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Original Research Article

Adoption of Climate Resilient Practices by Farmers in Rain fed and Irrigated Situations

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A B S T R A C T

The present study was conducted in Eastern Dry Zone of Karnataka state India. To measure the adoption of climate resilient practices a scale was developed. The data was collected from 180 farmers using structured interview schedule. The collected data was analyzed and tabulated using Chi- square, ANOVA, Correlation and Principal Component analysis. The results of the study revealed that in Rain fed situation 41.11 per cent of farmers belonged to medium, 32.22 to low and 36.67 per cent to high adoption category. Where as in irrigated situation 38.88 of farmers belonged to low, 33.34 per cent to high and 27.78 to medium adoption of Climate Resilient Practices. This gets the support of significant results of Chi-square and F-test. Further, in Rain fed situation the practice, intercropping racked first, crop substitution ranked second, drought tolerant varieties ranked third, alteration in sowing/ planting dates ranked forth and establishing wind breaks ranked fifth. On the other hand in Irrigated Situation the practice crop substitution racked first, drought tolerant varieties ranked second, intercropping ranked third, alteration in sowing/ planting dates ranked forth and pest and disease resistant varieties ranked fifth. In addition, in Rain fed situation, the profile characteristics such as cosmopoliteness, organizational participation, education, awareness about diversification and risk orientation, were found to be have significant relationship with adoption of climate resilient practices at one per cent level. Whereas In irrigated situation, profile characteristics such as education, organizational participation, annual income, risk orientation and innovative proneness, were found to be have significant relationship with adoption of climate resilient practices at one per cent level of probability.

Keywords

Adoption, Climate resilient practices, Rain fed, Irrigated, Principal component, Analysis

Introduction

Climate change is affecting India drastically and its impacts are many and serious-erratic monsoon, changes in agricultural zones, spread of tropical diseases, sea level rise, change in availability of fresh water, floods, droughts, heat waves, storms, hurricanes etc. Abrupt climate change could make large areas of the country uninhabitable. Country is facing unpredictable weather for the last few years. Analysis of different meteorological data from weather stations in the country shows that there is an upward trend in mean monthly temperature, and downward trend in relative humidity (RH), annual rainfall and number of wet days in a year. States like Bihar, Assam and parts of Karnataka are experiencing dry spells, whereas Southern Gujarat, Maharashtra, parts of Bihar, Andhra Pradesh, Ladakh and Western Karnataka were hit by the flood. Some areas in India receive more than normal rainfall while some of the areas receive almost no rainfall. The various studies show the overall loss in the crop production in the country in the last few years due to the anticipated rise in the temperature. It is expected that in the near future, India is going to face the challenges that includes unwanted pressure from the growing population and changing scenario of world trade in agriculture.

With unpredictable weather, farmers keep changing crop management practices by growing resistant varieties and prepared for constant change in the farming practices. Impacts of climate change are diversified and need to be understood, so as to workout pragmatic strategies to mitigate ill-effects of climate change. In this aspect adoption of climate resilient practices play an important role and mainly focus on survival strategies undertaken by the farmers to face the vulnerability of climate change and also anticipated future impacts. With this background, the present study was designed to understand the adoption of climate resilient practices initiated due to climate change by farmers with the following specific objectives.

1. To Know the Overall Adoption of Climate Resilient Management Practices by Farmers in Rain fed and Irrigated Situations.

2. To Know the Practice wise Adoption of Climate Resilient Management Practices by farmers in Rain fed and Irrigated Situations.

3. To Find out Relationship between Profile Characteristics and Adoption of Climate Resilient Management Practices by Farmers in Rain fed and Irrigated Situations; and

4. To Estimate the Contribution of Profile Characteristics to their Adoption of Climate Resilient Management Practices by Farmers in Rain fed and Irrigated Situations.

