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A STUDY ON CLIMATE CHANGE ADAPTATION BEHAVIOR OF FARM HOUSEHOLDS IN CUDDALORE DISTRICT

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Abstract

Agriculture is inherently sensitive to climate conditions, and is among the most vulnerable sectors to the risks and impacts of global climate change. Adaptation is certainly an important component of any policy response to climate change in this sector. Climate change adaptation reduces the negative effects of climate change and allows farmers and other land managers to capitalize on the new opportunities it presents. This paper deals with climate change adaptation behavior of farm households in Cuddalore district, Tamil Nadu. It outlines the various indicators of with climate change adaptation behavior of farm households and such indicators are quantified and measured. This paper makes a special note on regional variation, farm size variation, educational status variation, family size variation and gender variation in climate change adaptation behavior. This paper concludes with some interesting findings.

Introduction

This inevitable extent of climate change has large implications for agriculture. First, the 1 ◦C of committed climate change virtually mandates agricultural adaptation during the next 25 years. This adaptation would address the need to develop practices and management systems that maintain a productive agriculture for avoiding food security issues. In the past agricultural adaptation, once achieved, would last for a long time, but today adaptation needs to be continual as climate change proceeds. Furthermore, the ability to adapt is limited in places by financial, human, and physical capital, as well as by lifestyle and culture barriers. Moreover, many farmers learn farming practices and potential adaptations from their elders, but additional forms of learning will be needed if climate change alters the best enterprise mix. For example, lands that were: (1) traditionally cropped may be best moved into livestock; (2) mainly devoted to wheat may be more productive in corn, and; (3) producing corn may be desirable to move into sorghum. And the shifts in feed supply and livestock incidence may also be desirable. Collectively such dramatic enterprise shifts may well shift into unfamiliar situations, raising needs for extension and other forms of information dissemination.

Climate change adaptation is very essential to overcome the negative impacts of climate change on agriculture. It is evident from the work of Howden, et al., (2007) that climate change adaptation could be done by changing the agriculture inputs, crop varieties and species according to the changing climate scenario. The crop varieties should be resistant to heat shocks, drought, flood and Stalinization. Instead of applying chemical fertilizers, bio fertilizers and organic fertilizers could be used widely to mitigate the climate change impact. Irrigational practices to be adopted according to the prevailing rainfall, water resource potential and water resources availability. The cropping practices to be adapted by the way of altering timing and locations of different crop varieties.

Regarding irrigation adaptation strategies, river basin should be managed effectively and sincerely. In this context, there is a need to prevent water logging, soil erosion by the ways of using various technologies with a view to conserve water, soil moisture conservation and soil humidity conservation. Agriculture adaptation could be done by the way of diversifying income through supplementary occupations such as livestock rearing, fish culture along with rice farm. In order to overcome the impacts of insects and pests on crop yield consequent upon climate change, it is better to adopt integrated pest management, biological pest control mechanism and pathogens control through non chemical means.

The farmers are advised to follow climate forecasting to practice farming and reduction of production risk due to climate change impact. In the case of livestock sector the adaptation could be done by correlating livestock production with allied sector production. In this context, altering pasture location, altering forage production and integration of livestock and crop system could be made to overcome the negative impact of climate change on agriculture. In the case of forestry sector, the adaptation could be done by changing the forest management in terms of afforestation practice, species harvesting practices, crop rotation practices, planning landscape to minimize the crop damage and reduction of forest vulnerability. Further, adaptation could be made by focusing on greening Indian project, agro forestry and promotion of forest based industries along with reducing the fishing level and altering the catch practices.

Review on the Subject

Steven Kolikow, Marit Ellen Kragt and Amin W. Mugera (2012) showed how farmers' personal characteristics and the socio-institutional context within which farmers act contribute

to limits and barriers. Channing Arndt, Ken Strzepek and James Thurlow (2011) estimated the impact of climate change on food security in Tanzania. S. Mahendra Dev (2011) identified climate change related threats and vulnerabilities associated with agriculture as a sector and agriculture as people's livelihoods exposure, sensitivity, adaptive capacity. Juliana Speranza (2010) assessed the long-term effects of global climate change on Brazilian agriculture. Joachim Aurbacher, Christian Lippert and Tatjana Krimly (2010) assessed the impact of climate change on agriculture in German districts, based on Ricardian analysis.

