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Knowledge Level and Constraints in Adopting the Recommended Mitigation Strategies on Climate Change in Haryana

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ABSTRACT

The greatest influencer of agricultural productivity is the weather. Climate is typically defined as the normal weather, or more precisely, as the statistical explanation of important parameters in relations of the mean and variability over time scales extending from months to thousands or millions of years. Agriculture in India, as well as the respite of the world, is mostly reliant on the weather. Global warming has had an important impact on agriculture and its output. The shift in growing seasons and changes in agricultural zones have been exacerbated by rising temperatures. Changes in rainfall patterns, on the other hand, pose a severe threat to agriculture, affecting the country's economy and food security. The sale of agricultural products such as fertilizers, agro-chemicals and tractors are also affected by the delayed or insufficient monsoons. As a result, the farmer's income is impacted. The present study conducted during 2020-21 focuses on Knowledge level farmers on climate change and constraint experienced by the farmers in adopting recommended mitigation strategies in Hisar district. The majority of beneficiary farmers (48.89 per cent) had high knowledge level on Agro-met Advisory Services whereas majority of non-beneficiary farmers (67.76 per cent) had low knowledge level on Agro-met Advisory Services. Lack of technical skills and capacities for technology adoption, lack of awareness and sensitization about the creation and use of new technologies, non-availability of timely inputs, and lack of information about long-term mitigation strategies were the major constraints.

Introduction

Global warming is a phenomenon produced by an increase in Green House Gases (GHG) concentrations, which has primarily happened over the last 100 years. Recent research studies have suggested that gradual global warming could result in a comparatively abrupt slowing of the ocean's thermo line conveyor, resulting in harsher winter weather conditions, sharply reduced soil moisture, and more intense winds in certain regions that currently provide a significant portion of the world's food production. Absence of information about weather and climate, lack of understanding about adaptations, rationing of critical inputs such as water, lack of adequate seed, insecure property rights, and lack of market access, according to Maddison (2007) are major reasons. Few farmers saw a lack of weather information or long-term climate change as an impediment to adaptation. Similarly, few people believed they lacked information about how to make the right adjustments.

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In Ethiopia, a quarter of respondents said they were unaware about climate change. However, many people believed that absence of credit or funds was a barrier to adaptation. Planting multiple types of the similar crop and changing planting dates are major adaptations undertaken in reply to climate change. In order to support farm level decisions and minimize the loses in adverse climatic and weather conditions farmers' understanding about interaction of climate and agro-ecosystem need to be bridged through inclusion of farmers' communication network (Ravi Kumar *et al.* 2015). Knowledge of climate change impact of extension professionals regarding extinct/ near to extinct of certain plants/ birds and emergence of new insect pests / diseases was found whereas 56 % had knowledge that climate change resulted in suitability of certain new crops/ animal species (Ghanghas *et al* 2015).