Materials and Methods

The study was conducted in Eastern Dry Zone (Zone-5) of Karnataka, India. It covers six districts viz., Tumkur, Banglore (Rural), Bangalore (Urban), Kolar, Ramanagar and Chickballapur. Based on the existence of high range of variability in rainfall and temperature (since 20 years), six taluks were selected viz., Chickballapur, Dodddballapur, Anekal, Kolar, Gubbi and Ramanagar. From each of the selected taluks two villages were selected randomly. Thus, 12 villages were considered for the study. From each of the selected village 15 farmers were selected through proportionate random sampling. Thus, the total sample for the study was 180 respondents. The selected respondents were personally interviewed using pre-tested interview schedule. The data was tabulated and analyzed using Chi- square, ANOVA, Correlation and Principal Component analysis. Further, a scale was developed on adoption of Climate Resilient Practices. A score of 4,3,2, 1 and 0 were assigned to the responses fully followed, followed, un decided, partially not followed and not followed of adoption of climate resilient practices by farmers.

Results and Discussion

Overall adoption of climate resilient practices by farmers in rain fed and irrigated situations

In Rain fed situation, 41.11per cent of farmers had medium adoption of climate resilient practices followed by 32.22 per cent had low adoption and 26.67 per cent had high adoption of climate resilient practices (Table 1). On the other hand In irrigated situation, 38.88 per cent of farmers belonged to low adoptability followed by 33.34 per cent had high and 27.78 per cent had medium adoptability of climate resilience practices. Chi-square test applied was 86.938 turn out to be significant at one per cent level of probability indicating a significant variation in the overall adoption of climate resilient practices among the farmers in different agricultural situations *viz.*, Rain fed and irrigated,

Further, to know the significance difference F- test was carried out accordingly the results obtained were presented in Table 2 showed that there was a significant difference at 5 per cent level of probability (F- value 3.02) in adoption of climate resilient practices among the farmers in different situations *viz.*, Rain fed and irrigated.

Practice wise adoption of climate resilient practices by farmers in rain fed situation

Practice wise Adoption of Climate Resilient Practices by farmers in Rain fed Situation is presented in Table 3. The practice, intercropping racked first, crop substitution ranked second, drought tolerant varieties ranked third, alteration in sowing/ planting dates ranked forth and establishing wind breaks ranked fifth. The remaining practices on the order of rank were pest and disease resistant varieties, alteration in fertilizer usage , organic farming practices, integrated farming system approach, establishing soil and water conservation structures, integrated nutrient management practices, use of organic manures, soil moisture conservation measures, micro irrigation systems, crop rotation, use of suitable breeds, measures towards disease resistance in animals ,integrated weed management practices, soil test based fertilizer application, high yielding & drought resistant forage crops, mulching and farm pond. Further, the Climate Resilient Practice intercropping was followed by majority of rain fed farmers and the practices farm pond, mulching, high yielding & drought resistant forage crops, soil test based fertilizer application, integrated weed management practices, measures towards disease resistance in animals use of suitable breeds and crop rotation were not followed by majority of farmers.

Practice wise adoption of climate resilient practices by farmers in irrigated situation

Practice wise Adoption of Climate Resilient Practices in Irrigated Situation is presented in Table 4. The practice crop substitution racked first, drought tolerant varieties ranked second, intercropping ranked third, alteration in sowing/ planting dates ranked forth and pest and disease resistant varieties ranked fifth. The remaining practices on the order of rank were establishing wind breaks, alteration in fertilizer usage, organic farming practices, integrated farming system approach, establishing soil and water conservation structures, integrated nutrient management practices, use of organic manures, soil moisture conservation measures, micro irrigation systems, crop rotation, use of suitable breeds, measures towards disease resistance in animals, soil test based fertilizer application, integrated weed management practices, high yielding & drought resistant forage crops, mulching and farm pond. Further, majority of the farmers were not followed the Climate Resilient Practices such as farm pond, mulching, high yielding & drought resistant forage crops, soil test based fertilizer application, integrated weed management practices, use of suitable breeds, measures towards disease resistance in animals and crop rotation.

