MAUSAM, **73**, 3 (July 2022), 695-704

MAUSAM

DOI : https://doi.org/10.54302/mausam.v73i3.5937
Homepage: https://mausamjournal.imd.gov.in/index.php/MAUSAM

UDC No. 632.931.2

Relevance of extension advisory services in climate smart agriculture : A review

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(*Received 14 August 2019, Accepted 20 September 2021*)

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सार – जलवायु के प्रभाव को कम करने के लिए स्मार्ट कृषि से संबंधित विस्तारित सलाहकार सेवाओं की भूमिका का पता लगाने के लिए अध्ययन किया गया। कृषि, भारतीय अर्थव्यवस्था का एक बहुत ही प्रमुख क्षेत्र है जो रोजगार का (49%) और सकल घरेलू उत्पाद का छठा हिस्सा है। कृषि उद्योग को 500 मिलियन छोटे खेत धारकोंका समर्थन हैं। जलवायु परिवर्तन और जल के लिए भी कृषि अत्यंत संवेदनशील है। जलवायु परिवर्तन कृषि को विशेष रूप एशिया से और प्रशांत क्षेत्र में उन क्षेत्रों को प्रभावित करता है जो प्राकृतिक आपदाओं के प्रति संवदेनशील हैं। उच्च तापमान से वांछनीय फसलों की उपज कम हो जाती है जबकि खरपतवारों और कीटों के प्रसार को बढ़ावा मिलता है। वर्षा के पैटर्न में परिवर्तन और बाढ़, कृषि को प्रभावित करते हैं जिससे फसल खराब हो जाती है। भारत में, जलवायु परिवर्तन के कारण महत्वपूर्ण नकारात्मक प्रभाव हुए जिससे उपज हुई में कमी हुई। सलाहकार सेवाओं के अलावा मौसम की संभावना पर उन्नत जानकारी कृषि के लिए संसाधनों के उचित प्रबंधन में मदद करती है ताकि जोखिम को कम किया जा सके और विकास को सुविधाजनक बनाया जा सके ताकि सर्वोत्तम फसल उपज प्राप्तहो सके। इसके अलावा, विभिन्न राज्य या जिला स्तर के वित्त पोषण का पता लगाने वाली विस्तार सेवाओं के विकेन्द्रीकरण की आवश्यकता है। विस्तार सेवा पर खर्च करने वाले विभिन्न राज्यों या प्रांतों के राष्ट्रीय स्तर के प्रयास की प्रायः जानकारी नहीं होती है। यह जलवायु परिवर्तन, वनों की कटाई और वृक्षारोपण के संबंध में सर्वोत्तम प्रयासों के अनुकूलन के बारे में जागरूकता पैदा करके प्रमुख भूमिका निभाता है जो खाद्य सुरक्षा, गरीबी उन्मूलन और अचानक आने वाले जलवायु खतरों के बारे में भारत के किसानों के दृष्टिकोण को बदलने की क्षमता रखता है। इस प्रकार, सलाहकार सेवाएं अनुकूल मौसम का लाभ उठाने में मदद करती हैं और प्रतिकूल मौसम के प्रतिकूल प्रभाव को कम करती हैं।

ABSTRACT. Study was conducted to explore the role of extension advisory services in relation to smart agriculture to mitigate the effect of climate. Agriculture is a very prominent sector of the Indian economy accounts for (49%) of the employment and one-sixth of the GDP. The agricultural industry is supported by 500 million small holder farms. Agriculture is extremely vulnerable for climate change and water as well. Climate change affects agriculture in the Asia and Pacific region particularly in those areas that are vulnerable to natural disasters. Higher temperature reduce yield of desirable crops while encouraging weeds and pests proliferation. Changes in precipitation pattern and floods affect agriculture causing crop failures. In India, significant negative impacts occurred due to climate change reasoned to reducing the yields. In addition to advisory services advanced information on likelihood of weather help to carry out to proper management of resources for agricultural operations to minimize the risk and facilitate growth and realizes the optimum crop yield. Further, decentralization of extension services tracing the different state or district-level funding is needing exercise not always known at national level in various states or provinces spending on extension service. It plays a prominent role by creating awareness regarding adaptation of best practices regarding climate change, deforestation and planting of trees also potential to transform the vision of India's famers about food security, poverty alleviation and sudden climatic threats. Thus, the advisory services help taking the advantage of benevolent weather and minimize adverse impact of malevolent weather.

