FARMERS PERCEPTION ON CLIMATE CHANGE IN UDAIPUR DISTRICT OF RAJASTHAN, INDIA

ABSTRACT

Climate change is a severe environmental issue that has a global impact on agricultural output. It is critical to investigate farmers' perception of climate change it is one of the strongest factors in changing farmers' behavior to mitigate climate change and take necessary and appropriate actions to assure agricultural output. The present study was undertaken in the Udaipur district of Rajasthan in order to identify the perception level of farmers about climate change related to weather and climate, Agriculture, and Livestock related activities. A sample of 120 respondents from two tehsils was taken based on a random sampling technique. The study revealed that changes in the onset date of monsoon, very high temperatures during the summer season, the occurrence of drier spell heavy, Pest attacks on crops, decreases quality of products of crops/fruit plants, Poultry and livestock rearing become difficult and scarcity of fodder crops were the important aspects related to higher perception of farmers.

Keywords- Climate Change, Farmers' Perception, Weather, IPCC

INTRODUCTION

"Climate change is one of the biggest challenges facing the world today. The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programmed (UNEP) to assess climate change based on the latest science. Recent climate changes and climate variations are beginning to have effects on many natural and human systems. An IPCC Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems" (IPCC 2007). "The climate is one of the inputs for the agricultural growth and survival of related populations. Total annual crop losses in world agriculture are mainly due to direct weather impacts. An increase in atmospheric carbon dioxide (CO_2) and other greenhouse gases *viz*., methane (CH_2), nitrous oxide (N_2O), and Chloro Fluoro Carbons (CFC) due to fossil fuel burning, rapid industrialization, and deforestation create a layer in the atmosphere and prevent the long wave

radiation emitted by the earth which otherwise would have escaped to space. As a result, the average global temperatures are increasing (Aggarwal, 2008). The climate is an important factor in agricultural productivity. The fundamental role of agriculture in human welfare, concern has

been expressed by many organizations and others regarding the potential effects of climate

change on agricultural productivity. Interest in this matter has motivated a substantial body of research on climate change and agriculture over the past decade (Aydinalp and Cresser, 2008). In Asia, agricultural crop yield is expected to decline up to 5 to 30 percent by 2050s due to rising temperatures and this decline in agricultural yield will lead to food insecurity, which will become the most serious future problem for human beings" (Raghuvanshi and Ansari, 2017). "Different crops respond differently as global warming will have a complex impact. The tropics are more dependent on agriculture as 75 percent of the world population lives in the tropics and two-thirds of these people's main occupation is agriculture. With low levels of technology, a wide range of pests, diseases and weeds, land degradation, unequal land distribution, and rapid population growth, any impact on tropical agriculture will affect their livelihood. Rice, wheat, maize, sorghum, soybean, and barley are the six major crops in the world grown in 40 percent cropped area and contribute to 55 percent of non-meat calories and over 70 percent of animalfeed" (Motha 2005). Looking at the above facts, the present study was undertaken with the aim to identify the perception of farmers about climate change related to agriculture and allied fields.

METHODOLOGY

The present study was conducted in the Udaipur district of Rajasthan with a total of 120 respondents selected from two tehsils and eight villages. 15 respondents were selected from each village. To identify the adaptation strategies, a schedule was prepared with the help of agriculture and meteorological experts. Data were collected with the help of an interview schedule. The face-to-face interview technique was used for the collection of information from the selected respondents. For identifying perception level, frequency, and the percentage used to find out results and discussion: significant or non- significant difference between the respondents of both tehsils, the Z test was applied.

RESULTS AND DISCUSSION

Perception is the sensory experiment of the world. It involves both recognizing environmental stimuli and actions in response to the stimuli. Through the perceptual process, people gain information about the properties and elements of the environment that are critical to the survival of them. Perception not only creates our experience of the world around us, but it also allows us to act within our environment. The present study was conducted on the perception of farmers about climate change in the Udaipur district of Rajasthan. As a response to farmers, it's crucial to know what farmers think about climate change because their perception will influence their ability to adapt and change their farming practices. In this context, the information with regard

to the perception of farmers about weather change, agriculture, and animal production are collectedand presented in subsequent tables.

Perception of farmers about the effect on weather due to climate change

To know the perception of farmers about weather and climate change, an interview schedule was developed consisting of ten statements. The data were recorded regarding weather and climate change and presented in Table 1.

Table 1 indicates that the perception of cent percent of respondents was reported about the aspect namely change in onset date of monsoon and accorded the first priority by the farmers. This was followed by the very high temperature during the summer season, the occurrence ofmore dry spells, fluctuation in temperature during winter, the number of rainy days has decreased, change in the withdrawal of monsoons, and uneven rainfall due to climate change in which the high perception was observed among the 98.33, 97.50, 95.83, 90.83, 81.66 and 78.33 percent respondents, respectively.