Relationship between profile characteristics and adoption of climate resilient practices by farmers in rain fed and irrigated situations.

The correlation test carried out to identify the type of relationship between profile characteristics with adoption of climate resilient practices in different agricultural situations *viz*., Rain fed and irrigated (Table 5).

In Rain fed situation, the profile characteristics such as cosmopoliteness (-0.276) organizational participation (0.218) education (-0.212), awareness about diversification (0.196) and risk orientation (0.193), were found to be have significant relationship with adoption of climate resilient practices at one per cent level. Other variables such as innovative proneness (0.186), scientific orientation (-0.182), dependency ratio (-0.171), farming experience (0.162), economic motivation (-0.145) and mass media exposure (0.144) were found to be have significant relationship with adoption of climate resilient practices at five per cent level.

In irrigated situation, profile characteristics such as education (0.322), organizational participation (-0.275), annual income (0.255), risk orientation (-0.235) and innovative proneness (0.191), were found to be have significant relationship with adoption of climate resilient practices at one per cent level of probability. Whereas, awareness about diversification (-0.187),extension contact (-0.186), cosmopoliteness (0.183), farming experience (0.171) farm mechanization level (0.171), mass media exposure (0.169) scientific orientation (0.130) , irrigation potential (-0.129) and economic motivation (0.120) were found to be have significant relationship with adoption of climate resilient practices at five per cent level.

Contribution of profile characteristics to the adoption of climate resilient factors by farmers in rain fed and irrigated situation

While examining the practices wise contribution in Table 6 it was noticed that the adoption of climate resilient factor 1(intercropping) in Rain fed situation displayed strong association with profile characteristics such as education, dependency ratio, annual income, economic motivation, extension contact organizational participation and farm mechanization level. But negative sign of the co- efficient, farming experience (-0.487) indicated an inverse association with adoption. The next important factor 9 (integrated farming system approach) where adoption of climate resilient factor is strongly associated with variables such as Economic motivation, cosmopoliteness, distance to market, awareness about diversification. But negative sign of the co- efficient, dependency ratio (-0.376) , irrigation potential (-0.804) and farm mechanization level(-0.385) indicated an inverse association with the adoption of climate resilient factor. Factor 3 (drought tolerant varieties) displayed a strong association with variables such as , farm size, scientific orientation, extent of natural capital and farm mechanization level. But negative sign of the co- efficient, age (-0.376) and innovative proneness (-0.584) indicated an inverse association with the adoption of climate resilient factor. Whereas, factor 8(organic farming practices) displayed strongly associated with profile characteristics such as annual income, mass media exposure, risk orientation, scientific orientation and innovative proneness.factor 7(alteration in fertilizer usage) displayed association with dependency ratio, cosmopoliteness and awareness about diversification but negative sign of the co-efficient, age (-0.793) and farming experience (-0.724) indicated an inverse association with adoption factors. Whereas, dependency ratio, farming experience, economic motivation, scientific orientation, awareness about diversification and farm financial literacy displayed a strong association with factor 6 (pest and disease resistant varieties).

Further, in irrigated situation factor 1(crop substitution) displayed strong association with variables such as education, economic motivation, extension contact, distance to market and organizational participation. But negative sign of the co- efficient farm size (-0.322) and farming experience (-0.466) indicated an inverse association with the factors. The next important adoption factor is 2(drought tolerant varieties) is strongly associated with profile characteristics such as scientific orientation, irrigation potential and farm mechanization level. But negative sign of the co- efficient, distance to market (-0.711) and farm financial literacy (-0.467) indicated an inverse association with the adoption factor. The factor 9 (integrated farming system approach) is positively associated with profile characteristics like economic motivation, risk orientation, scientific orientation, cosmopoliteness and farm financial literacy. Whereas, Farm size and extent of natural capital had displayed strong association with factor 8 (organic farming practices), but negative sign of the co- efficient, dependency ratio (-0.312) and innovative proneness (-0.803) indicated an inverse association with the adoption of climate resilient practices. The factor 3 (intercropping) is positively associated with farm size and farming experience. Whereas the factor 7(alteration in fertilizer usage) display positive association with annual income, risk orientation, and financial literacy but negative sign of the co- efficient, dependency ratio (-0.305) indicated an inverse association with the adoption of climate resilient factor. Whereas, factor 6 (establishing wind breaks) strongly associated with age and farming experience and the factor 5 (pest and disease resistant varieties) was associated with farming experience.