Key words – Advisory service, Agro meteorology, Approaches, Climate smart agriculture, Extension and mitigation.

1. Introduction

Extension is an admittedly amorphous umbrella for its activities, which include providing information and consulting services to farmers and other agricultural and rural development agents. It was revealed that information is incontrovertible to make a right decision in respect to facing the threats of climate change to the world. Especially in India there is need for adequate and timely information that is given to the farmers. (Chukwuji, 2019). Extension and advisory service methods are critical components of EAS climate change. Extension is a central actor which synergies between climate change adaptation and mitigation. Extension services putting the new vision to become a platform for finding-out how to bring together global and national policies related to carbon emissions with the decision-making of farmers who are trying to earn their living and feed their families. In order to contribute to this, extension needs to engage with different actors promote new forms of institutional development and provide a different array of services than earlier. In many instances the providers of extension services for climate initiatives will be different from those involved in other aspects of agricultural extension provision. A central aspect of the changes required for climate-aware extension which is increased understanding and focus on risk. In some ways, extension has been efforts to address climate and food security risk through seed provision in agricultural rehabilitation programmes. A key factor in these efforts is to ensure that extension is not just an implementing partner. Analysis of how food security related extension programmes are received can also provide information about how farmers are combining new technologies with efforts to maintain agro-biodiversity within their farming systems. Extension also manages the conflicts that are likely to intensify in the wake of global demographic and environmental change. (Christoplos, 2010). The agriculture sector must produce more food for a growing world population which is expected to increase from 7 billion to about 9 billion by 2050 (Chattopadhyay and Chandras, 2018). Agriculture is the most vulnerable sector affected by climate change because of its dependency on local climate parameters such as rainfall, temperature and soil health, etc. The estimated impacts of both historical and future climate change on cereal crop yields in different regions indicate that the yield losses up to 35 per cent for rice 20 per cent for wheat, 50 per cent for sorghum13 per cent for barley and 60 per cent for maize depending on the location in future climate scenarios (MANAGE, 2018). Since agriculture makes up roughly 16 per cent of India's GDP, a 4.9 per cent negative impact on production implies a cost of climate change to be roughly up to 1.5 per cent of GDP per year (Raghuvanshi *et al.*, 2018). Although two thirds of farmers believe that climate change is occurring only 40 per cent implicate human activity. One-third of farmers are uncertain whether it is happening or not. The setting language and message an educator uses to convey climate science and adaptive management information needs to be carefully chosen (Morton *et al*., 2016). It was showed that overall perception of farmers towards climate change was found low (17%) to medium (77%) envisaging the need for generating the awareness on these issues. Other adaptation methods identified as farmers were growing alternate crops (31%), growing resilient crops (72%) and special care at critical stage of production (91%) soil & water conservation practices (77%) natural retention and flood control (45%), etc. This Information is required for the extension decision makers and workers related to projected changes in land use, resource extraction spread of non-indigenous species pollution and pollutants and climate in order to anticipate changes in regional vulnerability. Mapping vulnerability profiles with different for effective extension decision-making would be helpful in this regard (Shaik *et al*., 2011).

2. Data and methodology

2.1. *Rural Advisory Services (RAS)*

Rural Advisory Services as beacon of hope contributing in achieving climate-smart agriculture (CSA) by disseminating climate information and technologies and information on production practices for climate adaptation through innovative approaches. Extension providers plays major role in supporting CSA through the following technology development and information dissemination such as strengthening farmer's capacity, facilitation, brokering, advocacy and policy support. While, Rural Advisory Service possess comparative advantage in these functions and found already actively engaged. More, broadly to improve their effectiveness with regards to climate-smart agriculture will require capacity development at individual and organizational level and institutional reform at the systems level. Rural Advisory Services (RAS) making enable to farmers face the upcoming challenges also, disseminating climate-resilient technologies and practices.

