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RESPONSES AND STRATEGIES ADOPTED BY THE FARMERS TOWARD CLIMATE CHANGE IN VARANASI, U.P.

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Abstract: *Climate change and agriculture are interrelated to each other, both of which take place on a global scale. Climate change affects agriculture in a number of ways, including changes in average temperatures, rainfall, and climate extremes (e.g., heat waves); changes in pests and diseases; changes in atmospheric carbon dioxide and ground-level ozone concentrations; changes in the nutritional quality of some foods; and changes in sea level. The present paper focused to know about farmers' responses and strategies adopted by the farmers toward climate change. The response towards climate change was collected from 193 farmers. Ex-post facto research design was adopted for conduct the study. The findings revealed that majority (67.36 %) of the respondents belonged to the medium category of respondents strategies adopted in response to climate change followed by high category (17.62 %) and the least strength of the respondents was found to belong to low category (15.02 %). The change in rainfall pattern was found in 1st position followed by feeling extreme heat and experiencing the change in monsoon pattern was found in second and third position.*

Keyword: *Responses, Strategies, Adoption, farmers, climate change.*

Introduction: Climate is the long term statical expression of short term weather. Climate can be defined as expected weather when changes in the expected weather occur, we call these climate change. Climate may change in different ways, over different time (www.enviropedia.org.uk). The planet's average surface temperature has risen about 2.0 degree Fahrenheit (1.1 degree Celsius) since the late 19th century, a change driven largely by increased carbon dioxide and other human-made emission into the atmosphere Most of the warming occurred in the past 35 years, with 16 of the 17 warmest years on record occurring since 2001 [1]. One major reason attributed to this is the phenomena of climate which is occurring globally. The Climate of a place is the average weather that it experiences over a period of time. The factors that determine the climate in a location are rainfall, sunshine, wind, humidity and temperature. Climate change refers to any long term significant change in expected patterns of average weather of a specific region or area or zone over a period of time. Such a change may be brought about by natural process such as change in the earth's orbit around the sun, the earth's tilt change in ocean circulation [2]. The most common adaptation practices were adopting new drought-resistant crop varieties and increasing investments in irrigation infrastructure. Roughly half of the respondents stated that they adopted new cropping technologies. More than half of the respondents purchased wheat drought weather index insurance. They also concluded that Farmers' estimates of future crop loss caused by climate change were positive and significantly related with multiple cropping adaptation practices. These results were expected, as multiple cropping is one way of reducing losses caused by climate change [3].

Methodology

The study was carried out in Varanasi district of Uttar Pradesh. Varanasi district of Uttar Pradesh was selected purposively. In this district two most populated block were selected purposively (Araziline and Kashividyapeeth). Out of 217 villages of Araziline block, 6 villages (Bangalipur, Chaukhandi, Dashrathpur, Gaharpur, Hardattpur and Kursaton) were selected randomly; that constituted 2.5 per cent

of total villages. Similarly, out of 117 villages of Kashividyapeeth block, 3 villages (Akhari, Dafi and Nuawn) were selected randomly. The farmers population of the selected villages was obtained from the panchayat in which proportionate random sampling with five percent equal allocation was followed to make a sample size of 193 respondents. For the purpose of data collection only the heads of household were treated as a respondent.

Findings: It is clear from Table 1 that majority (67.36 %) of the respondents belonged to the medium category of respondents strategies adopted in response to climate change followed by high category (17.62 %) and the least strength of the respondents was found to belong to low category (15.02 %). Reported that adopted agronomic practices that reduce impact of climate change. like that Information about climate change [4], lack of incentives, and small farm size were major hindrance to adaptation and adoption of farming practices that can reduce impacts of climate change.

Table 1: Distribution of respondents according to strategies adopted by the farmers in response to climate change (n=193)

S. No.	Category	Frequency	Percent
1	Low (up to 66)	29	15.02
2	Medium (67 – 81)	130	67.36
3	High (above 81)	34	17.62
	Total	**193**	**100.00**

Mean=73.32; SD=7.20

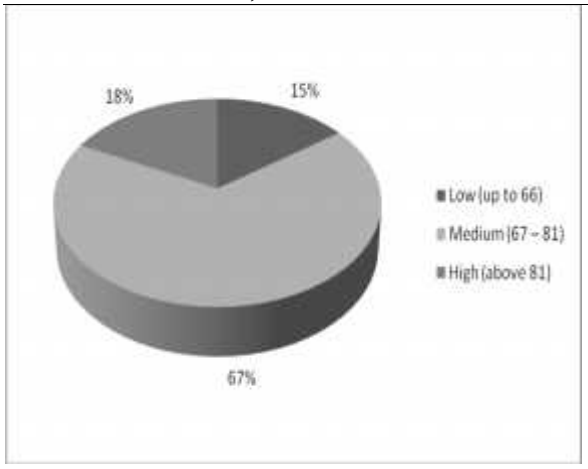

Fig. 1: Distribution of respondents according to strategies adopted by the farmers in response to climate change

It is clear from Table 2 that the ranking of responses and strategies adopted by respondents, 1st position was found 'use sufficient insecticides for protection of crop from insects and pests' followed by 2nd position 'practice fallowing of land for efficient agronomic practices' and I use crop varieties that are well acclimated and resistant to area specific insect, pest and diseases was found in 3rd position while 'In order to be out of the danger of crop failure, I have started having crop insurance' was found in 4th position and 'I am practicing proper application of fertilizers in order to avoid any insect pest infestation due to over fertilization' was found in 5th position. The statement 'Now, I have to invest more to secure my production' was found in 6th position and 'I assure proper drainage of wetland for crop cultivation' was found in 7th position while 'I dump the agricultural wastes at proper time and proper place for the purpose of avoiding any seasonal occurrence of disease, supplemented by changing climatic conditions' was found in 8th position. I have given up cultivating those crops demanding more cost of production and I use proper crop rotation to ensure nutrient availability in the soil was found in 9th and 10th positions respectively.