Table.1 Overall adoption of climate resilient practices by farmers in rain fed and irrigated situations

Adoption category	*Agricultural situation*					
	Rain fed(n=90)		*Irrigated(n=90)*		*Total (N=180)*	
	Number	*Per cent*	*Number*	*Per cent*	*Number*	*Per cent*
Low	29	32.22	35	38.88	35	19.45
Medium	37	41.11	25	27.78	109	60.55
High	24	26.67	30	33.34	36	20.00
Total	90	100.00	90	100.00	180	100.00

Chi-square Value=86.938** **= Significant at 1 per cent level.

Table.2 Adoption of climate resilient practices by farmers in rain fed and irrigated situations

(N=180)

Situations	*Sample size*	*Adoption*		*'F' Value*
		Mean	*S.D*	
Rain fed	**90**	**30.32**	**14.34**	**3.02***
Irrigation	**90**	**32.36**	**24.62**	
Total	**180**	**31.32**	**26.82**	

*= Significant at 5 per cent level;

Table.3 Practice wise adoption of climate resilient practices by farmers in rain fed situation

(n=90)

Sl.No.	Practices	Fully followed		Followed		Un decided		Partially not followed		Not followed		Score	Rank
		Score	%	Score	%	Score	%	score	%	Score	%		
1	Intercropping	14	15.55	45	50.00	7	7.77	20	22.23	4	4.45	225	I
2	Crop Substitution	5	5.55	37	41.11	31	34.45	13	14.44	4	4.45	206	II
3	Drought Tolerant Varieties	21	23.34	34	37.77	0	0.00	13	14.45	22	24.44	199	III
4	Alteration in sowing/ Planting Dates	0	0.00	40	44.45	25	27.77	11	12.23	14	15.55	181	IV
5	Establishing Wind Breaks	9	10.00	36	40.00	13	14.45	6	6.67	26	28.88	176	V
6	Pest and Disease Resistant Varieties	9	10.00	40	44.45	0	0.00	17	18.88	24	26.67	173	VI
7	Alteration in Fertilizer Usage	9	10.00	31	34.45	15	16.66	4	4.45	31	34.44	163	VII
8	Organic Farming Practices	8	8.88	27	30.00	16	17.78	17	18.89	22	24.45	162	VIII
9	Integrated Farming System Approach	0	0.00	31	34.44	14	15.55	25	27.78	20	22.23	146	IX
10	Establishing Soil and Water Conservation Structures	9	10.00	18	20.00	15	16.67	13	14.45	35	38.88	133	X
11	Integrated Nutrient Management Practices	8	8.88	13	14.45	19	21.12	15	16.67	35	38.88	124	XI
12	Use of Organic Manures	8	8.88	12	13.34	20	22.23	15	16.67	35	38.88	123	XII
13	Soil Moisture Conservation Measures	8	8.88	13	14.45	15	16.67	19	21.12	35	38.88	120	XIII
14	Micro Irrigation Systems	2	2.22	8	8.88	23	25.55	20	22.00	37	41.11	98	XIV
15	Crop Rotation	0	0.00	12	13.33	10	11.11	20	22.23	48	53.33	76	XV
16	Use of Suitable Breeds	0	0.00	9	10.00	8	8.89	24	26.66	49	54.45	67	XVI
17	Measures Towards Disease Resistance in Animals	0	0.00	8	8.89	9	10.00	24	26.66	49	54.45	66	XVII
18	Integrated Weed Management Practices	0	0.00	8	8.89	8	8.89	24	26.67	50	55.55	64	XVIII
19	Soil test Based Fertilizer Application	0	0.00	8	8.89	8	8.89	22	24.45	52	57.77	62	XIX
20	High Yielding & Drought resistant Forage Crops	0	0.00	9	10.00	8	8.89	18	20.00	55	61.11	61	XX
21	Mulching	0	0.00	8	8.89	8	8.89	17	18.88	57	63.34	57	XXI
22	Farm Pond	1	1.11	8	8.89	4	4.44	16	17.78	61	67.78	52	XXII