2.2. *Building the resilience for farmer's*

RAS have a wealth of experience with non-formal education and experiential learning. To promote livelihood diversification, some RAS have adopted a market-oriented approach to extension by supporting farmers in the area of marketing, value addition and enterprise skills development. Often being the one of the important agencies operating after disasters RAS also build resilience after extreme climate events by working

TABLE 1

Distribution of respondents according to technology proposed based upon extension management n = 80

S. No.	Particulars	Frequency	Percentage
1.	Suggest micro irrigation technology to mitigate the effect of climate change	76	95.00
2.	Zero tillage technology	78	97.50
3.	Adopting the poly house to grow vegetable production in adverse climate	72	90.00
4.	Water conservation technology in changed climate	77	96.25
5.	Area specific nutrient management techniques.	67	83.75
6.	Growing genetic modified crop to lower the effect of climate change	71	88.75
7.	Adopting solar/wind energy to reduce the GHG gases	63	78.25
8.	Provide agro meteorological data information to farmers	21	26.25
9.	Screen house in field to grow the seed in adverse climate.	19	23.75
10.	Adopt university agro metrology SMS service.	43	53.75
11.	Laser land leveler technology for smoothly irrigation and water saving	79	98.75
12.	Heat and drought resistant variety/breed of crop and livestock.	69	86.25
13.	Seed treatment technology to avoid soil based disease in changed climate	78	97.05
14.	Raised bed planting system in dry region.	37	46.25
15.	Encourage farmers to install a small weather observatory in villages	14	17.05
16.	Nutrient management alternatives	17	21.25
17.	Ground water recharges techniques	52	65.00
18.	Crop simulation modal to reducing adverse environmental impact	21	26.25
19.	Ground water recharges techniques	70	87.05
20.	Kisan call centre for agricultural update in adverse climate	65	81.25

Sources : Manjeet *et al.* (2018)

with humanitarian agencies to distribute seeds other inputs.

The data presented in revealed that majority of 98.75 per cent suggested that adoption of 'Laser land leveler technology is successful for farmers to cope up with adverse climate condition because it save water and money as well as enhance the farmers production followed by zero tillage technology' 97.50 per cent was helpful in mitigating the effect of climate change, while 97.05 per cent of officers suggested seed treatment technology to avoid soil based diseases in climate (Table 1). It was reported that (2017) of Scientists working at International Maize and Wheat Improvement Center (CIMMYT) determined that using zero tillage with residue retention techniques resulted in the lowest global warming potential. It is indicated that percentage of Greenhouse gases (CO_2-equivalent) released into the atmosphere was lower by approximately 8 tons per hectare per year. It is showed that 96.25 per cent of the officers suggested that to adopt water conservation technology whereas, 95.00 per cent of the officers addressed that micro irrigation technology to mitigate the effect of climate change and 90.00 per cent officers suggested that for successful adoptions of poly house to grow vegetable production in adverse climatic condition. Data presented in revealed that Majority of 88.75 per cent officers suggested that adoption of genetically modified crops more useful in mitigating climate change followed by 87.05 per cent officers recommended that ground water recharges technique is beneficial for mitigation to reduce the severity and 86.25 of per cent officers promoted that heat and drought resistant variety/breed of crop and livestock useful to abolish the adverse impact of climate change in regard to mitigation. While, 83.75 per cent officers advised that area specific nutrient management techniques is use full for optimize the supply of soil nutrients over time and space to match the requirements of crops also, 81.25 per cent officers emphasized about the kisan call centre for agricultural update in adverse climate

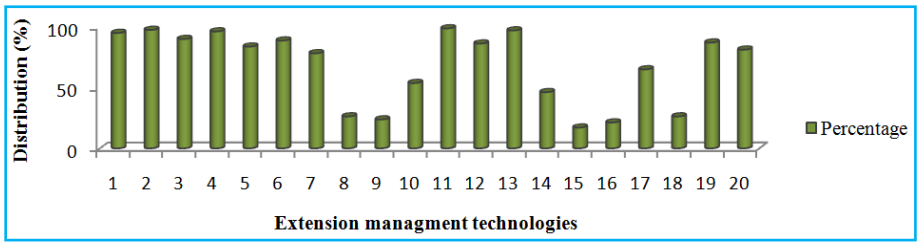

Fig. 1. Technology is proposed based upon extension management

TABLE 2

Distribution of the respondents according to mitigation based facilities proposed by Government n = 80

S. No.	Particulars	Frequency	Percentage
1.	Crop insurance to mitigate the effect of climate change	61	76.25
2.	Weather based crop insurance	45	56.25
3.	To come in to kisan mela/farm darshan	78	97.50
4.	About seed bank, etc.	23	28.75
5.	About credit facility in adverse climatic condition	34	42.50
6.	Farmer field school to build different climatic adaptation	79	98.75
7.	Training for farmer to aware about climate change	36	45.00
8.	Organize any tree planting program	28	35.00
9.	To establishment local weather data bank in local to know about previous weather records to avoid adverse climate.	12	15.00
10.	About different subsidy plan on seed and agricultural implements to lower the input cost in adverse climate	7	98.75
11.	To test soil/water testing mobile services	78	97.75