There is new and stronger indication that human activities have affected the chemical makeup of atmospheric GHGs, causing most of the heating over the last 50 years. Climate change is a natural occurrence, and the world has disappeared through various transformations since its inception. Climate change occurs over decades, centuries, and millennia, just as weather varies from day to day. However, the alterations have now become more obvious. According to historical evidence, the earth has warmed faster than it has ever before in the last 100 years, and if this trend continues, the implications would be disastrous. According to the Bureau of Meteorology, the global climate is rapidly changing. The Intergovernmental Panel on Climate Change (IPCC) estimates that global average temperatures will be between 1.4 and 5.8 degrees Celsius higher by 2100 than they were in 1990. This is a significant rate of warming. In the tropics, major variations in precipitation, both increases and declines, are expected. Weather phenomena such as storms and floods are anticipated to turn out to be more frequent and intense as a result of climate change. The thermal expansion of the ocean and the melting of mountain glaciers will both contribute to a rise in sea level as a result of climate change. By 2100, the global mean sea level is expected to rise by 15 to 95 cms (IPCC 2001).The greater the risk of environmental damage, the faster the climate changes. Many ecosystems may deteriorate or fracture, resulting in the extinction of particular species. If GHG emissions continue at their current rate, hunger and disease will increase, and water resources will be further stressed, according to predictions. Extreme weather events such as heavy rains, storms, droughts, floods, and sea level increase are also expected to become more common and last longer, according to scientists. Due to the melting of polar ice caps and thermal expansion of sea water, the upper layers of the oceans warm as the earth's atmosphere warms. In order to improve the country's food security, the Indian government has absorbed on improving farmers awareness of sustainable farming practices. Despite excellent agricultural research and technologies, Indian farmers confront a variety of challenges in maintaining crop yield. Many of these issues are tied to weather and climate changes. To properly address this issue, the government established the District level Agrometeorological Advisory Service (DAAS) in June 2008 as one of the Ministry of Earth Sciences flagship programmes. The DAAS seeks to build a suitable dissemination system for agrometeorological information (weather forecasts and agromet- advisories) to the farming community in order to boost crop/livestock productivity. It allows farmers to take benefit of favourable weather while minimizing the negative effects of unfavourable weather on crops. Weather-based agro-advisories are currently distributed to the farming community at the district level via mass media (Radio, Print and TV). However, there is a important information gap between the information generator and the user. These systems reach to supply timely information at the Block and Panchayat (village) level must be expanded. The Department of Information Technologies Common Service Centre (CSC) is a good solution for bridging the information gap by leveraging developments in information technology (IT), which has seen gradual application in information distribution in recent years. Lack of credit and material about climate change forecasting (both short-term variations and long-term climate change, as well as information about adaptation options and other agricultural production activities), rationing of inputs, and lack of seed inputs, according to Nhemachena and Hassan (2007) are major constraints for most farmers. The generalization that can be strained from the studies is that even though respondents' knowledge and perceptions of climate change varied, most farmers agreed on a gradual change in climate and that there has been a wide variation in weather conditions from season to season and year to year in recent periods. These studies have given a base to study the farmers' views on climate change in regional as well as at global level. The present study focuses on Knowledge level farmers on climate change and constraint experienced by the farmers in adopting recommended mitigation strategies.

Methodology

The study was showed in Hisar district, Haryana state. The Hisar station lies at latitude of 29°10'N and longitude of 75°46'E and an altitude of 215.2 m above mean sea level. In present investigation, Ex-post facto research design was used. This design was considered appropriate, since it is systematic empirical enquiry, for measuring the phenomenon, which has already occurred and is continuing. Knowledge is the process of gathering, retrieving, and recognizing information. For the aim of the study, the operational degree for quantifying climate change knowledge was created by developing a teacher-made test, as described by Anastasi (1961). An opinion poll was created based on the statements made about climate change. There were a total of six questions created. These were the knowledge questions that were asked. The respondents were given the knowledge exam that had been prepared. The farmers' knowledge items were quantified by assigning a score of one for accurate answers and zero for incorrect answers on each item. The knowledge score of the respondents was calculated by adding the scores of all the separate items that were answered correctly by the farmers. In the occasion of agro-met advice service farmers and other farmers, the maximum score a respondent can receive

Table 1 Classification of farmers according to Knowledge Level of Agro-met advisory service

Category	Criteria
Low	<(Mean - 0.425*SD)
Medium	(Mean ± 0.425*SD)
High	>(Mean + 0.425*SD)

is 6. Using the formula, each farmers raw knowledge score was turned into a knowledge index:

$$\text{Knowledge index} = \frac{\text{Number of correct responses}}{\text{Total number of knowledge items}} 100$$

Respondents were alienated into low, medium, and high knowledge levels based on their total score, using mean and standard deviation as a measure of check.

The schedule was established to determine the constraints faced by the Agro-met advice service farmers in implementing the proposed strategies, and they were asked to mark the severity of their responses to each question as more severe, severe, or less severe. The data was tabulated using the percentage and ranks order.