Table.4 Practice wise adoption of climate resilient practices by farmers in irrigated situation

(n=90)

Sl. No.	Practices	Fully followed		Followed		Un decided		Partially not followed		Not followed		Score	Rank
		Score	%	Score	%	Score	%	Score	%	Score	%		
1.	Crop Substitution	6	6.66	38	42.23	29	32.23	13	14.44	4	4.44	209	I
2.	Drought Tolerant Varieties	24	26.66	33	36.66	0	0.00	11	12.23	22	24.45	206	II
3.	Intercropping	16	17.77	45	50.00	6	6.66	19	21.12	4	4.45	203	III
4.	Alteration in sowing/ Planting Dates	2	2.23	39	43.33	24	26.66	11	12.23	14	15.55	184	IV
5.	Pest and Disease Resistant Varieties	11	12.23	40	44.45	0	0.00	15	16.66	24	26.66	179	V
6.	Establishing Wind Breaks	9	10.00	38	42.23	12	13.34	5	5.55	26	28.88	179	VI
7.	Alteration in Fertilizer Usage	9	10.00	33	36.66	14	15.55	3	3.34	31	34.45	166	VII
8.	Organic Farming Practices	8	8.88	30	33.34	14	15.56	16	17.77	22	24.45	166	VIII
9.	Integrated Farming System Approach	2	2.23	31	34.44	13	14.44	25	27.77	19	21.12	152	IX
10.	Establishing Soil and Water Conservation Structures	10	11.12	20	22.22	14	15.55	12	13.34	34	37.77	140	X
11	Integrated Nutrient Management Practices	9	10.00	16	17.78	18	20.00	14	15.56	33	36.66	134	XI
12	Use of Organic Manures	9	10.00	15	16.67	19	21.12	14	15.55	33	36.67	133	XII
13.	Soil Moisture Conservation Measures	9	10.00	16	17.77	14	15.56	18	20.00	33	36.66	130	XIII
14.	Micro Irrigation Systems	4	4.44	11	12.22	21	23.34	19	21.12	35	38.88	110	XIV
15.	Crop Rotation	2	2.23	15	16.66	9	10.00	19	21.11	45	50.00	85	XV
16.	Use of Suitable Breeds	3	3.34	9	10.00	8	8.89	23	25.55	47	52.22	78	XVI
17.	Measures Towards Disease Resistance in Animals	2	2.23	9	10.00	9	10.00	23	25.55	47	52.22	76	XVII
18.	Soil test Based Fertilizer Application	2	2.23	10	11.12	8	8.88	21	23.33	49	54.44	75	XVIII
19.	Integrated Weed Management Practices	2	2.23	9	10.00	7	7.77	24	26.66	48	53.34	73	XIX
20.	High Yielding & Drought resistant Forage Crops	3	3.34	9	10.00	8	8.89	16	17.77	54	60.00	71	XX
21.	Mulching	3	3.34	8	8.89	8	8.89	15	16.66	56	62.22	67	XXI
22.	Farm Pond	4	4.44	9	10.00	4	4.44	14	15.56	59	65.56	65	XXII

Table.5 Relationship between profile characteristics and adoption of climate resilient practices by farmers in rain fed and irrigated situations