Sources : Manjeet *et al.* (2018)

change. Hence, it is proved as key source to disseminate the information about sudden onset which is occurred in climate change. Further, data presented in (Table 1) indicated that majority 78.25 per cent of extension personnel suggested that adoption of solar energy utilization techniques was better option due to pollution free and renewable source to reduce GHG gases. The data indicated that in majority of 65.00 per cent of the officers suggested to farmers about ground water recharge technology (Table 1). The 53.75 per cent of respondents were advised to adopt university agro-metrology SMS service to deal with abrupt climate change conditions in advance and it is denoted that only 46.25 per cent of the respondent suggests raised bed planting system in dry region where as only 26.25 per cent of the officers/respondents provided agro-metrological data to farmer because it will helps farmer to estimation of monsoon pattern and possesses the chance to boost their agriculture cultivation (Table 1). A very few 23.75 per cent officers suggested adopting green house in field to grow seed for better germination in adverse conditions because the effect of climate variations is more on germinations. In it was perceived that 21.50 per cent of respondent suggested farmers about nutrient management alternatives (Table 1). While very few 17.50 per cent of the respondent told farmers to establish of small weather observatory in villages, respectively (Table 1).

Majority of the respondents indicated that 98.75 per cent of the respondents promoted farmer field school for better adaptations and 98.75 per cent of the officers admired to farmers for availing best possible use of different subsidy plans (Table 2). It was found that 97.75 per cent officers recommended farmers to get their soil and water samples to be tested using soil/water testing mobile services and demarked as one of the best tool. Whereas majority of the officers 97.50 per cent advised farmers to attend the kissan mela/farm darshan so that they become aware of new farm technologies to lower the adverse effect of climate change (Table 2). Maximum 76.25 per cent of the respondents told that they guided about crop insurance whereas suggestion about

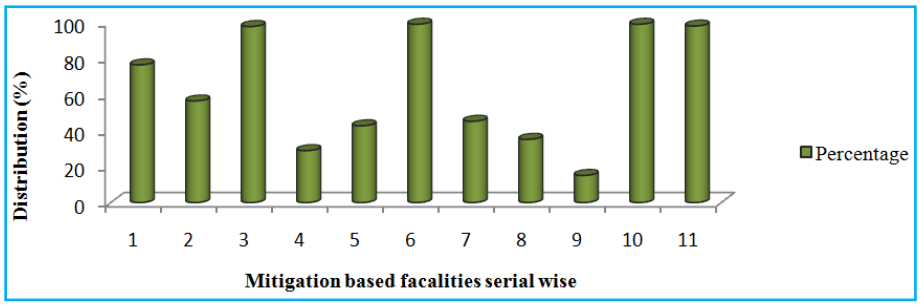

Fig. 2. Distribution of respondents according to their mitigation based facilities

weather based crop insurance was suggested by the 56.25 per cent of the respondents to secure net return to farmers under adverse climatic events (Table 2). Findings are in conformity with the researches of (Nagasree *et al*., 2011) reported that Government of India launched a Weather Based Crop Insurance Scheme (WBCIS), which is a unique weather based insurance product designed to provide insurance protection against losses in crop yield resulting from adverse weather incidences. Thus, Government provides subsidy in premium thus making it affordable. It was further observed (Table 2) from data Table two that only 45.00 per cent of the officers that they emphasize on organizing training programmes for farmer to enhance their knowledge to improve their decision making ability. The (Table 2) 42.50 per cent of the respondents suggested about credit facility from government financial institute that enable farmers to put in more crop inputs. Findings are in conformity with the researches of (Swain, 2014) found that climate change with increasing agricultural risk, there is a need to redesign insurance products not merely as a risk transfer mechanism but as a potent device to reduce risk and crop loss by inducing desirable proactive and reactive responses in insurance users. Whereas (Table 2) 35.00 per cent of them considered that organizing any tree planting programme was better strategy to cope up with present situation. It was revealed from the data mentioned in (Table 2) only 28.75 per cent of the respondents guide farmers about seed bank to maintain genetic variability of seeds that will make crop more resistance to climate variability and Very less number of the officers 15 per cent told that they suggested establishment of local weather data bank was more promising strategy (Manjeet *et al*., 2018).