Results and Discussion

To acquire a better understanding of the specifics of knowledge concerning components of climate change, the respondents were separated into two groups: those who had right knowledge and those who have wrong knowledge. The results in table 1 indicated that (87.78 %) beneficiary farmers and 32.22 per cent of non-beneficiary farmers were known about SMS facilities (e-Mausam) provided by CCSHAU, Hisar. 93.33 per cent of beneficiary farmers and 13.33 per cent of non-beneficiary farmers known healthier seasonal crop management is possible due to Agro-met Advisory Services. 86.67 per cent of beneficiary farmers and 31.11 per cent of non-beneficiary farmers can change the cropping pattern with the help of Agro-met Advisory Services. 67.78 per cent of beneficiary farmers and 7.78 per cent of non-beneficiary farmers improve the social relationship with the help of Agro-met Advisory Services. 78.89 per cent of beneficiary farmers and 26.67 per cent of non-beneficiary farmers had effective planning of plant protection measures by Agro-met Advisory Services. 88.89 per cent of beneficiary farmers and 32.22 per cent of non-beneficiary farmers benefited the day to day farm operation like sowing, harvesting, marketing etc. can be performed well on time with the help of technical direction on weather. Statements wise overall knowledge level of Agro-met Advisory Services is (83.33 %) beneficiary farmers and (23.33%) non beneficiary farmers respectively.

The data table 2 revealed that (48.89 %) beneficiary farmers had high knowledge level on Agro-met Advisory Services

Table 2 Knowledge level of beneficiary farmers on climate change in Agro-met Advisory Services

Sl. No.	Knowledge items	AAS farmers (90)		Non-AAS farmers (90)	
		F	%	F	%
A	Agro-Met Advisory Services				
1	Do you know about SMS facilities (e-Mausam) provided by CCSHAU	79	87.78	29	32.22
2	Healthier seasonal crop management is conceivable due to Agro-Met advisory services	84	93.33	12	13.33
3	Farmer can swing the cropping pattern with the help of AAS	78	86.67	28	31.11
4	Agro-Met advisory services improves the social relationship of the farmers	61	67.78	7	7.78
5	AAS helps farmers in effective planning of plant protection measures	71	78.89	24	26.67
6	Day to day farm operation like sowing, harvesting, marketing etc. can be achieved well on time with the help of technical management on weather	80	88.89	29	32.22
	Average	75	83.33	21	23.33

Table 3 Distribution of farmers according to their knowledge on Agro-met Advisory Services

Sl. No.	Category	AAS farmers		Non-AAS farmers	
		Frequency	Percentage	Frequency	Percentage
1	Low	11	12.22	61	67.78
2	Medium	35	38.89	16	17.78
3	High	44	48.89	13	14.44

followed by 38.89 per cent and 12.22 per cent had medium and low knowledge level on Agro-met Advisory Services respectively. whereas 67.76 per cent of non-beneficiary farmers had low knowledge level on Agro-met Advisory Services followed by 17.78 per cent of non-beneficiary farmers had medium knowledge level on Agro-met Advisory Services and 14.44 per cent of non-beneficiary farmers had low knowledge level on Agro-met Advisory Services had high knowledge level. Climate is the main cause of agricultural productivity. Crop and livestock productivity, as well as hydrologic balances, input availability, and other agricultural system components, are expected to be impacted by climate change. Crop productivity will be lowered as a result of climate change, and farmers economic conditions will be impacted. As a result, determining the level of knowledge among farmers is critical. This indicates that beneficiary farmers were more knowledgeable about climate change than non-beneficiary farmers. As compared to non-beneficiary

