



## FARMERS AWARENESS AND ADAPTATION MEASURES AGAINST CLIMATE CHANGE

\*Sujith G.M., Shankara, M.H. & Shivamurthy, M.

Department of Agronomy, University of Agricultural Sciences, Gandhi Krishi Vigyan Kendra, Bangalore -560 065

\*Corresponding author email: sujithsasalu@gmail.com

### ABSTRACT

The present study was conducted to know the farmers' perception of climate change, particularly two climatic parameters such as rainfall and temperature. Rainfall and temperature are the important climate change parameters, their variation and intensity of occurrence during two time intervals before 2000 and after the year 2000 were considered. The data were collected from 120 randomly selected respondents in three districts of the Eastern Dry Zone (Zone-5) of Karnataka and analysed with the help of suitable statistical tests. The findings indicated that, about 94 % of the farmers perceived that, there were less number of dry spells, no changes in the onset of timing in rainfall and quantity of rainfall received was more before the year 2000 which was contrary to the actual rainfall received after the year 2000. With respect to changes in temperature, before 2000, majority (98.33%) of farmers were expressed undecided, that they were not in the position to perceive whether they have experienced less extreme temperature. 95.83 % of respondents agreed that temperature was not increased and majority (95 %) of them opined that they were not experienced higher extreme temperature and after the year 2000, the farmers perceived that there was increase in the temperature, experiencing more extreme temperature and scorching sunshine, no one experienced less extreme temperature, there was changes in the temperature and they agreed that summers were getting warmer. However, 97.50 % of farmers opined that winters were getting warmer. Regarding adaptation initiated in paddy crop, before the year 2000, it could be observed that all farmers (100%) have not taken any adaptation measures like changing of the varieties from long to short duration, from short to long duration, changing of rice crop to other alternative crops etc. After the year 2000, all the farmers (100 %) have changed the planting dates of rice, increased the quantity of fertilizer, seeds, number of irrigation, plant protection chemical spray etc.

**KEY WORDS:** Farmers, Climate change, Awareness and Adaptation.

### INTRODUCTION

Agriculture and Climate are mutually dependent. Changing climatic conditions can have a big effect on human life, environment and agriculture. There is a need to understand the effect of climate change on agricultural sector both at Global and as well as at regional level especially from the point of view of ensuring food security to vulnerable section of the population. ADB, (1995) reported that, if a one-meter sea level rise were to take place today, it would displace 7 million families in India. In fact, it is the greatest environmental threat faced by the planet earth. According to an estimation of IPCC (2001), by the end of 20th century, the mean global surface temperature had increased by 0.6 °C. Change in weather conditions can be best observed through the extreme rise in temperature, melting of glaciers and sudden rise in sea level. These changes are causing serious problems to human and other forms of life. It has become common knowledge that the poor families' particularly rural women are likely to be hit hardest by climate change and the capacity to respond to climate change is lowest among them. The brunt of climate changes is expected to be very high in India due to greater dependence on agriculture, limited natural resources, alarming increase in human and livestock population, changing pattern in land use and socio-economic factors that pose a great threat in meeting the food, fibre, fuel and fodder requirement. Winters *et al.*

(1998) analyzed the impact of global climate change on developing countries, and revealed that developing countries will potentially suffer from income and production losses because of climate change. Anticipating the climate change, farmers keep modify crop management practices by growing resistant varieties and be prepared for adapting coping mechanisms. Mendelsohn and Dinar (1999) reported that, adaptation was estimated to reduce the potential damages of climate change from 25 to 15-23% in Indian agriculture. A wide variety of adaptive actions required to overcome adverse effects of climate change on Agriculture. At the farm levels, adjustment may include the introduction of late maturing crop varieties or species, changing cropping sequences, adjusting timing of field operations, conserving soil moisture through appropriate tillage methods and improving irrigation efficiency, Rosenzweig and Daniel (1993). Impacts of climate change are diversified and need to be understood, so as to workout pragmatic strategies to mitigate ill-effects of climate change. With this background this study was conducted to understand the farmers' awareness of changes in rainfall and temperature pattern and it's their adaptation measures initiated in rice crop.