Sl. No.	Characteristic	Correlation Coefficient (r)	
		Rain fed ($n_{=90}$)	**Irrigated ($n_{=90}$)**
1.	Age	-0.003NS	-0.075NS
2.	Education	-0.212**	0.322**
3.	Dependency Ratio	-0.171*	0.047NS
4.	Farm Size	-0.071NS	0.066NS
5.	Farming Experience	0.162*	0.171*
6.	Annual Income	-0.092NS	0.255**
7.	Economic Motivation	-0.145*	0.120*
8.	Mass Media Exposure	0.144*	0.169*
9.	Risk Orientation	0.193**	-0.235**
10.	Scientific Orientation	-0.182*	0.130*
11.	Extension Contact	0.080NS	-0.186*
12.	Cosmopoliteness	-0.276**	0.183*
13.	Distance to Market	0.085NS	-0.093NS
14.	Awareness about Diversification	0.196**	-0.187*
15.	Extent of Natural Capital	-0.090NS	0.07NS
16.	Innovative Proneness	0.186*	-0.191**
17.	Farm Financial Literacy	-0.071NS	-0.072NS
18.	Irrigation Potential	0.088NS	-0.129*
19.	Organizational Participation	0.218**	-0.275**
20.	Farm Mechanization Level	-0.040NS	0.171*

NS: Non-Significant; *: Significant at 5per cent level; **: Significant at 1per cent level.

Table.6 Contribution of profile characteristics to the adoption of climate resilient factors by farmers in rain fed and irrigated situation

S.I. No.	Characteristic	Rain fed (n=90)						Irrigated (n_1=90)							
		Adoption Factor						Adoption Factor							
		1	9	3	8	7	6	1	2	9	8	3	7	6	5
1.	Age			-0.376		-0.793								0.891	
2.	Education	0.809				.390		0.808							
3.	Dependency Ratio	0.605	-0.376				0.312				-0.312	0.686	-0.325		
4.	Farm Size			0.867				-0.322			0.665				
5.	Farming Experience	-0.487				-0.724	0.319	0-.466						0.721	
6.	Annual Income	0.320			0.356								0.808		
7.	Economic Motivation	0.777	0.323				0.332	0.504		0.415					
8.	Mass media Exposure				0.825							0.890			
9.	Risk Orientation				0.883					0.596		0.544	0.301		
10.	Scientific Orientation			0.313	0.425		0.690		0.452	0.688					
11.	Extension Contact	0.919						0.903							
12.	Cosmopolitenes s		0.946							0.910					
13.	Distance to market		0.946					0.332	-0.711						
14.	Awareness about Diversification		0.487			0.467	0.451								0.938
15.	Extent of Natural Capital			0.882							0.915				
16.	Innovative Proneness			-0.584	0.539						-0.803	0.331			
17.	Farm Financial Literacy						0.783		-0.467	0.559			0.383		
18.	Irrigation Potential		-0.804						0.832						
19.	Organizational Participation	0.925						0.905							
20.	Farm Mechanization Level	0.438	-0.385	0.685				0.387	0.746						
	Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.														

In Rain fed situation 41.11 per cent of farmers belonged to medium, 32.22 to low and 36.67 per cent to high adoption category. Where as in irrigated situation 38.88 of farmers belonged to low, 33.34 per cent to high and 27.78 to medium adoption category of Climate Resilient Practices. This gets the support of significant results of Chi-square and F-tests. The possible reason for medium to low adoptability may be due to the fact that it is relatively a new concept to many farmers and still it is in the stage of acceptance by the farmers. This implied that farmers need to be educated regarding importance and advantages of climate resilient management practices for their acceptance**.** The above trend of results gets the support of Shankara (2010) reported that majority of farmers (43.33%) had low adoption followed by (33.34%) per cent had medium and high (23.33%) adoption level of climate related activities because of lack awareness regarding adoption strategies. Manjunath (2018) reported that 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 factor like acute water shortage and Tail end farmers had more extension contact with the subject matter specialists (SMS's) of Krishi Vignan Kendra (KVK) and they were participated in extension educational activities like demonstrations, group meetings, field days etc., to a greater extent. Further, the farmers in head reach area had obtained a relatively lesser mean score, while the farmers in Tail end area had a higher mean score with respect to adoption scores. The t-value showed significant difference between adoption level of Head reach and Tail end farmers at 5 per cent level of probability. Similarly Balakrishnan and Vasanthakumar (2010) revealed that more than half of respondents had medium level of knowledge followed by high level of knowledge and low knowledge level about SRI technology. Also, Thiyagarajan (2011) revealed that majority of the respondents had medium level of knowledge followed by low level and high level of knowledge on SRI cultivation. Further, Jasna (2015) reported that in Karnataka and Jharkhand NICRA farmers had a higher resilient index score than the non- NICRA farmers.

