

**Original Research Article**  
**Study on the Knowledge Level of Paddy Farmers on  
Climate Change in Nagapattinam District of Tamil  
Nadu, India**

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**ABSTRACT**

This study examined the Knowledge level of Paddy farmers on Climate Change in Nagapattinam district of Tamil Nadu state in India. The study was conducted in Nagapattinam district of Tamil Nadu. Since, it is situated in coastal area and very often subjected to natural calamities which were mainly reflected on the Paddy cultivation to the worst status. The ex-post facto research design was used in this research study. A sample size of 200 was fixed for the study. The data was collected with the use of a well-structured and pre tested interview schedule for farmers covering all the aspects of knowledge on Climate change. The knowledge level of the respondents with climate change was measured by designing exclusively the knowledge test. The study revealed that the more than half of the respondents (55.00 %) had medium level of knowledge on climate change. Nearly one-third (32.50 %) of the respondents had high level of knowledge and a lesser number of respondents (12.50 %) were found to be under the category of low level knowledge. Educational status, farming experience, contact with extension agency, information seeking behaviour, social participation, innovativeness, risk orientation and awareness had shown positive and significant association with knowledge of paddy farmers and these variables contributed in improving the knowledge level of the Paddy farmers on climate change. They had knowledge on changes in the rainfall patterns, extreme climatic events, changes in the crop growths stages, ground water table, pest and disease outbreak but the farmers doesn't have enough knowledge on climate change adaptation strategies in Paddy cultivation with respect to tackle the problem of salinity, sodicity and effects of humidity in grain filling to cope up with climate change. Hence, it is recommended that special training programmes may be frequently offered in the study area to improve the knowledge and skill of the farmers on climate change.

*Key words: Climate change, Knowledge test, Paddy, Coastal area, Nagapattinam district*

**1. INTRODUCTION**

Changing and increasingly variable climate is an important issue realized as a formidable challenge to ensuring food security in developing countries and engaging the global community, adds the dimensions of urgency and complexity to the problems of rainfed agriculture. It is observed that

the incidence of extreme climatic events such as droughts and floods is likely to increase in the coming decades making agriculture much more jeopardy.

Though India has achieved self-sufficiency in food graining production through Green Revolution, it brought a host of environmental challenges like loss of soil fertility, waterlogging, water pollution, intensified pests and fluctuation in farm input price. (Cummings, 2019). In addition to all these, climate change has added a new dimension to the existing problems by posing a significant threat to Indian agriculture in general and food security in particular ( Rao et al., 2016). India is also identified as one of the highly vulnerable temperature, frequent heat waves, droughts, extreme precipitation events and intense cyclonic activities. (Ray et al., 2019; Rohini et al., 2016; Majumder, 2017). The agriculture and the allied sectors are directly and highly affected by the climate change and which resulted in affects production of agriculture, water availability, soil fertility, and pests (Porter, 2014). The overall effect of climate change on agriculture could be positive or negative; the magnitude of impact can also vary from very low to very high, depending on regional or geographical location and status of socioeconomic development ( Mendelsohn et al., 2006, Tol et al., 2004, Tripathi, 2016).

Hence, it is necessary for the farmers to have enough knowledge about the climate change to combat these adversities. Knowledge has been referred as the body of information possessed by an individual which is in accordance with the established fact. The body of information possessed by the individuals influences them to behave in a particular manner. Knowledge is a pre-requisite for adoption of innovation, as this would enable the farmers to completely understand a technology and its relative advantage. Hence, an attempt was made to assess the knowledge.

## **2.METHODOLOGY**

The choice for selection of the district had fallen on coastal ecosystems of Tamil Nadu state for the conduct of the present study. Coastal belts are more prone to devastating impact of climate change. The geographical setting of Tamil Nadu makes the state vulnerable to natural disasters such as cyclones (Mascarenhas & Jayakumar, 2007) floods and earthquake-induced tsunami. Among the 29 districts of Tamil Nadu, Nagapattinam district is very often subjected to natural calamities which were mainly reflected on the paddy cultivation to the worst status. Since the last few years, the district has high range of variability in rainfall and temperature. The district is one among those districts having more area under paddy cultivation. The district has eleven blocks, of which five blocks viz, Thalainayar, Kuttalam, Mayiladuthurai, Kivelur and Sembanar Koil were selected based on the maximum area covered under paddy cultivation and high range of variability in rainfall and temperature. In order to select the villages for the study, the list of revenue villages in each of the five selected blocks was collected. Five villages from each of the selected blocks were identified purposively based on the maximum area under paddy cultivation. The respondents for the present study were paddy farmers from the selected villages. A sample size of 200 was fixed for the study. Sample of 40 paddy farmers were selected from each of the 5 blocks by adopting simple random sampling method.