2.3. *How can extension service help with adaption and mitigation?*

There are several ways in which extension systems can help farmers to deal with climate change. Extension aware farmers for greater climate variability and uncertainty and help to create contingency measures to deal with exponentially increasing risk and alleviate the consequences of climate change by providing advice on how to tackle with droughts, floods and so forth. This type of assistance acquiring new links of agro-based information new regulatory structures and government priorities and policies, helps with adaptation and mitigation technologies and management information, capacity development, facilitating and implementing policies and programs. Climate change will initiate extreme events like sudden onset of disasters and new diseases. Evidence is emerging that the biggest impacts will be in the form of micro-level droughts, floods and other events that cause severe hardship but do not attract the attention of the community. There is a need to engage new sets of actors including humanitarian agencies. Thus, education move beyond for technical training to enhance farmers 'abilities for planning, problem solving, critical thinking, prioritizing, negotiating, building consensus and leadership skills working with multiple stakeholders. Capacity development is important within extension as well extension agents have traditionally been trained only in technical expertise and often lack soft skills such as communication development of farmer groups (Kumar *et al*., 2018).

2.4. *Sector involved in Climate Smart Agriculture*

As per study majority of 75 per cent participants involved in CSA for the evaluation and prioritization activities followed by maximum 40 per cent participants are local farmers, 25 per cent government officials from different departments and reaming 25 per cent development organizations and 10 per cent from private sector representative (Khatri Chhetri, 2019).

2.5. *Involvement of extension and advisory services in specific areas*

Indian Meteorological department (IMD) is having several kinds of network of observatories in India to monitor and assess the weather which are Conventional Observational Network, Automatic Weather Stations

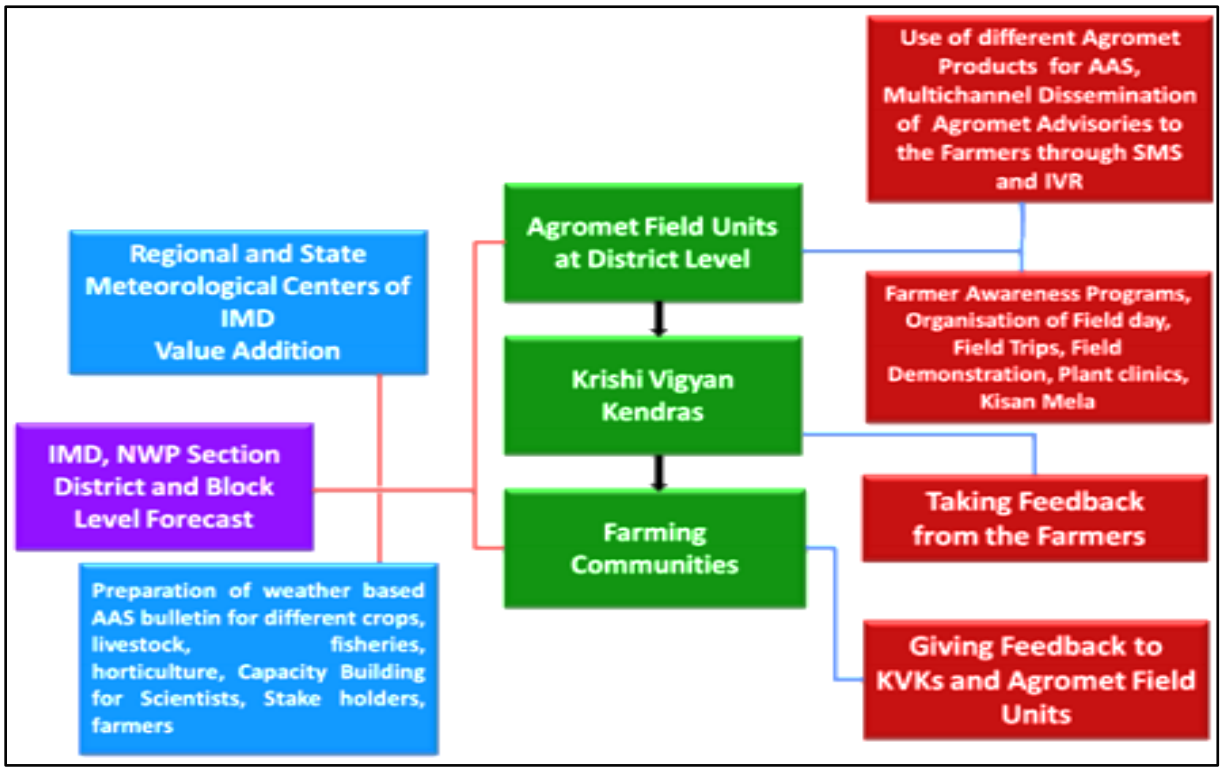

Fig. 3. Overview of Agromet Advisory Services in India [*Source* : Chattopadhyay and Chandras, (2018)]