Analysis of the table further reveals that the number of heavy showers decreased, the duration of the summer season is prolonged and an increase in cyclonic effect were the aspects of weather and climate change, which got the perception by 65.00, 44.16 and 35.83 percent farmers of Udaipurdistrict. Almost all the aspects of weather and climate change had more or less the same prioritiesgiven by the respondents of both the tehsils in respect of their perception.

Table 1: Perception of farmers about the effect on weather due to climate change

n = 120

S. No.	Statements	Girwa tehsil		Kotra tehsil		Total		Z Value
		f	%	f	%	f	%	
1.	Change in onset date of monsoon	60	100	60	100	120	100	2.12*
2.	Number of rainy days has decreased	59	98.33	50	83.33	109	90.83	
3.	Uneven rainfall due to climate change	39	65	55	91.66	94	78.33	

4.	Occurrence of more dry spell	58	96.66	59	98.33	117	97.50	
5.	Number of heavy showers decreased	33	55	45	75	78	65.00	
6.	Change in date of withdrawal of monsoon	42	70	56	93.33	98	81.66	
7.	Very high temperature during summer season	58	96.66	60	100	118	98.33	
8.	Fluctuation in temperature during winter	55	91.66	60	100	115	95.83	
9.	Duration of summer season is prolonged	28	46.66	25	41.66	53	44.16	
10.	Increase in cyclonic effect	28	46.66	15	25	43	35.83	

f= frequency, % = per cent, *Significant at 0.05 level

Further analysis of Table 1 reveals that calculated 'Z' value (2.12) was found to be more than its tabulated value at 5 per cent level of significance. Therefore, there was significant difference between the perception level of respondents of both the tehsils about weather and climate change.

These results are similar with IPCC report released in 2007 in which reported that the temperature have increased as compared to previous years, the rainfall amount has decreased as compared to previous years, dry spells during rainy season have increased, total number of rainy days has decreased and the rainfall has become unexpected and irregular. Krishna *et al.* (2011) also reported that more than 80.00 per cent of the respondents perceived rainfall variability with untimely, late monsoon start, no winter rain, and high intensity with short periods. Furthermore, they have been experiencing an unpredictable rainfall pattern over the past 10 years. Escarcha *et al*. (2018) who found that almost all the farmers observed both the frequency and severity of extreme event such as heat, floods, typhoons and drought had increased, reflecting the actual trends in perception and temperature recorded.

Perception of farmers about effect on agriculture due to climate change

To measure the effect of climate change on agriculture, twelve statements were developed. The frequency and percentage of each statement was calculated and the results of the same have been given in the Table 2.

Table 2: Effect of climate change on agriculture

n = 120

S.No.	Statements	Griwa Tehsil		Kotra tehsil		Total		Z Value
		f	%	f	%	f	%	
1.	Cropping pattern changed	32	53.33	30	50	62	51.66	**1.16^{NS}**
2.	Dropping of flowers in fruit crops due to increased temperature	44	73.33	46	76.66	90	75.00	
3.	Pest attack is more	56	93.33	59	98.33	115	95.83	
4.	More occurrence of diseases	54	90.00	55	91.66	109	90.83	
5.	Number of irrigations is increased	38	63.33	56	93.33	94	78.33	
6.	Wind speed affects the pollination in fruit crops	28	46.66	15	25	43	35.83	
7.	Production of various crops is reducing	56	93.33	58	96.66	114	95.00	
8.	Traditional varieties of crops are getting extinct	40	66.66	37	61.66	77	64.16	
9.	Ripening time of crops/fruits are changed	46	76.66	49	81.66	95	79.16	
10.	Decreases quality of products of crops/fruit plants	54	90	57	95	111	92.50	
11.	Effect on natural vegetation	51	85	45	96	80	66.66	

12.	Heavy rain affects the grain formation in cereals	27	45	23	38.33	50	41.66	

f= frequency, %= per cent NS = Non-Significant

Table 2 reveals that pest attack is more (95.83%), production of various crops is reducing (95.00%), decreases quality of products of crops/fruit plants (92.50%), more occurrence of diseases (90.83%), ripening time of crops/fruits are changed (79.16%) and number of irrigations is increased (78.33%), were the statements which are highly perceived due to severe change of climate change in the study area. Whereas, effect on natural vegetation, traditional varieties of crops are getting extinct, cropping patterns changed, heavy rain affects the grain formation in cereals and wind speed affects the pollination in fruit crops were also affected due to climate change as reported by 66.66, 64.16, 51.66, 41.66 and 35.83 percent farmers, respectively.

From the above discussion, it can be concluded that cropping patterns, more insect-pest and disease attacks, changes in natural vegetation, changes in the ripening of crops, quality of produce of crops, and fruit plants were adversely affected due to climate change.