A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure (Kothari, 2008). In the broader sense, the research design is the conceptual structure within which research is conducted; it constitutes the blue print for the collection, measurement and analysis of data.

For this study, *ex post-facto* type of research design was used. In this type of research, instead of creating a treatment, the researcher evaluated the effects of a statistically occurring phenomenon after the occurrence. Since climate change, as an ever existing recurrent phenomenon in the study area over a period of time and hence the *ex post - facto* type of research was employed.

The data collection was done with the use of a well structured and pre tested interview schedule for farmers covering all the aspects of knowledge on Climate change. The knowledge level of the respondents with climate change was measured by designing exclusively the knowledge test. The details of the steps involved the designing the knowledge test is given below. The technologies were identified by having discussion with scientists and available literatures.

## 2.1 Item collection

A list of items seeking knowledge on climate change was prepared from the already identified climatic factors with the help of experts from Tamil Nadu agricultural university.

## 2.2 Item analysis

The selected items were administered to 15 respondents in the non-sampling area. Scores of 2 and 1 were given to “correct” and “incorrect” answers respectively. The total score for each respondent was calculated. Afterwards the total scores of the respondents were arranged in descending order. As suggested by Singh (1986), 27 percent of the upper groups constituted as “high group” and 27 percent of bottom group as “low group”. The score of these two groups were considered for calculating item difficulty and item discrimination indices.

## 2.3 Difficulty index

The difficulty index was computed by averaging the proportion of correct answers in high group and the proportion of correct answers in low group. The formula for determining the index on the basis of the extreme group is as under.

$$P = \frac{R_U + R_L}{N_U + N_L}$$

Where,

P is the index of difficulty

$R_U$  is the number of examinees answering correctly in the upper group

$R_L$  is the number of examinees answering correctly in the lower group

$N_U$  is the number of examinees in the upper group

$N_L$  is the number of examinees in the lower group

## 2.4 Discrimination index

Discrimination index is referred to the extent to which an item discriminates well informed individual from the poorly informed ones. It was evaluated using the 'Net D index of discriminations', which had been defined as an unbiased index of absolute difference in the number of discriminations made between the upper group and the lower group, it is proportional to the net discriminations made by the item between the two groups, i.e., the difference between the proportion of correct answers of the high / upper group 27 per cent and low group 27 per cent examinees.

$$V = \frac{R_U}{N_U} - \frac{R_L}{N_L}$$

Where,

$R_U$  is the number of examinees answering correctly in the upper group.

$R_L$  is the number of examinees answering correctly in the lower group.

$N_U$  is the number of examinees in the upper group.

$N_L$  is the number of examinees in the lower group.

V is the discriminating power or validity

## 2.5 Item selection

The difficulty index and discriminatory index were the criteria for selection of items for the test to start with the items having difficulty index of 0.4 to 0.6 and discrimination index of above 0.4 were selected.

## 2.6 Item administration

The selected items were administrated to the respondents in the study area. For correct answers two score was given and for incorrect answers one score was given. The knowledge level of the respondents was calculated by using the formula followed by Madhan (2002).

The formula used for the calculation of knowledge index of each respondent was

$$\text{Knowledge index} = \frac{K}{P} \times 100$$

Where,

K= Knowledge scores obtained by an individual respondent

P= Maximum possible scores for all items

The respondents were classified into three categories such as low, medium and high using mean and standard deviation.

### 3. RESULTS AND DISCUSSION

In order to assess knowledge level of the respondents, necessary data were collected and they were categorized into three categories viz., low, medium and high based on the overall score obtained in the knowledge test. The distribution of respondents according to their knowledge level on the climate change is presented in the Table 1.

**Table 1. Distribution of respondents based on their knowledge level**

(n = 200)

S.No.	Category	Number	Per cent
1.	Low	25	12.50
2.	Medium	110	55.00
3.	High	65	32.50
	<b>Total</b>	<b>200</b>	<b>100.00</b>

It could be inferred from the Table 1. that more than half of the respondents (55.00 %) had medium level of knowledge on climate change. Nearly one-third (32.50 %) of the respondents had high level of level of knowledge and a lesser number of respondents (12.50 %) were found to be under the category of low level knowledge.