(AWS), Buoy/Ship Observations, Cyclone Detection Radars, Doppler Weather Radars and Satellites observations. Another two important issues which are being dealt are extreme weather events and climate change & variability. Thus, extension advisory services can in help to ensure that agricultural rehabilitation programs are relevant and sustainable (Chattopadhyay and Chandras, 2018).

2.6. *Disseminating information through extension in light of CSA*

Dissemination of agromet advisories to the farmers through various multi-channel systems like All India Radio and Doordarshan, private TV and radio channels, newspaper and internet and SMS. National Bank for Agricultural and Rural Development, etc., are disseminating agromet advisories in SMS and IVR format to the farming community. In addition to that number of AMFUs has started sending agromet advisories through SMS in collaboration with National Informatics Centre (NIC)/Agricultural Technology Management Agency (ATMA)/KVK/NABARD/Internet. Agromet Advisories are also being disseminated information in both Regional and English languages through kisan SMS a portal launched by the Ministry of Agriculture and farmer welfare Government of India. At present 21.69 million farmers are benefitted by this service directly (Chattopadhyay and Chandras, 2018).

2.7. *Extension approaches used in CSA*

Addressing these global challenges requires generation adaptation and use of new knowledge which involves interaction and support from a wide range of organizations. Extension systems tackle a diversity of objectives that include and go well beyond transferring new technology. This encompasses the effectively and responsively to domestic and international markets reduce, the vulnerability and enhance the voice of the rural poor. There are several ways in extension systems can contribute to CSA. Agro meteorological services rendered by India Meteorological Department (IMD), Ministry of Earth Sciences is a step to contribute to weather information based crop/livestock management strategies and operations dedicated to enhancing crop production and food security. IMD is operating a project Gramin Krishi Mausam Sewa (GKMS) with an objective to serve the farming community at different parts of the country this has a potential to change the face of any country in terms of food security and poverty alleviation.

2.8. *Different approaches used in Extension*

S. No.	Approaches
1.	Climate Awareness programmes/Campaigns, Exhibitions
2.	Climate Trainings
3.	Climate workshops
4.	Plant health Rallies
5.	Climate Farmers field schools
6.	Field visits to progressive farmers
7.	Demonstration on different adaptation or mitigation practices
8.	Dissemination of appropriate climate resilient technology
9.	ICT-supported network
10.	Participatory crop planning
11.	Appointment of climate manager at the village level
12.	Establishment of plant clinics

2.9. *Innovative extension approaches for climate-smart agriculture*

Short Messaging Services

Short text messages of 160-164 characters in the local language (Marathi) were sent to registered mobile numbers of farmers. Maximum two SMS per week based on weather advisories and contingency plans were sent to the farmers.

Climate Wallpapers

One-page advisories in the form of tables or posters related to weather prediction of agricultural operations needed to be performed were pasted on common display boards of villages to provide advisory services to the farmers. In CCA project, these advisories were named Krishi Salah.

Climate Voice Messages

SMS was converted into voice messages in the areas with low literacy rate and disseminated to the farmers.

Folk media

Some nukkad natak (street plays) related to effect of climate change on agriculture were prepared under the CCA project, so farmers could know more about the changing climatic conditions.

Climate Group meetings

Farmers were organized in a group because it is easy to connect them or to disseminate climate-related information to them in a group. Various committees were formed in the village to look after different components like under CCA project village development committee (VDC) were formed. There were 10-15 members in a committee and there was also 40-50 % reservation of women's in all the committee (MANAGE, 2018).