**METHODOLOGY**

The study was conducted in the Eastern Dry Zone (Zone-5) of Karnataka. Based on the existence of high range of variability in rainfall and temperature (since 20 years), three taluks Ramanagar (kasaba), Chickballapur (kasaba) and Tumkur (kasaba) were chosen purposively. From each of the so selected taluks, four villages were selected randomly. Thus 12 villages were considered for the study. From each of the selected villages ten respondents were selected by applying systematic random sampling technique. To elicit the data, the farmers with an age group of 35 to 70 years, with a farming experience of more than 15 years were randomly selected. Appropriate statements were prepared for data collection in relation to climate change particularly on rainfall pattern and changes in temperature. The data were collected from the 120 respondents with the help of pre-tested interview schedule.

**RESULTS & DISCUSSION**

**Farmer’s awareness about changes in rainfall pattern**

Data with respect to awareness of farmers about changes in the rainfall is presented in two time intervals such as before and after 2000. A cursory look at the table 1 reveals that, about 94 % of the farmers opined, there were less number of dry spells and only 5.83 % of them expressed as undecided on the same statement, while 90 % of them opined that, there were no changes in the onset timing of rainfall and amount of rainfall was more before 2000. Similarly about 88.34 % of farmers perceived that there was no change in the rainfall pattern, majority (87.50%) of farmers opined that there was no change in the rainfall during crop growth period and 85.83 % of them agreed that number of rainy days were more, before 2000. Contrary to the perception of rainfall pattern farmers perceived that, after 2000 all farmers (100 %) perceived that, there was a change in the onset timing of rainfall, changes in the rainfall during crop growth period and there was a change in the rainfall pattern. Majority (99.17%) opined that dry spells were more and 97.5 % of them agreed that amount of rainfall and rainy days were less.

**TABLE 1:** Awareness of farmers about changes in the rainfall pattern (n=120)

Sl. no	Statements	Responses					
		Before 2000			After 2000		
		Agree No (%)	Undecided No (%)	Disagree No (%)	Agree No (%)	Undecided No (%)	Disagree No (%)
1.	Number of rainy days (>2.5mm) were more	103 (85.83)	17 (14.17)	-	-	3 (2.50)	117 (97.50)
2.	Amount of rainfall was more	108 (90.00)	12 (10.00)	-	-	3 (2.50)	117 (97.50)
3.	There was changes in the onset timing of rainfall	5 (4.17)	7 (5.83)	108 (90.00)	120 (100.00)	-	-
4.	More dry spells	-	7 (5.83)	113 (94.17)	119 (99.17)	1 (0.83)	-
5.	There was changes in the rainfall during crop growth period (July -October)	9 (7.50)	6 (5.00)	105 (87.50)	120 (100.00)	-	-
6.	There was no changes in the rainfall pattern	106 (88.34)	6 (5.00)	8 (6.66)	-	-	120 (100.00)

(Figures in parentheses depicts percentage)

**TABLE 2:** Awareness of farmers about changes in temperature before and after 2000 (n=120)

Sl. no	Statements	Responses					
		Before 2000			After 2000		
		Agree No (%)	Undecided No (%)	Disagree No (%)	Agree No (%)	Undecided No (%)	Disagree No (%)
1.	There was increase in the temperature	-	5 (4.17)	115 (95.83)	120 (100.00)	-	-
2.	a. Experienced more extreme temperature	-	6 (5.00)	114 (95.00)	120 (100.00)	-	-
	b. Experienced less extreme temperature	2 (1.67)	118 (98.33)	-	-	-	120 (100.00)
3.	a. Experienced scorching sun shine	-	6 (5.00)	114 (9.00)	120 (100.00)	-	-
	b. Summer was getting warmer	-	9 (7.50)	111 (92.50)	120 (100.00)	-	-
4.	a. Winter was getting warmer	-	6 (5.00)	114 (95.00)	117 (97.50)	3 (2.50)	-
	b. There was no changes in the temperature	114 (95.00)	6 (5.00)	-	-	-	120 (100.00)

(Figures in parentheses depicts percentage)

### Farmer's awareness about changes in temperature

Awareness of farmers about changes in the temperature was presented in two time intervals such as before and after 2000. The data presented in the table 2 reveals that, farmers awareness of changes in the temperature before 2000, majority (98.33%) of farmers were expressed undecided, that they were not in the position to perceive whether they have experienced less extreme temperature. 95.83 % of respondents agreed that temperature was not increased and majority(95 %) of them opined that they were not experienced higher extreme temperature, scorching sunshine followed by warmer winters and there was no changes in the temperature. 92.50% of farmers agreed that summers were not getting warmer. After 2000, the farmers perceived that there was increase in the temperature, experiencing more extreme temperature and scorching sunshine, no one experienced less extreme temperature, there was changes in the temperature and they agreed that summers were getting warmer. However, 97.50% of farmers opined that winters were getting warmer.