Further, in Rain fed situation the practice, intercropping racked first, crop substitution ranked second, drought tolerant varieties ranked third, alteration in sowing/ planting dates ranked forth and establishing wind breaks ranked fifth. On the other hand in Irrigated Situation the practice crop substitution racked first, drought tolerant varieties ranked second, intercropping ranked third, alteration in sowing/ planting dates ranked forth and pest and disease resistant varieties ranked fifth. The probable reason for a above findings may be that the intercropping in Rain fed situation acts as a natural insurance a reduce the risk when the main crop failures and alternative crop provides sustainable income to the farmers. Depending on the climatic factors and availability of natural resources farmers need to adopt cropping pattern to reduce the impact of climate change, adoption of drought tolerant varieties and changing planting dates according to climate change helps in overcoming adverse conditions and establishment of wind breaks to conserve soil moisture and provides organic manure to agriculture land. Vinay and Umesh (2015) also observed that the farmers have adapted several coping mechanisms in crop production and soil and water conservation practices in response to changes in climatic parameters. Majority of farmers (80% agro-met advisory service (AAS) and 45% control) have changed from growing of long duration varieties to short duration varieties. Similarly, a sizable proportion of farmers have changed their cropping pattern that instead of growing ragi alone, they shifted to red gram, vegetables and grapes. Majority of farmers, particularly AAS category have started adopting few soil and water conservation practices. Farmers have also changed the spacing, quantity of seeds used, fertilizer application and frequency of irrigation. Further, Raviya (2017) clearly indicated that the level of adoption was found very high (more than 70 per cent) in practices like, method of sowing (rank I), land preparation (rank II), seed rate (rank III), inter culturing (rank IV) and spacing (rank V). Manjunath (2018) reported that in both Head reach and Tail end area majority of the respondents have adopted the practices like summer ploughing, puddling at the right time, pregermination of paddy seeds, trimming of top of the aged seedlings before transplanting during late planting, maintaining closer spacing of aged seedlings and increasing number of aged seedling per hill. In both Head reach and Tail end area only notable number of respondents have partially adopted the technologies like field sanitation, improved land leveling, maintaining thin film of water for suppression of weeds, use of organic manures, green leaf and green manure, applying recommended quantity of fertilizers and application of neem coated urea.

The profile characteristics such as cosmopoliteness, organizational participation, education, awareness about diversification and risk orientation, were found to be having significant relationship with adoption of climate resilient practices at one per cent level. Whereas in irrigated situation, profile characteristics such as education, organizational participation, annual income, risk orientation and innovative proneness, were found to be have significant relationship with adoption of climate resilient practices at one per cent level. The above trend of results may be attributed to the fact that cosmpoliteness helps to expose person to developmental opportunities like credit or government subsidy programmes to undertake suitable permanent measures. The person who is participating in different rural organizations can perceive the trends of climate change more effectively and try to acquire relevant technologies. Education enhances the thinking ability and influences the selection of alternative actions and judicious use of resources. Awareness about diversification helps to evaluate the coping strategies, related to farm activities and also to choose the appropriate strategies to mitigate the ill effects of climate change. The risk orientation determine the quality of any individual to excel their activity which might have influenced the ability to take up different measures to overcome risk and to have better adoption of climate resilient practices. Economic dimension is the major determinant of adoption of any process and to continue in it. Similarly in agriculture farmers will have positive attitude and better adoption of climate resilient practices. The innovative proneness is a cognitive aspect of change, which affects the readiness of an individual to accept new technology. Further, majority of the respondents from Rain fed and irrigated situations would like to achieve higher returns by adopting the innovations intensively related to climate resilience practices. The results are in line with the studies of Shankara (2010) reported the relationship of independent variables with perception of climate change, revealed that, out of fifteen variables viz., age, education, family size, farming experience, income, land holding, innovative proneness and extension agency contact had a positive significant relationship with the farmers perception on climate change. Lalitha (2016) observed that, there was a positive and significant relationship between education, annual income, cropping intensity, irrigation potential, risk orientation, scientific orientation and perception of farmers on climate change with agro bio-diversity level at five per cent level. Nitesh (2017) indicated that environmental activities participation had a highly significant association with the standard of living of beneficiaries at one per cent level in Green army members. Prabhu (2017) revealed that chi-square test had highly significant association between profile characteristics and management level at one per cent level.