2.10. *Extension methods*

S. No.	For learning purpose	For capacity development
1.	Climate Field Group Visits	Climate Trainings
2.	Farmer Interest Groups (FIGs)	Climate Workshops
3.	Climate Trainings	Field Demonstration
4.	Informative Crop Calendar	Climate-Smart Farmers Field Schools
5.	Livestock Calendar	Weather-Based Insurance

2.11. *Economic assessment of the Agromet Advisory Services*

Study revealed that to assess the economic impact of weather forecast-based advisories 1996, 2009 and 2015 by National Centre for Agricultural Economics and Policy Research in 1996 showed that there was 10-25% economic benefit obtained by the farmers due to the adoption of agromet advisory services. National Council of Applied Economic Research has estimated the economic benefit of these services in 2009 at Rs. 50,000 crores per year is extrapolated to rise to Rs. 211,000 crores if the entire farming community in the country were to apply Agromet information to their agricultural activity. During 2015, again National Council of Applied Economic Research estimated that economic benefit from the use of weather information as the product of the percentage of farmers receiving information. Conversion factors, crop-wise, were used to convert farmers' financial profits to economic profits. At present only, 24 per cent of the farmers taking benefit from the SMS services. Agromet Services has the potential of generating net economic benefit up to Rs. 3.3 lakh crores on the 22 principal crops when service is utilized by all farming households (Chattopadhyay and Chandras, 2018).

2.12. *Impact of Agro meteorological Advisory Bulletin (AAB)*

Utility of Agro Meteorological Advisory Bulletin enumerating selected cases when advisories were helpful or otherwise. The forecast of parameter other than wind directions match satisfactorily with actual observations and thus, the advisories were quite effect in crop management. Specific instances of benefit/loses due to AAS with cultural practices, sowing, spraying, pesticides, irrigation, fertilizer application and labour saving, etc. modified as per advisories (Khobragade *et al*., 2014).

TABLE 3

Distribution of respondents according to utility and relative importance of aspects of the weather based agro advisory service

S. No.	Key aspects of the service	Levels of the aspects	Utility value	Importance value
1.	Frequency of message	Daily	-2.252	38.603
		Once in two days	-2.990	
		Twice a week	1.169	
		Once in a week	4.073	
2.	Timing of the message	Morning	-0.447	11.735
		Afternoon	0.509	
		Evening	-0.062	
3.	Source of message	Scientists	2.321	24.826
		SMS from KVK	-0.062	
		Extension agents from State Department of Agriculture	-1.283	
		Research Scholar	-0.308	
4.	Mode of feedback	Phone call	-0.469	12.292
		Text message	0.876	
		Voice message	-0.407	
5.	Response time	Instantly	0.211	12.544
		Within a day	0.211	
		Within two days	-0.422	

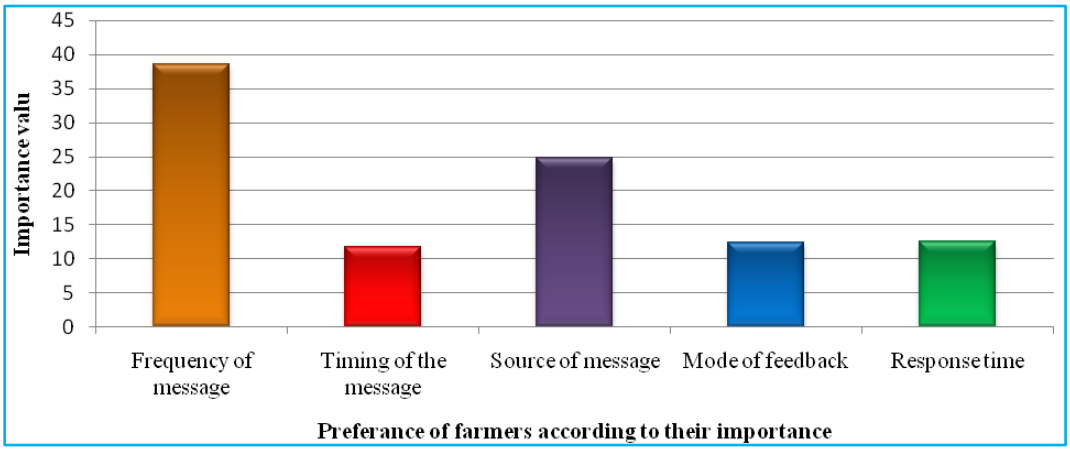

Fig. 4. Performance of farmers according to their importance

2.13. *Preference of farmers towards agro advisory services with its utility*

It was reported that from a farmer's perspective, the forecast value increases only if it is capable of influencing their decisions on management practices. Farmers wish to associate themselves to the weather based agro advisory services that are in fully accordance with their existing attitude, values, needs and interests. Therefore, mobile phone enabled weather information and advisory service should be designed in such a way as preferred by farmers to improve its utility. Hence, it becomes important to understand the different aspects of the service which is appropriate to the farmers needs to increase the adoption of advisories (Dharanipriya *et al.*, 2019).