Table 2: Ranking of statement according to respondents responses to strategies adopted by them in response to climate change (n = 193)

S.N.	Statement	Mean score	Rank
1	I use organic manures instead of chemical fertilizers	1.47	**24th**
2	I use sufficient insecticides for protection of crop from insects and pests.	4.72	**1st**
3	I use crop varieties that are well acclimated and resistant to area specific insect, pest and diseases.	4.16	**3rd**
4	I assure proper drainage of wetland for crop cultivation	3.84	**7th**
5	I use cover crop to protect soil from erosion and conserve soil moisture.	3.47	**11st**
6	I have adopted drip irrigation in order to use available water most efficiently.	1.41	**25th**
7	I go for green manuring to enrich the soil with nutrients and add moisture to it.	3.18	**13rd**
8	I use proper crop rotation to ensure nutrient availability in the soil	3.57	**10th**
9	I am having proper provisions for water harvesting in order to cope with the unfavourable climatic condition in future, if any.	2.03	**19th**

10	I go for filling up or replanting to cope with climate change.	2.99	**14th**
11	I practice fallowing of land for efficient agronomic practices.	4.20	**2nd**
12	I have adopted crop diversification better suited to changing climatic conditions	3.25	**12nd**
13	I use modern machineries and technologies to tackle to changing climatic conditions.	2.06	**19th**
14	In order to be out of the danger of crop failure, I have started having crop insurance.	4.05	**4th**
15	I have started practicing agro forestry to tackle the changing climatic conditions.	2.55	**15th**
16	I am practicing proper application of fertilizers in order to avoid any insect pest infestation due to over fertilization.	4.04	**5th**
17	I dump the agricultural wastes at proper time and proper place for the purpose of avoiding any seasonal occurrence of disease, supplemented by changing climatic conditions.	3.79	**8th**
18	Now, I have to invest more to secure my production.	4.03	**6th**
19	I have given up cultivating those crops demanding more cost of production.	3.60	**9th**
20	Now, I am taking alternate enterprise like horticultural crop with main crop in order to be in the safe zone of economic calamities occurring due to changing climatic conditions.	2.14	**16th**
21	I have also started incorporating other income generating activities like fisheries, cottage industries, etc. along with the main agriculture for ensuring safe economic return.	2.13	**17th**
22	I have started processing of crops to minimise post harvest losses	1.97	**20th**
23	I use wind breaks and shelter belts to cope up with unfavourable winds.	1.88	**21st**
24	I also use crop sheds or grow the crops in greenhouse for ensured production.	1.87	**22nd**
25	I have started constructing and rejuvenating farm ponds for ensured water availability.	1.60	**23rd**

I use cover crop to protect soil from erosion and conserve soil moisture was found in 11th position followed by 12th position 'I have adopted crop diversification better suited to changing climatic conditions' and 'I go for green manuring to enrich the soil with nutrients and add moisture to it' was found in 13th position while 'I go for filling up or replanting to cope with climate change' was found in 14th position. The statement 'I have started practicing agro forestry to tackle the changing climatic conditions was found in 15th position followed by 16th position 'Now, I am taking alternate enterprise like horticultural crop with main crop in order to be in the safe zone of economic calamities occurring due to changing climatic conditions' and 'I have also started incorporating other income generating activities like fisheries, cottage industries, etc. along with the main agriculture for ensuring safe economic return was found in 17th position while 'I am having proper provisions for water harvesting in order to cope with the un-favourable climatic condition in future, if any' and 'I use modern type of machineries and technologies to tackle to changing climatic conditions both was found in 18th position altogether. The statement 'I have started processing of crops to minimise post-harvest losses' and 'I use windbreaks and shelterbelts to cope up with unfavourable winds' was found in 19th and 20th positions respectively. The statement 'I also use crop sheds or grow the crops in greenhouse for ensured production' was found in 21st position after this 'I have started constructing and rejuvenating farm ponds for ensured water availability' statement was found in 22nd position and 'I use organic manure instead of chemical fertilizers' statement was found in 23rd while the statement 'I have adopted drip irrigation in order to use available water most efficiently' was the last position (24th).

Conclusion: The majority (67.36 %) of the respondents were found the medium category of respondents strategies adopted in response to climate change the ranking of responses and strategies adopted by respondents were found 'use sufficient insecticides for protection of crop from insects and pests' followed by 'practice fallowing of land for efficient agronomic practices' and use crop varieties that are well acclimated and resistant to area specific insect, pest and diseases practicing proper application of fertilizers in order to avoid any insect pest infestation due to over fertilization' proper drainage of wetland for crop cultivation, dump the agricultural wastes at proper time and proper place for the purpose of avoiding any seasonal occurrence of disease, supplemented by changing climatic conditions.

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