The appropriate reason for medium to higher level of knowledge on climate change might be due to the fact that majority of them were literate, with medium to higher level of extension agency contact and social participation. In addition to this most of the farmers had medium to high level of awareness on climate change. In order to increase their income this would have aroused their interests to acquire more knowledge. Further, the extension personnels from government and Non Governmental Organisations were also played an important role in both extension and educational activities. Due to this reason the knowledge on climate was medium to high among the respondents.

This finding corroborates with the findings of Jayasree (2004), who also reported that majority of the paddy farmers had medium level of knowledge on recommended water management practices.

### 3.1 The association and contribution of profile of paddy farmers with their knowledge level

The results of correlation and multiple regression analysis between the profile of paddy farmers and knowledge have been presented in Table 2

**Table 2. Correlation and multiple regression analysis of profile of paddy farmers with their knowledge level**

(n = 200)

V.No.	Name of variables	'r'	Regression coefficient	Std.error	't' value
1.	Age	0.132	0.168	0.172	0.978 <sup>NS</sup>
2.	Educational status	0.418 <sup>***</sup>	0.339	0.110	3.092 <sup>***</sup>
3.	Annual income	0.134	0.145	0.177	0.819 <sup>NS</sup>
4.	Occupation	0.121	0.069	0.130	0.532 <sup>NS</sup>
5.	Area under rice cultivation	0.126	0.154	0.169	0.914 <sup>NS</sup>
6.	Farming experience	0.564 <sup>***</sup>	1.218	0.192	6.332 <sup>***</sup>
7.	Irrigation source	0.107	0.851	0.535	1.592 <sup>NS</sup>
8.	Farm power status	0.126	0.020	0.035	0.578 <sup>NS</sup>
9.	Contact with extension agency	0.419 <sup>***</sup>	0.132	0.035	3.714 <sup>***</sup>
10.	Information seeking behaviour	0.380 <sup>***</sup>	0.020	0.019	1.020 <sup>NS</sup>
11.	Social participation	0.299 <sup>***</sup>	0.021	0.013	1.620 <sup>NS</sup>
12.	Fatalism	0.131	0.095	0.088	1.085 <sup>NS</sup>
13.	Innovativeness	0.341 <sup>***</sup>	0.583	0.147	3.977 <sup>***</sup>
14.	Decision making behaviour	0.154 <sup>**</sup>	-0.001	0.016	-0.080 <sup>NS</sup>
15.	Risk orientation	0.308 <sup>***</sup>	0.054	0.022	2.401 <sup>**</sup>
16.	Awareness	0.409 <sup>***</sup>	0.139	0.037	3.766 <sup>***</sup>
17.	Attitude towards climate change	-0.321 <sup>***</sup>	-0.068	0.032	-2.090 <sup>*</sup>
NS -Non significant *** - Significant at 0.01 level ** -Significant at 0.05 level * - Significant at 0.1 level of probability		F = 17.74 R <sup>2</sup> =0.624 Constant=10.499			

From Table 2 it could be inferred that out of seventeen variables, nine variables viz., educational status (X<sub>2</sub>), farming experience (X<sub>6</sub>), contact with extension agency (X<sub>9</sub>), information

seeking behaviour ( $X_{10}$ ), social participation ( $X_{11}$ ), innovativeness ( $X_{13}$ ), risk orientation ( $X_{15}$ ) and awareness ( $X_{16}$ ) had shown positive and significant association with knowledge of paddy farmers at one per cent probability level, Whereas the attitude towards influence of climate change ( $X_{17}$ ) had shown negative and significant association with knowledge of paddy farmers at the same level of probability.

The variable decision making behaviour ( $X_{14}$ ) had shown positive and significant relationship at five per cent probability level. However, variables such as annual income ( $X_3$ ), occupation ( $X_4$ ), area under rice cultivation ( $X_5$ ), irrigation source ( $X_7$ ), farm power status ( $X_8$ ) and fatalism ( $X_{12}$ ) depicted their non significant relationship with that of dependent variable.

The multiple regression analysis was further performed to find out the extent of contribution of each variable towards the knowledge level of paddy farmers on climate change.

Table 3 depicts the  $R^2$  value was 0.624 which revealed that all the selected seventeen variables acted as a cause to bring 62.40 per cent variation towards knowledge of paddy farmers.