The finding on the utility and relative importance values of each aspect of the service obtained using analysis is presented in the. The (Table 3) among the different levels of frequency of message the level 'once in

a week' was found to have the highest utility value of 4.073 followed by the levels 'twice a week' (1.169), 'daily' (-2.252) and 'once in two days' (-2.990). Regarding (Table 3) timing of the message delivered to the farmers, 'afternoon hours' had the highest utility value (0.509) followed by 'evening' (-0.062) and 'morning hours' (-0.447). The (Table 3) the source of message scientist (2.321) and SMS from KVK (-0.061) followed by research scholar (-0.308) in. With regard to mode of feedback, text message had highest utility value (0.876) followed by voice message (-0.407) and phone call (-0.469). The data mentioned in response of time, instant response and within a day response were found to have the equal utility value of (0.211) whereas within two days response had obtained the utility score of (-0.422) (Table 3). Hence, advisories provided once in a week by scientists during afternoon hours was considered to be more desirable by farmers. This is in contrary with the findings of (Prabha and Arunachalam, 2017) who reported that majority of the respondents preferred to receive the messages on daily basis (53.50%) during morning hours (55.00%) and only small proportion of the respondents preferred to receive messages on weekly basis (9.50%) during afternoon hours (12.50%). The probable reason for farmers in the study area preferring weekly once advisories during evening hours was that farmers were annoyed of more number of unwanted messages flooding their inbox. This in turn may obstruct the farmers to overlook the useful information being delivered. Further, farmers mostly remained busy in their fields during morning hours looking after the adoption of cultivation practices. Farmers may rest for a while, in the afternoon hours during which they could allocate sometime to view the messages and could also enable farmers to discuss with the fellow farmers in the evening hours to make decision on the adoption of information. Regarding the source of information, scientists from Tamil Nadu Agricultural University were preferred more as they were continuously involved in research activities. About the mode of feedback & response time, text message given either instantly or within a day was most preferred by farmers. Responding to farmers queries instantly or within a day will enhance the utility of the information. This is because it enables the farmers to quickly take needed actions to cope up with the risks or adverse situations. It could also be found that the frequency of message had obtained the highest importance value of 38.603 followed by the source of information (24.826), response time (12.544), mode of feedback (12.292) and timing of the message (11.735) respectively in that order. This shows that the aspects, *viz*., frequency of message and source of information were considered to be most important aspects.

3. Conclusions

It is concluded from the study that extension is not just riding on the bike and interacting with farmers. It is umbrella of various activities to achieve the certain target in agriculture. On the other hand, climate change is not watching some slight glimpses of weather. But from the pint of farmers it has huge debacle in agriculture regarding their production and livelihood. Weather information the scientist collecting, maintaining and displaying the data on screen or in research report may looks easy but taking action is indeed is very complicated with regard to providing the weather information to the farmers. In present scenario agro met advisory would be the backbone of farmers. Sustainable development is long-term goal which can only be achieved through different management practices. Proper incorporation of agro climatic considerations in the development of improved strategies requires a much longer time frame than has been used in the past. Climate change is a major threat in present situation and work carried out have describes the key role of transfer of technology though extension service. Work should be done at grass root level and able to identify the root cause of non-adoption of mitigation strategies. Further, it is concluded that extension methods and approaches were identified to make them aware about climatic hazard which need to be implemented to make the farmers more climate smart. Therefore, extension approaches need to be considered as part of a broader set of adaptation measures and policies for agricultural systems at a range of scales. Climate change is an ongoing phenomenon. CSA policies should promote both practices and services such as financial services and strategies for imparting knowledge and management.

Acknowledgement

The contents, data and views mentioned in this review paper written by author and some are taken from other relevant studies. I express my gratitude and indebted to the teacher of Department of Extension and Agricultural Metrology of CCSHAU, for their great collaboration for preparing this paper.

Disclaimer : The contents and views expressed in this research paper/article are the views of the authors and do not necessarily reflect the views of the organizations they belong to.

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