### Adaptation measures initiated by rice growers in response to climate change

A cursory look at the table 3 reveals that, 120 respondents were considered for the study out of these there were only 49 respondents growing the rice. The data were collected

with respect to adaptation measures initiated by the rice growers and presented in the table 3. It could be observed that all farmers (100%) have not taken any adaptation measures like changing of the varieties from long to short duration, from short to long duration, changing of rice crop to other alternative crops, changing in the planting dates, spacing between rows and plants, quantity of fertilizer application, quantity of seeds, number of plant protection chemical spray and irrigation due to changes in the climate before 2000 in the rice production. After 2000 in rice production, all the farmers (100%) have changed the planting dates of rice, increased the quantity of fertilizer, seeds, number of irrigation, plant protection chemical spray, 51.00 % of rice growers had increased the spacing between plants and rows, while 59.18 % had changed variety from long to short duration and most (62.06%) of them shifted from Mandya Vijay variety to Rashi followed by Prakash to Rashi (17.24 %), Jaya to Mangala (13.80 %) and mandya vijay to IR 20 (6.90 %) and only 16.32 % changed short to long duration varieties such as IR 20 to Jaya (62.50 %) and Rashi to Prakash (37.50%). 40.81% of farmers changed rice crop production to other crops like ragi (55.00 %) followed by red gram (30.00 %) and are count (15.00 %) due to climate change after 2000 in rice production.

**TABLE 3:** Adaptation measures initiated by rice growers in response to climate change (n=49)

Sl. No.	Statements	Adaptation measures			
		Before 2000		After 2000	
		Initiated	Not initiated	Initiated	Not initiated
I.	Adaptation measures initiated in rice production				
1	Varieties				
a.	Changed from long duration to short duration varieties	–	49 (100)	29 (59.18)	20 (40.82)
i.	Prakash to Rashi	–	–	5 (17.24)	–
ii.	Jaya to Mangala	–	–	4 (13.80)	–
iii.	Mandya vijay to Rashi	–	–	18 (62.06)	–
iv.	Mandya vijay to IR 20	–	–	2 (6.90)	–
Sl. No.	Statements	Adaptation measures			
		Before 2000		After 2000	
		Initiated	Not initiated	Initiated	Not initiated
1	Changed from short duration to long duration varieties	–	49 (100)	8 (16.32)	41 (83.68)
i.	IR 20 to Jaya	–	–	5 (62.50)	–
ii.	Rashi to Prakash	–	–	3 (37.50)	–
2.	Changed from rice to other crops	–	49 (100)	20 (40.81)	29 (59.19)
i.	Paddy to Arecanut	–	–	3 (15.00)	–
ii.	Paddy to Ragi	–	–	11 (55.00)	–
iii.	Paddy to Red gram	–	–	6 (30.00)	–
3.	Changed in the planting dates	–	49 (100)	49 (100)	–

Sl. no	Statements	Adaptation measures					
		Before 2000			After 2000		
		I	D	NC	I	D	NC
4.	Spacing between the rows/plants	–	–	49 (100)	25 (51.00)	–	24 (49.00)
5.	Quantity of seeds used	–	–	49 (100)	49 (100)	–	–
6.	Quantity of fertilizer application	–	–	49 (100)	49 (100)	–	–
7.	Number of irrigations given	–	–	49 (100)	49 (100)	–	–
8.	Number of times plant protection chemicals sprayed	–	–	49 (100)	49 (100)	–	–

I=Increased, D=Decreased, NC=No Change, (Figures in parentheses depicts percentage)



**CONCLUSION**

Climate change is affecting India in a big way and its impacts are many and serious. With unpredictable weather, farmers were aware about changes based on their vast experience in the farming and they have initiated too many adaptation measures such as, keep changing crop management practices by growing resistant varieties and are prepared for constant change in the farming practices. Further, there is a need to understand the awareness of farmers about climate change in hilly and coastal area and their management practices in order to develop suitable strategies to overcome sudden impact of climate change on human beings and surroundings.

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