Naresh Soora, et.al., (2013) carried out a simulation analysis using the InfoCrop-rice model to quantify impacts and adaptation gains, as well as to identify vulnerable regions for irrigated and rain fed rice cultivation in future climates in India. Prabhat Barnwal and Koji Kotani (2013) examined the case of rice yield in Andhra Pradesh, India, an important state producing rice as a main crop but reported to be vulnerable to climate change. Ashok Mishra, et.al., (2013) explored the potential of using short-term weather forecasts to increase irrigation efficiency in rice cultivation, as a potential adaptation option to future climate change. Anubhab Pattanayak and K.S. Kavi Kumar (2013) estimated the weather sensitivity of rice yield in India, using disaggregated (district) level information on rice and high resolution daily weather data over the period 1969-2007. K N Ninan and Satyasiba Bedamatta (2012) assessed the impact of climate change on Indian agriculture covering a cross section of crops, seasons and regions based on existing literature.

Methods and Materials

This study deals with impact of climate change on farm households in Cuddalore district, Tamil Nadu. In this study 6 blocks in Cuddalore district are covered viz., Parangipettai, Cuddalore, Kumaratchi, Keerapalayam, Nallur and Kammapuram. From each block four villages are selected as sample. In total 24 villages are covered in the study. Further from each village 30 farm households are selected as sample. In total 720 farm households are selected as sample under stratified random sampling method. The collected data are classifies tabulated with help of computer programming. Cross tabulation is done by putting independent variables of block, farm size, caste status, educational status, family size and gender status with the dependent variables on climate change adaptation behavior of the farm households'. The data analysis is done with the help of ANOVA two way analysis, t' test and mean score.

Result and Discussion

Climate Change Adaptation

This section deals with respondents' rating on climate change adaptation. It can be assessed with the help of 25 factors on a 5 point rating scale. These include move to different sites, changing planting dates, reduced number of livestock rearing, praying for rain, use of moist valley bottom, minimum tillage, practice mulching, cultivate improved crop variety, change from crop to livestock management, planting early maturing crops, change crop variety, enhanced traditional irrigation scheme, land use extension, cultivation of millets in place of rice plant a different crops, cultivate drought resistance crop variety, land use intensification, enhancing animal rearing practice, planting trees, mixed farming, move to different crops, inter cropping, diversify from farm to nonfarm activities, seek off farm employment and diversified crops.

Table 1 Block Wise Respondents' Rating on Climate Change Adaptation

Variables	Parangipettai	Cuddalore	Kumaratchi	Keerapalayam	Nallur	Kammapuram	Mean
Change crop variety	3.88	3.69	3.53	3.31	3.15	2.96	3.42
Mixed farming	3.09	2.90	2.74	2.52	2.36	2.17	2.63
Planting early maturing crops	3.95	3.76	3.60	3.38	3.22	3.03	3.49
Planting trees	3.20	3.01	2.85	2.63	2.47	2.28	2.74
Changing planting dates	4.21	4.20	4.16	4.06	3.98	3.79	4.05
Seek off farm employment	2.52	2.43	2.27	2.05	1.89	1.80	2.16
Reduced number of livestock rearing	4.22	4.18	4.20	3.90	3.81	3.75	4.01
Move to different sites	4.21	4.22	4.18	4.06	4.09	4.00	4.11
Move to different crops	2.94	2.75	2.59	2.37	2.21	2.02	2.48
Change from crop to livestock management	4.02	3.83	3.67	3.45	3.29	3.10	3.56
Diversified crops	2.41	2.32	2.16	1.94	1.78	1.69	2.05
Plant a different crops	3.55	3.36	3.20	2.98	2.82	2.63	3.09
Diversify from farm to nonfarm activities	2.74	2.55	2.39	2.17	2.01	1.82	2.28
Enhanced traditional irrigation scheme	3.81	3.62	3.46	3.24	3.08	2.89	3.35
Cultivate drought resistance crop variety	3.45	3.26	3.10	2.88	2.72	2.53	2.99
Cultivate improved crop variety	4.08	3.89	3.73	3.51	3.35	3.16	3.62
Enhancing animal rearing practice	3.31	3.12	2.96	2.74	2.58	2.39	2.85
Practice mulching	4.16	3.97	3.81	3.59	3.43	3.24	3.70
Inter cropping	2.85	2.66	2.50	2.28	2.12	1.93	2.39
cultivation of millets in place of rice	3.62	3.43	3.27	3.05	2.89	2.70	3.16
Praying for rain	4.22	4.18	4.17	3.91	3.69	3.60	3.96
Minimum tillage	4.15	4.06	4.00	3.68	3.52	3.33	3.79
Land use extension	3.73	3.54	3.38	3.16	3.00	2.81	3.27
Use of moist valley bottom	4.21	4.12	4.06	3.74	3.58	3.39	3.85
Land use intensification	3.39	3.20	3.04	2.82	2.66	2.47	2.93
Average	3.60	3.45	3.32	3.10	2.95	2.78	3.20