The 'F' value (17.74) was significant at one per cent level of probability. Since the 'F' value was significant, the prediction equation was fitted for the knowledge level of paddy farmers on climate change and the same is given below.

$$Y = 10.499 + 0.168X_1 + 0.339^{***}X_2 + 0.145X_3 + 0.069X_4 + 0.154X_5 + 1.218^{***}X_6 + 0.851X_7 + 0.020X_8 + 0.132^{***}X_9 + 0.020X_{10} + 0.021X_{11} + 0.095X_{12} + 0.583^{***}X_{13} - 0.001X_{14} + 0.054^{**}X_{15} + 0.139^{***}X_{16} - 0.068^{*}X_{17}$$

The Table 39 explained that out of seventeen variables, five variables namely educational status ( $X_2$ ), farming experience ( $X_6$ ), contact with extension agency ( $X_9$ ), innovativeness ( $X_{13}$ ) and awareness ( $X_{16}$ ) had shown positive and significant contribution with the dependent variable 'knowledge' at one per cent level of probability.

The variable risk orientation ( $X_{15}$ ) had shown positive significant contribution at five per cent level of probability, whereas attitude towards influence of climate change ( $X_{17}$ ) had shown negative significant contribution at ten per cent level of probability.

The Table 3 further indicated that the strength of variable can be explained as an unit increase *ceteris paribus* in namely educational status ( $X_2$ ), farming experience ( $X_6$ ) contact with extension agency ( $X_9$ ), innovativeness ( $X_{13}$ ), risk orientation ( $X_{15}$ ), and awareness ( $X_{16}$ ) would increase the knowledge level of the respondents by 0.339, 1.218, 0.132, 0.583, 0.054 and 0.139 units respectively.

From this it could be inferred that the variables namely educational status, farming experience, contact with extension agency, innovativeness, risk orientation and awareness had high contribution to the dependent variable knowledge.

The educational status would have adequate contribution towards the knowledge level of respondents on climate change. Educational status is positively related to knowledge level. As the

education level of a respondent increases, more would be intention to participate in search for climate change information.

Farming experience resulted in a significant and positive relationship with the knowledge level of paddy farmers. It is natural that, the farmers having more experience in farming activity would have more understanding about climate change. Hence more farming experience supports greater level of knowledge on the climate based agricultural issues. Extension agency contact had a positive and significant relationship with the knowledge level. The role of extension personnel was to bring about desirable changes among the clientele group. Higher level of extension agency contact which resulted in more knowledge on climate change. Hence, in the present study these changes reflected the upgradation of respondents' knowledge level.

Innovativeness was found to have a positive and significant relationship with the knowledge. Innovative mind helped the respondents to adopt a new cultivation practices or technology. Optimal level of innovativeness always helped the respondents to acquire more knowledge on climate change. Thus innovativeness supports the knowledge level of the paddy farmers. The independent variable risk orientation resulted in a significant and positive relationship with the knowledge level. Farmers having high risk bearing ability would always like to try new practices, even before they were convinced with their advantages. This might be due to the fact that more risk orientation made anyone to progress and also to have in depth knowledge. Thus the variable risk orientation exhibited a positive and significant relationship with the knowledge level of paddy farmers.

Awareness found to have a positive and significant relationship with the knowledge level. Awareness is the state or ability to perceive, to feel, or to be conscious of an event. When the respondents aware about changing climatic conditions, more would be intention to gain additional information on climate change. Thus the result could be substantiated.

Hence it could be inferred that as a result of more literacy rate, higher farming experience, extension agency contact, innovativeness, risk orientation and awareness level of paddy farmers would have resulted in improving their knowledge level.

#### **4. CONCLUSION**

More than half of the respondents (55.00 %) had medium level of knowledge on climate change. Nearly one-third (32.50 %) of the respondents had high level of knowledge and a lesser number of respondents (12.50 %) were found to be under the category of low level knowledge. Educational status, farming experience, contact with extension agency, information seeking behaviour, social participation, innovativeness, risk orientation and awareness had shown positive and significant association with knowledge of paddy farmers and these variables contributed in improving the knowledge level of the Paddy farmers on climate change. They had knowledge on changes in the rainfall patterns, extreme climatic events, changes in the crop growths stages, ground water table, pest and disease outbreak but the farmers doesn't have enough knowledge on climate change adaptation strategies in Paddy cultivation with respect to tackle the problem of salinity, sodicity and effects of humidity in grain filling to cope up with climate change. Hence, a special

training may be frequently offered in the study area to improve the knowledge and skill of the farmers on climate change.

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