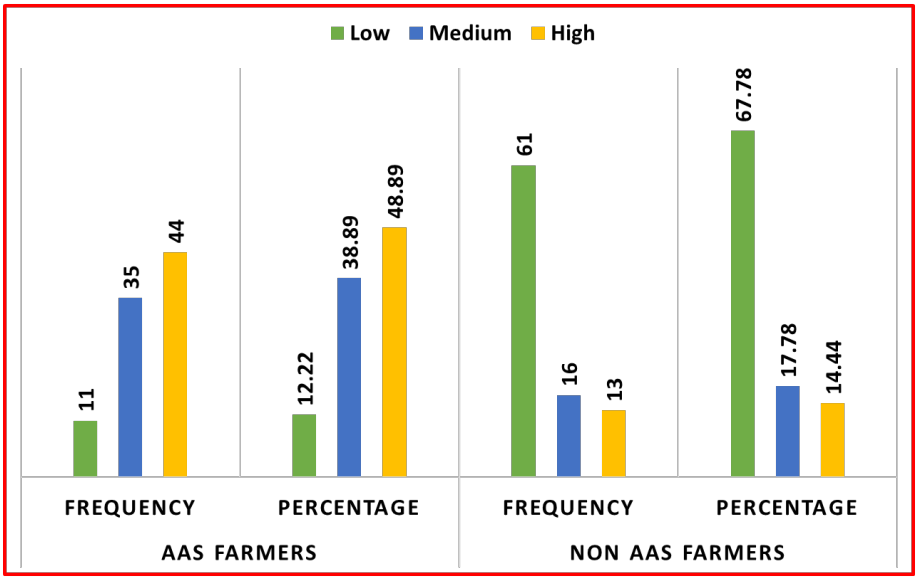

Figure 1 Distribution of farmers according to their knowledge level on Agro-met Advisory Services

farmers, we can see a substantial difference in knowledge levels because beneficiary farmers receive ideas from professionals and weekly Agro-met Advisory Services bulletins offering suitable climate change information aid to enhance their knowledge.

Hence, the hypothesis set for the research that there would be no difference in knowledge about climate change among Agro-met Advisory Services and non Agro-met Advisory Services farmers was excluded. These results are in traditionalism with the studies of Dunlaps (1998), Stamm *et al*., (2000) and Ryo *et al*., (2011).

The constraints handled by farmers are mentioned in Table 4. Farmers must play a vital part in overcoming the negative effects of climate change and its consequences on agriculture by implementing a variety of alternative crop production practices. This is a crucial step in stabilizing and sustaining their lives. In such conditions, farmers faced numerous challenges or limits in implementing recommended adaptation measures to mitigate the negative consequences of climate change. The data in the table 4 revealed that, major constraints faced by farmers to take up recommended adoption measures to overwhelmed ill effects of climate change were, lack of technical skills and capacities for adoption of technologies (Rank 1), lack of awareness and sensitization to the development and use of new technologies (Rank 2), non-availability of timely inputs (Rank 3), lack of information about long-term climate change (Rank 4), higher costs in technology adoption (Rank 5), lack of extension services in technology dissemination (Rank 6) and lack of investment capital and land tenure issues (Rank 7).The likely causes for this are that farming has been done on a small scale in recent years, with limited per capita land availability, a low income group, and a lack of cosmopoliteness. Adapting appropriate technologies in their field is quite tough for them. We can deduct from this those farmers are having difficulty implementing mitigating strategies.

Table 4 Constraints faced by beneficiary farmers in adopting the recommended mitigation stratergies

Sl. No.	Constraints	Score	Per cent (%)	Ranks
1	Adoption of new technology costs money.	136	75.56	V
2	Lack of venture capital and land tenure issues	87	48.33	VII
3	Non availability of timely inputs (Seeds, chemicals and pesticides)	156	86.67	III
4	Lack of awareness and sensitization to the development and utilization of new technologies.	157	87.22	II
5	Lack of extension services in technology dissemination	125	69.44	VI
6	Lack of technical skills and capacities for adoption of technologies	171	95	I
7	Lack of information about long term climate change	145	80.56	IV

Conclusion

The majority of beneficiary farmers (48.89 per cent) had high knowledge level on Agro-met Advisory Services followed by 38.89 per cent and 12.22 per cent had medium and low knowledge level on Agro-met Advisory Services respectively, whereas majority of non-beneficiary farmers (67.76 per cent) had low knowledge level on Agro-met Advisory Services followed by 17.78 per cent of non-beneficiary farmers had medium knowledge level on Agro-met Advisory Services and 14.44 per cent of non-beneficiary farmers

had low knowledge level on Agro-met Advisory Services had high knowledge level. Lack of technical skills and capacities for technology adoption, lack of awareness and sensitization about the creation and use of new technologies, non-availability of timely inputs, and lack of information about long-term mitigation strategies were the major constraints faced by respondents in taking up the recommended mitigation strategies to overcome the ill effects of climate change, in order of their rank.

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