Source: Computed from primary data

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*F crit*
Variation due to climate change impact adaptation	57.28326	24	2.386802	440.2341	1.608437
Variation due to blocks	12.14395	5	2.42879	447.9785	2.289851
Error	0.6506	120	0.005422		
Total	70.07781	149			

Data presented in table 1 indicate the block wise respondents' rating on climate change adaptation. It could be noted that out of the 25 indicators of climate change adaptation, the respondents rate the move to different sites is the first level climate change adaptation and it is evident from their secured a mean score of 4.11 on a 5 point rating scale. Changing planting dates is rated at second level climate change adaptation and it is estimated from the respondents' secured a mean score of 4.05 on a 5 point rating scale. The respondents rate the reduced number

of livestock rearing is the third level climate change adaptation. It is evident from their secured a mean score of 4.01 on a 5 point rating scale. The respondents rank the fourth level climate change adaptation by citing the fact that the praying for rain and it is observed from the respondents' secured a mean score of 3.96 on a 5 point rating scale. Use of moist valley bottom is rated at fifth level climate change adaptation and it could be known from the respondents' secured a mean score of 3.85 on a 5 point rating scale.

The respondents' rate the minimum tillage is the sixth level climate change adaptation and it is revealed from their secured a mean score of 3.79 on a 5 point rating scale. Practice mulching is rated at seventh level climate change adaptation and it observed from the respondents' secured a mean score of 3.70 on a 5 point rating scale. The respondents' rate the cultivation of improved crop variety is their eighth level ranking. It is evident from their secured a mean score of 3.62 on a 5 point rating scale. The respondents rank the ninth level climate change adaptation by citing the fact that change from crop to livestock management as per their secured a mean score of 3.56 on a 5 point rating scale. Planting early maturing crops is rated at tenth level climate change adaptation and it is evident from the respondents' secured a mean score of 3.49 on a 5 point rating scale. The respondents' rate the changing crop variety is the eleventh level climate change adaptation and it could be known from their secured a mean score of 3.42 on a 5 point rating scale. Enhanced traditional irrigation scheme is rated at twelfth level climate change adaptation and it is reflected from the respondents' secured a mean score of 3.35 on a 5 point rating scale. The respondents rank the thirteenth level climate change adaptation by citing the fact that land use extension. It is evident from their secured a mean score of 3.27 on a 5 point rating scale. The respondents rank the fourteenth level climate change adaptation by citing the fact that cultivation of millets in place of rice and it is clear from their secured a mean score of 3.16 on a 5 point rating scale. Plant a different crops is rated at fifteenth level climate change adaptation as per the respondents' secured a mean score of 3.09 on a 5 point rating scale.

The respondents' rate the cultivation of drought resistance crop variety is the sixteenth level climate change adaptation and it could be known from their secured a mean score of 2.99 on a 5 point rating scale. Land use intensification is rated at seventeenth level climate change adaptation and it is reflected from the respondents' secured a mean score of 2.93 on a 5 point rating scale. The respondents' rate the enhancing animal rearing practice as their observed eighteenth level climate change adaptation and it is revealed from their secured a mean score of 2.85 on a 5 point rating scale. The respondents' rate the planting trees is the nineteenth level rated climate change adaptation of climate change and it could be known from their secured a mean score of 2.74 on a 5 point rating scale. Mixed farming is rated at twentieth level climate change adaptation and it is reflected from the respondents' secured a mean score of 2.63 on a 5 point rating scale.