The adoption of climate resilient practice intercropping in Rain fed situation displayed a strong association with profile characteristics such as education, dependency ratio, annual income, economic motivation, extension contact, organizational participation and farm mechanization level. But negative sign of the co- efficient, farming experience indicated an inverse association with adoption. The next important practice integrated farming system approach where adoption of climate resilient factor is strongly associated with variables such as economic motivation, cosmopoliteness, distance to market, awareness about diversification. But negative sign of the co-efficient, dependency ratio, irrigation potential and farm mechanization level indicated an inverse association with the adoption of climate resilient factor. The practice drought tolerant varieties displayed a strong association with variables such as, farm size, scientific orientation, extent of natural capital and farm mechanization level. But negative sign of the co- efficient, age and innovative proneness indicated an inverse association with the adoption of climate resilient practice and considered as a major contributing factors for adoption of climate resilient practices followed by organic farming practices, alteration in fertilizer usage and pest and disease resistant varieties. Further, in irrigated situation crop substitution displayed strong association with variables such as education, economic motivation, extension contact, distance to market and organizational participation. but negative sign of the co- efficient farm size and farming experience indicated an inverse association with the factors. The next important adoption practice drought tolerant varieties are strongly associated with profile characteristics such as scientific orientation, irrigation potential and farm mechanization level. But negative sign of the co- efficient, distance to market and farm financial literacy indicated an inverse association with the adoption factor. The practice integrated farming system approach is positively associated with profile characteristics like economic motivation, risk orientation, scientific orientation, cosmopoliteness and farm financial literacy and considered as a major contributing factors for adoption of climate resilient practices followed by organic farming practices, intercropping, alteration in fertilizer usage, establishing wind breaks and factor and resistant varieties.

In conclusion, majority of the farmers comes under medium to low adoption of climate resilient practices category. So, there is a necessary to improve the adoption of climate resilient practices management system which brings awareness among the people to provide early warning in order to avoid the ill effects of climate change. Further, the variables like economic motivation, mass media exposure, and distance to market, innovative proneness, irrigational potential, education, risk orientation and extent of natural capital were the most influencing characteristics in adoption of climate resilient practices by the farmers. Therefore, there is an urgent need that government to promote integrated farming system with better management of climate resilient practices. Further, there is a need for specialized training programmes to increase the awareness regarding climate resilient management and motivate them to excel in their life endeavours. Variables such as awareness about diversification, farming experience, organizational participation, extent of natural capital, extension contact, mass media exposure, education, scientific orientation and farm mechanization level, were the prime factors in adoption of climate resilient practices. Therefore, the government, developmental departments such as department of agriculture / horticulture, rural development and NGO"s to focus their efforts towards amplification of these factors through their developmental programmes and schemes in order to ensure enhancement of climate resilient management. In addition, developmental schemes to focus exclusively on climate resilient aspects of the farmers need to be designed and implemented. Further, developmental schemes to focus exclusively on adoption of climate resilient practices management.

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