Further analysis of Table 2 reveals that the calculated "Z" value (1.16) was found to be less than its tabulated value at a 5 percent level of significance Therefore, there was no significant difference in the perception level of respondents about agriculture between the respondent of Girwa and Kotra tehsils.

These results are similar to the findings of Chand and Kumar (2018) who reported that the majority of farmers were aware of climate change and its negative impact on agriculture and considered climate change as a silent risk to their future livelihood. Similar findings were also reported by Krishna *et al.* (2011), Williams *et al.* (2015), and Kabir *et al.* (2016).

Perception of farmers about change in animal production due to climate change

To measure the effect of climate change on animal production, eighteen statements were developed. The frequency and parentage of each statement were calculated and results of the same have been presented in Table 3.

Table 3 Effect of climate change on animal production

n= 120

S. No.	Statements	Girwa Tehsil		Kotra tehsil		Total		
		f	%	f	%	f	%	Z Value
1.	Poultry and livestock rearing become difficult	55	91.66	57	95	112	93.33	
2.	Most of the animal species getting distinct	43	71.66	44	73.33	87	72.50	
3.	Scarcity of fodder crops	53	88.33	59	98.33	112	93.33	
4.	Habits of animals and birds are changing	20	33.33	38	63.33	58	48.33	
5.	Health of farm animals are affected	53	88.33	57	95	110	91.66	
6.	Death rate of livestock is increasing	43	71.66	44	73.33	87	72.50	
7.	Effect on puberty of animals	49	81.66	37	61.99	86	71.66	
8.	Decrease in production of animals	52	86.66	56	93.33	108	90.00	**1.72^{NS}**
9.	Effect on thinness of egg shall in poultry	42	70	30	50	72	60.00	
10.	Effect on breeding of animals	38	63.33	40	66.66	78	65.00	
11.	Diseases and injuries due to heat waves	52	86.66	38	63.33	90	75.00	
12.	Increased malnutritional in animals	55	91.66	58	96.66	113	94.16	
13.	High mortality in poultry birds	51	85	57	95	108	90.00	

14.	Nasal Diseased due to Air Pollution	25	41.66	18	30	43	35.83	

15.	Brucellosis in animals	36	60	16	26	52	43.33	
16.	Metabolic disruption in animals	36	60	20	33.33	56	46.66	
17.	Effect on immune system	48	80	50	83.33	98	81.66	
18.	Lameness in poultry	41	68.33	55	91.66	96	80.00	

f= frequency, %= per cent NS = Non-Significant

Table 3 reveals that increased malnutritional in animals was perceived at the highest level by 94.16 percent of respondents due to climate change. This was followed by poultry and livestock rearing becoming difficult and scarcity of fodder crops, which were given second priority by 93.33 percent of farmers for both statements.

Analysis of the table indicates that the health of farm animals are affected (91.16 %), high mortality in poultry birds (90.00 %), decrease in the production of animals (90.00 %), effect on the immune system ((81.66 %), lameness in poultry (80.00 %), diseases and injuries due to heat waves (75.00%), death rate of livestock is increasing (72.50 %), most of the animal species getting distinct (72.5%), effect on puberty of animals (71.65%) and effect on breeding of animals (65.00 %) were also considered important aspects by the respondents. Whereas, the effect on the thinness of egg shall in poultry, habits of animals and birds changing, metabolic disruption in animals, brucellosis in animals, and nasal disease due to Air Pollution were the statements perceived by 60.00, 48.33, 46.66, 43.33, and 35.83 percent respondents. These statements were comparatively less affected due to climate change. The probable reason for these findings may be due to the majority of respondents choose crop-livestock diversification to mitigate the effect of climate change.

Further analysis of Table 3 reveals that the calculated Z value (1.72) was found to be less than its tabulated value at a 5 percent level of significance. Therefore, there is no significant difference in perception level between the respondents of Girwa and Kotra tehsils. It means the farmers have similar perceptions about the effect on livestock production due to climate changein the Udaipur district of Rajasthan.

These results are similar to the findings of Sejian *et al.* (2012) who found that higher temperature, potentially caused by greenhouse gases, would likely result in a decline in dairy production, reduced animal weight gain, reproduction, and lower feed-conversion efficiency in warm regions. Incidence of diseases among livestock and other animals are likely to be affected

by climate change. Since most of the diseases are transmitted by vectors such as ticks and flies (the development stages of ticks and flies are often dependent on ambient temperature). Cattle, goats, horses, and sheep are also vulnerable to an extensive range of nematode worm infections,most of which have their development stages influenced by climatic conditions.

CONCLUSION

From the above discussion, it can be concluded that the weather, agriculture, and animal production were adversely affected due to climate change in Udaipur district of Rajasthan.

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