The respondents' rate the move to different crops is the twenty first level climate change adaptation and it could be known from their secured a mean score of 2.48 on a 5 point rating scale. Inter cropping is rated at twenty second level climate change adaptation and it is reflected from the respondents' secured a mean score of 2.39 on a 5 point rating scale. The respondents' rate the Diversify from farm to nonfarm activities as their observed twenty third level climate change adaptation and it is revealed from their secured a mean score of 2.28 on a 5 point rating scale. The respondents' rate the seek off farm employment is the twenty fourth level rated climate change adaptation and it could be known from their secured a mean score of 2.16 on a 5 point rating scale.

Diversified crops is rated at twenty fifth level climate change adaptation and it is reflected from the respondents' secured a mean score of 2.05 on a 5 point rating scale.

The respondents' of Parangipettai block rank the first position in their overall rated climate change adaptation as per their secured a mean score of 3.60 on a 5 point rating scale. The respondents' of Cuddalore block record the second position in their overall rated climate change adaptation as per their secured a mean score of 3.45 on a 5 point rating scale. The respondents' of Kumaratchi block hold the third position in their overall rated climate change adaptation as per their secured a mean score of 3.32 on a 5 point rating scale. The respondents' of Keerapalayam block register the fourth position in their overall rated climate change adaptation as per their secured a mean score of 3.10 on a 5 point rating scale. The Nallur block respondents' occupy the fifth position in their overall rated climate change adaptation as per their secured a mean score of 2.95 on a 5 point rating scale. The Kammapuram block respondents' turn down to the last position in their overall rated climate change adaptation as per their secured a mean score of 2.78 on a 5 point rating scale.

The anova two way model is applied for further discussion. The computed anova value 440.23 is greater than its tabulated value at 5 percent level significance. Hence, the variation among the impacts of climate change on farm households' is statistically identified as significant. In another point, the computed anova value 447.97 is greater than its tabulated value at 5 percent level significance. Hence, the variation among the blocks is statistically identified as significant as per the respondents rated climate change adaptation.

Table 2 shows data on the farm size wise respondents' rating on climate change adaptation. The marginal farm size group respondents rank the first position in their overall rated climate change adaptation as per their secured a mean score of 3.50 on a 5 point rating scale. The small farm size group respondents record the second position in their overall rated climate change adaptation as per their secured a mean score of 3.27 on a 5 point rating scale.

Table 2 Farm Size Wise Respondents' Rating on Climate Change Adaptation

Variables	Marginal	Small	Medium	Large	Mean
Change crop variety	3.77	3.49	3.35	3.07	3.42
Mixed farming	2.98	2.70	2.56	2.28	2.63
Planting early maturing crops	3.84	3.56	3.42	3.14	3.49
Planting trees	3.09	2.81	2.67	2.39	2.74
Changing planting dates	4.20	4.12	4.08	3.80	4.05
Seek off farm employment	2.41	2.23	2.09	1.91	2.16
Reduced number of livestock rearing	4.16	4.08	4.04	3.76	4.01
Move to different sites	4.26	4.18	4.14	3.86	4.11
Move to different crops	2.83	2.55	2.41	2.13	2.48
Change from crop to livestock management	3.91	3.63	3.49	3.21	3.56
Diversified crops	2.30	2.12	1.98	1.80	2.05
Plant a different crops	3.44	3.16	3.02	2.74	3.09
Diversify from farm to nonfarm activities	2.53	2.35	2.21	2.03	2.28
Enhanced traditional irrigation scheme	3.70	3.42	3.28	3.00	3.35
Cultivate drought resistance crop variety	3.34	3.06	2.92	2.64	2.99
Cultivate improved crop variety	3.97	3.69	3.55	3.27	3.62
Enhancing animal rearing practice	3.20	2.92	2.78	2.50	2.85
Practice mulching	4.05	3.77	3.63	3.35	3.70
Inter cropping	2.74	2.46	2.32	2.04	2.39
cultivation of millets in place of rice	3.51	3.23	3.09	2.81	3.16
Praying for rain	4.11	4.03	3.99	3.71	3.96
Minimum tillage	4.14	3.86	3.72	3.44	3.79
Land use extension	3.62	3.34	3.20	2.92	3.27
Use of moist valley bottom	4.10	3.92	3.78	3.60	3.85
Land use intensification	3.28	3.00	2.86	2.58	2.93
Average	3.50	3.27	3.14	2.88	3.20

