contributed to the tune of 63.26 per cent of variation in adoption of climate resilient technologies by paddy growers. The plausible reasons may be that selected profile characteristics of farmers were the deciding factors of adoption level of farmers. Independent variables have synergic effects on one another, helping each other to have a positive relation to the adoption of climate resilient technologies in paddy cultivation. So, multiple regression analysis provided scope to predict the adoption level possessed by farmers by making use of the above said selected variables. Similar assumptions were also made by earlier researchers.

It can be concluded from the results of the study that, major portion of the farmers in head reach area have low adoption level (40%) followed by medium adoption level (40%) in the tail end area. Among them a negligible proportion of farmers have adopted micro irrigation, use of light and pheromone traps, leaf colour chart, seed treatment with salt water, use of bio fertilisers etc. Hence farmers need to be educated, convinced about the importance of Climate resilient agricultural technologies, about adapting to changing climate and adverse effects of changing climate etc. In the long run there is a need to provide required facilities by the State department of Agriculture, besides providing more technical guidance through conducting demonstration in each village and follow up approach.

Present finding is in conformity with the findings of Shivaramu and Murthy [5], Shivaramu et al. [6], Thiyagarajan [9], Jamadar [10], Prasad [12] and Rane [8].

Table 3. Test of significance between Tail end and Head reach paddy growers with respect to extent of adoption of climate resilient agricultural technologies. (n=100)

Paddy growers	Extent of adoption	
	Mean score	**"t" value**
Head reach (n=50)	23.99	1.8692*
Tail end (n=50)	30.61	

** Significant at 5% level*

Table 4. Relationship between independent variables and Adoption level of Paddy growers on Climate Resilient Agricultural Technologies. (n=100)

Sl. no.	Independent variables	Correlation coefficient(r)
1	Age	0.115 NS
2	Education	0.309 **
3	Family size	0.092 NS
4	Type of family	0.026 NS
5	Farming experience	0.027 NS
6	Land holding	0.152 NS
7	Annual income	0.086 NS
8	Risk orientation	0.298 **
9	Cosmopoliteness	0.265 **
10	Scientific orientation	0.383 **
11	Mass media exposure	0.268 **
12	Extension participation	0.320 **
13	Social participation	0.096 NS
14	Innovative proneness	0.282 **
15	Extension contact	0.320 **
16	Economic motivation	0.236*

*NS; Non-significant, * significant at 5% level, ** significant at 1% level*

Table 5. Extent of contribution of independent variables on adoption of climate resilient agricultural technologies by paddy growers (n=100)

Sl. no.	Independent variables	Regression coefficient (b)	Standard error of regression coefficient	't' value
1	Age	0.291	0.183	1.588 NS
2	Education	2.391	1.076	2.221 *
3	Family size	2.847	2.524	1.127 NS
4	Type of family	3.244	3.446	0.941 NS
5	Farming experience	1.198	1.286	0.931 NS
6	Total land holding	0.048	0.752	0.064 NS
7	Annual income	3.424	3.962	0.865 NS
8	Risk orientation	0.651	0.162	4.001 **
9	Cosmopoliteness	1.185	0.609	1.946 NS
10	Scientific orientation	1.770	0.837	2.114 *
11	Mass media exposure	1.469	0.612	2.39 *
12	Extension participation	1.504	0.468	3.21 **
13	Social participation	0.392	0.560	0.701 NS
14	Innovative proness	0.184	0.079	2.310 *
15	Extension contact	0.814	0.361	2.25 *
16	Economic motivation	0.028	0.482	0.059 NS

*NS; Non-significant, * significant at 5% level, ** significant at 1% level*
R2=0.6326

4. CONCLUSION

Majority of the Head reach farmers have low-medium adoption level, whereas Majority of the Tail end farmers have medium-high adoption. The correlation analysis indicated a positive and significant relationship at one per cent level between the independent variables such as education, risk orientation, cosmopoliteness, scientific orientation, mass media exposure, extension participation, innovative proneness, extension contact and adoption. While economic motivation had a positive and significant relationship with adoption at five per cent level. Negligible proportion of farmers adopted have adopted micro irrigation, use of light and pheromone traps, leaf colour chart, seed treatment with salt water, use of bio fertilisers etc Hence farmers need to be educated, convinced about the importance of Climate Resilient Agricultural technologies, about adapting to changing climate and adverse effects of changing climate etc. In the long run there is a need to provide required facilities by the State department of Agriculture, besides providing more technical guidance through conducting demonstration in each village and follow up approach.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Venkateswarlu B, Maheswari M, Srinivasa Rao M, Rao VUM, Srinivasa Rao CH, Reddy KS, Ramana DBV, Rama Rao CA, Vijay Kumar P, Dixit S, Sikka AK. National Initiative on Climate Resilient Agriculture (NICRA), Research Highlights (2012-13). Central Research Institute for Dryland Agriculture, Hyderabad; 2013.
2. IPCC. Managing the risks of extreme events and disasters to advance climate change adaptation summary for policymakers, special report of inter-governmental panel on climate change; 2007.
   (Accessed on 14th March 2015)
   Available: https://www.ipcc.ch/pdf/special-reports/srex/SREX_FD_SPM_final.pdf
3. Alagesan V, Budhar MN. System of rice intensification: Exploring the level of adoption and problems of discontinuance. International Rice Research Notes (IRRN); 2009.
4. Shankara MH. A study on understanding the perception of farmers about climate change and their adaptation measures in Eastern dry zone of Karnataka. M.Sc. (Agri.) Thesis (Unpub.), University of Agricultural Sciences, Bangalore; 2010.
5. Shivaramu K, Krishnamurthy B. Adoption of SRI technology by paddy growers.

Mysore Journal of Agricultural Sciences. 2011;45(3):648-655.
6. Shivaramu K, Siddu HC, Ranganatha AD. Economics and adaption of drum seeding technology by paddy growers. Environment & Ecology. 2011;29(1A):287-289.
7. Muttanna. A study on perception of climate change among farm women and its impact on production of red gram. M.Sc. (Agri.) Thesis, Univ. Agri. Sci., Bangalore; 2013.
8. Rane, Satish. A study on adoption of eco-friendly technologies among rice growers of Hanumana block of Rewa district (M.P.). M.Sc. (Agri.) Thesis (Unpub.), JNKVV. Maharastra; 2016.
9. Thiyagarajan M. Impact analysis of System of Rice Intensification (SRI) among the paddy farmers of Coimbatore District. M.Sc. (Agri.) Thesis (Unpub.), Tamil Nadu Agricultural University, Coimbatore, India; 2011.
10. Jamadar. Farmer awareness of climate change and their adaptations. M.Sc. Thesis (Unpub), Univ. of Agril. Sci., Dharwad; 2012.
11. Mahato N. Climate change and its impact on agriculture. International Journal of Scientific and Research Publications. 2014;4(4).
12. Dutta Bibhu Prasad. A study on the adoption behaviour of rice farmers towards Alternate Wetting and Drying (AWD) technology in Puri district of Odisha. M.Sc. (Agri.) Thesis (Unpub.), OUAT, Bhubaneswar; 2015.

© 2018 Manjunath et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sciencedomain.org/review-history/27368