Source: Computed from primary data

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*F crit*
Variation due to climate change impact adaptation	37.94122	24	1.580884	494.0262	1.669456
Variation due to farm size	5.0036	3	1.667867	521.2083	2.731807
Error	0.2304	72	0.0032		
Total	43.17522	99			

The medium farm size group respondents hold the third position in their overall rated climate change adaptation as per their secured a mean score of 3.14 on a 5 point rating scale. The large farm size group respondents turn down to the last position in their overall rated climate change adaptation as per their secured a mean score of 2.88 on a 5 point rating scale.

The anova two way model is applied for further discussion. The computed anova value 494.02 is greater than its tabulated value at 5 percent level significance. Hence, the variation among the impacts of climate change on farm households' is statistically identified as significant. In another point, the computed anova value 521.20 is greater than its tabulated value at 5 percent level significance. Hence, the variation among the farm size groups is statistically identified as significant as per the respondents rated climate change adaptation.

Table 3 shows data on the education wise respondents' rating on climate change adaptation. The under graduate degree level educated respondents rank the first position in their overall rated climate change adaptation as per their secured a mean score of 3.69 on a 5 point rating scale. The higher secondary level educated respondents record the second position in their overall rated climate change adaptation as per their secured a mean score of 3.48 on a 5 point rating scale. The secondary level educated respondents hold the third position in their overall rated climate change adaptation as per their secured a mean score of 3.16 on a 5 point rating scale. The upper primary level educated respondents record the fourth position in their overall rated climate change adaptation as per their secured a mean score of 3.07 on a 5 point rating scale.

Table 3 Education Wise Respondents' Rating on Climate Change Adaptation

Variables	Under Graduate	Higher Secondary	Secondary	Upper primary	Primary	Mean
Change crop variety	4.06	3.74	3.35	3.26	2.71	3.42
Mixed farming	3.27	2.95	2.56	2.47	1.92	2.63
Planting early maturing crops	4.13	3.81	3.42	3.33	2.78	3.49
Planting trees	3.38	3.06	2.67	2.58	2.03	2.74
Changing planting dates	4.23	4.20	4.18	4.09	3.57	4.05
Seek off farm employment	2.60	2.48	2.09	2.00	1.65	2.16
Reduced number of livestock rearing	4.18	4.13	4.14	4.05	3.50	4.01
Move to different sites	4.25	4.23	4.20	4.15	3.74	4.11
Move to different crops	3.02	2.80	2.41	2.32	1.87	2.48
Change from crop to livestock management	4.20	3.88	3.49	3.40	2.85	3.56
Diversified crops	2.39	2.27	1.98	1.89	1.74	2.05
Plant a different crops	3.73	3.41	3.02	2.93	2.38	3.09
Diversify from farm to nonfarm activities	2.82	2.60	2.21	2.12	1.67	2.28
Enhanced traditional irrigation scheme	3.99	3.67	3.28	3.19	2.64	3.35
Cultivate drought resistance crop variety	3.63	3.31	2.92	2.83	2.28	2.99
Cultivate improved crop variety	4.16	3.94	3.65	3.46	2.91	3.62
Enhancing animal rearing practice	3.49	3.17	2.78	2.69	2.14	2.85
Practice mulching	4.14	4.02	3.63	3.54	3.06	3.70
Inter cropping	2.93	2.71	2.32	2.23	1.78	2.39
cultivation of millets in place of rice	3.80	3.48	3.09	3.00	2.45	3.16
Praying for rain	4.10	4.09	4.07	4.01	3.65	3.96
Minimum tillage	4.13	4.11	3.72	3.63	3.38	3.79
Land use extension	3.91	3.59	3.20	3.11	2.56	3.27
Use of moist valley bottom	4.19	4.17	3.78	3.69	3.44	3.85
Land use intensification	3.57	3.25	2.86	2.77	2.22	2.93
Average	3.69	3.48	3.16	3.07	2.60	3.20

Source: Computed from primary data

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*F crit*
Variation due to climate change impact adaptation	47.34084	24	1.972535	114.399	1.63128
Variation due to educational status	17.61075	4	4.402688	255.3381	2.466476
Error	1.655288	96	0.017243		
Total	66.60688	124			

The primary level educated respondents turn down to the last position in their overall rated climate change adaptation as per their secured a mean score of 2.60 on a 5 point rating scale.

The anova two way model is applied for further discussion. The computed anova value 114.39 is greater than its tabulated value at 5 percent level significance. Hence, the variation among the impacts of climate change on farm households' is statistically identified as significant.

In another point, the computed anova value 255.33 is greater than its tabulated value at 5 percent level significance. Hence, the variation among the educational status is statistically identified as significant as per the respondents rated climate change adaptation.

Table 4 Family Size Wise Respondents' Rating on Climate Change Adaptation

Variables	Small	Medium	Large	Mean
Change crop variety	2.84	3.55	3.96	3.42
Mixed farming	2.05	2.76	3.17	2.63
Planting early maturing crops	2.91	3.62	4.03	3.49
Planting trees	2.16	2.87	3.28	2.74
Changing planting dates	3.67	4.18	4.19	4.05
Seek off farm employment	1.78	2.29	2.50	2.16
Reduced number of livestock rearing	3.64	4.14	4.15	4.01
Move to different sites	3.82	4.19	4.21	4.11
Move to different crops	1.90	2.61	3.02	2.48
Change from crop to livestock management	2.98	3.69	4.10	3.56
Diversified crops	1.77	2.18	2.29	2.05
Plant a different crops	2.51	3.22	3.63	3.09
Diversify from farm to nonfarm activities	1.80	2.41	2.72	2.28
Enhanced traditional irrigation scheme	2.77	3.48	3.89	3.35
Cultivate drought resistance crop variety	2.41	3.12	3.53	2.99
Cultivate improved crop variety	3.04	3.75	4.16	3.62
Enhancing animal rearing practice	2.27	2.98	3.39	2.85
Practice mulching	3.22	3.83	4.14	3.70
Inter cropping	1.91	2.52	2.83	2.39
cultivation of millets in place of rice	2.58	3.29	3.70	3.16
Praying for rain	3.58	4.09	4.10	3.96
Minimum tillage	3.41	3.92	4.13	3.79
Land use extension	2.69	3.40	3.81	3.27
Use of moist valley bottom	3.27	4.08	4.09	3.85
Land use intensification	2.35	3.06	3.47	2.93
Average	2.69	3.33	3.62	3.20

Source: Computed from primary data

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*F crit*
Variation due to climate change impact adaptation	26.92687	24	1.121953	63.97774	1.746353
Variation due to family size	11.22538	2	5.612688	320.0555	3.190727
Error	0.841757	48	0.017537		
Total	38.994	74			

Table 4 shows data on the family size wise respondents' rating on climate change adaptation. The large family size group respondents rank the first position in their overall rated climate change adaptation as per their secured a mean score of 3.62 on a 5 point rating scale. The medium family size group respondents hold the third position in their overall rated climate change adaptation as per their secured a mean score of 3.33 on a 5 point rating scale. The small family size group respondents turn down to the last position in their overall rated climate change adaptation as per their secured a mean score of 2.69 on a 5 point rating scale.

The anova two way model is applied for further discussion. The computed anova value 63.97 is greater than its tabulated value at 5 percent level significance. Hence, the variation among the impacts of climate change on farm households' is statistically identified as significant. In another point, the computed anova value 320.05 is greater than its tabulated value at 5 percent level significance. Hence, the variation among the family size groups is statistically identified as significant as per the respondents rated climate change adaptation.

Table 5 Gender Wise Respondents' Rating on Climate Change Adaptation

Variables	Male	Female	Mean
Change crop variety	3.71	3.13	3.42
Mixed farming	2.92	2.34	2.63
Planting early maturing crops	3.78	3.20	3.49
Planting trees	3.03	2.45	2.74
Changing planting dates	4.14	3.96	4.05
Seek off farm employment	2.35	1.97	2.16
Reduced number of livestock rearing	4.20	3.82	4.01
Move to different sites	4.18	4.04	4.11
Move to different crops	2.77	2.19	2.48
Change from crop to livestock management	3.85	3.27	3.56
Diversified crops	2.14	1.96	2.05
Plant a different crops	3.38	2.80	3.09
Diversify from farm to nonfarm activities	2.47	2.09	2.28
Enhanced traditional irrigation scheme	3.64	3.06	3.35
Cultivate drought resistance crop variety	3.28	2.70	2.99
Cultivate improved crop variety	3.91	3.33	3.62
Enhancing animal rearing practice	3.14	2.56	2.85
Practice mulching	3.99	3.41	3.70
Inter cropping	2.68	2.10	2.39
cultivation of millets in place of rice	3.45	2.87	3.16
Praying for rain	4.15	3.77	3.96
Minimum tillage	4.08	3.50	3.79
Land use extension	3.56	2.98	3.27
Use of moist valley bottom	4.14	3.56	3.85
Land use intensification	3.22	2.64	2.93
Average	3.45	2.95	3.20

Source: Computed from primary data

t statistical vale 17.14, df 24, t critical value 1.71

Table 5 shows data on the gender wise respondents' rating on climate change adaptation. The male respondents' rank the first position in their overall rated climate change adaptation as per their secured a mean score of 3.45 on a 5 point rating scale. The female respondents' hold the next position in their overall rated climate change adaptation as per their secured a mean score of 2.95 on a 5 point rating scale.

The t test is applied for further discussion. The computed t value 17.14 is greater than its tabulated value at 5 per cent level significance. Hence, there is a significant difference between male respondents' and female respondents' in their overall rated climate change adaptation.

Conclusion

It could be seen clearly from the above discussion that the respondents' rate the high level climate change adaptation by citing the indicators that move to different sites, changing planting dates, reduced number of livestock rearing, praying for rain, use of moist valley bottom, minimum tillage, practice mulching, cultivate improved crop variety and change from crop to livestock management as per their secured a mean score above 3.50 on a 5 point rating scale. The respondents' rank the moderate level climate change adaptation by stating the facts that planting

early maturing crops, change crop variety, enhanced traditional irrigation scheme, land use extension, cultivation of millets in place of rice plant a different crops, cultivate drought resistance crop variety, land use intensification, enhancing animal rearing practice, planting trees, mixed farming as per their secured a mean score in the range of 2.50 to 3.50 on a 5 point rating scale. The respondents' rate the low level climate change adaptation by indicating the facts that move to different crops, inter cropping, diversify from farm to nonfarm activities, seek off farm employment and diversified crops as per their secured a mean score below 2.50 on a 5 point rating scale. It could be observed that the respondents of Parangipettai block rank the first position in their overall rated climate change adaptation, respondents of Cuddalore block the second, respondents of Kumaratchi block the third, respondents of Keerapalayam block the fourth, respondents of Nallur block the fifth and respondents of Kammapuram block the last.

The result of farm wise analysis reveals that the marginal farm size group respondents rank the first position in their overall rated climate change adaptation, small farm size group respondents the second, medium farm size group respondents the third and large farm size group respondents the last. The result of education wise analysis shows that the under graduate degree level educated respondents rank the first position in their overall rated climate change adaptation, higher secondary level educated respondents the second, secondary level educated respondents the third, upper primary level educated respondents the fourth and primary level educated respondents the last. The family size wise result of analysis indicates that the large family size group respondents rank the first position in their overall rated climate change adaptation, medium size group respondents the second and small family size group respondents hold the last position. It is observed that the male respondents rank the first position in their overall rated climate change adaptation and the female respondents hold the next position.

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