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A Study on the Awareness of Women Farmers to Climate Change in Rice Crop in Karnataka

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ABSTRACT: Climate change is one of the serious environmental issues faced by the world. Climate change refers to the long term changes in the climate that occur over decades, centuries or longer. It is mainly caused by the rapidly increasing green house gases in the atmosphere. As agriculture depends entirely on climate, it is the most vulnerable sector to climate change. The production of rice is mostly affected both by rising temperature and availability of water. Women commonly suffer greater risks and burdens from the effects of climate change in the situation of poverty who make up the majority of the world's poor, generally have lower income, less access to credit and decision making authority and limited control over resources, increasing their vulnerability to many climate impacts. Majority of the operations in rice crop were carried out by women farmers. Therefore it is necessary to understand whether women farmers are aware of climate changes and its influence in rice crop. An attempt has been made to study the awareness of women farmers on climate change in rice crop. *Ex-post facto* research design was adopted for the study with a sample of 120 respondents covering two districts of Karnataka. From the analysis, it was found that majority of the women farmers had high level of awareness. Major challenge of the study is to unearth the profile characteristics of women farmers and to determine the factors influencing awareness of women farmers towards climate change in rice crop.

Keywords: Climate change, Awareness, Women farmers, Rice crop, Karnataka.

INTRODUCTION

Climate change is one of the most defining concerns of today's world and has greatly altering the earth's ecosystem. It refers to any change in the climate over time, whether due to natural variability or as a result of human activity (Parry, 2007). An increase in the concentration of atmospheric green house gases has resulted in tremendous rise in global warming. Worldwide temperature have increased more than 0.6 over the past century and it also reported that average temperature will increase between 1.4 to 5.8°C, by the end of 2100 (Intergovernmental Panel for Climate Change, 2014). Climate-smart agriculture is also essential for increasing yields and improving product quality. Agriculture and climate change are inextricably linked. The rapid speed of climate change will undoubtedly have a significant influence on agro-ecosystem productivity. As such the production of most cereals like rice is affected both by rising temperature and availability of water. Rainfall has been found to have a deleterious influence on rice crop throughout the heading and flowering periods. The effects of high temperatures on cellular and developmental processes result in decreased fertility and grain quality (Barnabas *et al*., 2008). Therefore, climate change is the biggest hazard to the rice cultivation. Most of the farmers had come across the changing climatic conditions but not fully aware of the effects of climate change on agriculture.

Women farmers are involved both in the production and processing of rice crop and role of women farmers in agriculture is remarkable. Hence, the level of income and welfare of a household largely depends on the degree of women's effective participation. Majority of the operations in rice cultivation like weed management, nursery management, transplanting, harvesting and irrigation management are performed mostly by the women farmers. They are involved in farm management decision about inputs, hiring of labour apart from monitoring of pests incidence and weeds in rice crop. Nearly half of the human resources in rural areas are women and most of them are unaware about climate change. So it is important to know and

understand about whether women farmers are aware of climate change and its effect in order to take necessary measures to combat climate change.

MATERIALS AND METHODS

The state of Karnataka was chosen for the study purposively. The districts (Shimoga and Hassan) were selected purposively based on highest area under rice crop in Southern Transition Zone of Karnataka as this zone experiences heavy floods. Two taluks from each districts were selected randomly. Two villages from each taluk were selected randomly and from each of the selected village, fifteen women farmers were selected randomly. The sample constituted to a total of one hundred and twenty (120) respondents. The data was collected using a pre tested structured interview schedule and analysed using SPSS. The women farmers were personally interviewed by the researcher.

RESULTS AND DISCUSSION

Socio-economic profile of the women farmers. A socio-economic profile of the women farmers is presented in Table 1.

Table 1: Distribution of women farmers according to their socio-economic characteristics.

Sr. No.	Variables	Frequency	Percentage
1.	**Age**		
a.	Young age (up to 38 years)	25	20.84
b.	Middle age (38-56)	72	60.00
c.	Old age (>56 years)	23	19.16
2.	**Education**		
a.	Illiterate /no schooling	21	17.50
b.	Functionally literate(can read and write)	7	5.80
c.	Primary school(up to 5th class)	28	23.33
d.	Upper Primary school(up to 8th class)	25	20.83
e.	Secondary (up to 10th class)	16	13.33
f.	Higher secondary(up to 12th class)	12	10.00
g.	Under graduation	11	9.20
3.	**Farming Experience**		
a.	Low farming experience	16	13.33
b.	Medium farming experience	46	38.33
c.	High farming experience	58	48.33
4.	**Farm size**		
a.	Marginal (up to 1.00 ha)	23	19.17
b.	Small (1.00-2.00 ha)	33	27.5
c.	Semi-medium (2.00-4.00 ha)	48	40.00
d.	Medium (4.00-10.00 ha)	14	11.66
e.	Large (more than 10.00 ha)	2	1.67
5.	**Annual income**		
a.	Low annual income	48	40.00
b.	Medium annual income	59	49.16
c.	High annual income	13	10.83
6.	**Innovativeness**		
a.	Low	10	08.33
b.	Medium	80	66.66
c.	High	30	25.00
7.	**Risk taking ability**		
a.	Low	40	33.33
b.	Moderate	49	40.83
c.	High	31	25.83
8.	**Source of information**		
a.	Low	70	58.33
b.	Medium	36	30.00
c.	High	14	11.66
9.	**Access to weather information**		
a.	Low	54	45.00
b.	Medium	40	37.50
c.	High	21	17.50
10.	**Trainings undergone on Climate Resilient Agriculture (CRA)**		
a.	Low	60	50.00
b.	Medium	38	31.67
c.	High	22	18.33

From the overview of data (Table 1), majority of the women farmers in study sample were middle aged (60.00%), educated up to primary and upper primary (almost 45%), had high farming experience (48.33%), semi medium farm size (40.00%), medium annual income (49.16%). Further they displayed medium innovativeness (66.66%) and moderate risk taking ability (40.83%), low source of information (58.33%), low access to weather information (45.00%), low training undergone on Climate Resilient Agriculture (CRA) (50.00%).

Awareness about climate change. In the study sample, 100% of the women farmers claimed to be aware of the climate change. In addition, when questioned about their level of knowledge on climate change in rice, nearly half of the respondents (42.5%)

showed 'high' awareness about climate change, followed by 30.83 percent had 'medium' level and 26.6 percent of respondents had 'low' level of awareness about climate change. The women farmers showed a high level of awareness on climate change over time in rice crop mainly due to their extensive farming experience and ongoing participation in numerous farming activities. Medium farm size medium innovativeness also aids to high awareness of women farmers to climate change. Tewari *et al.* (2019) reported that 91.00 % of farm women were completely aware of climate change indications *viz.,* increased temperature, water level fluctuations (77.00%), and irregular and variable rainfall (69.0%). Chanana-Nag and Aggarwal (2020) stated that large number of women farmers were aware of and affected by high level of drought probability, excess rainfall and heat wave. Lawson *et al*. (2020) discovered that majority of women farmers saw a shift in temperature, rainfall and the frequency of dry periods. Diarra *et al.* (2021) documented that women farmers in Cinzana were aware of the effects of climate change. He further added that during the season, 72 per cent of women noticed an increase in daytime temperatures, as well as a drop in rain intensity and quantity. Sohail *et al.* (2021) reported that farmers were well aware of wastewater's fertility potential, but they were less knowledgeable of how dirty water affected crops. Agriculture suffers from the pollution of industrial wastewater discharges. The findings also indicated that the main concerns associated with climate change and how it is affecting agriculture include droughts, temperature changes, floods, and variance.

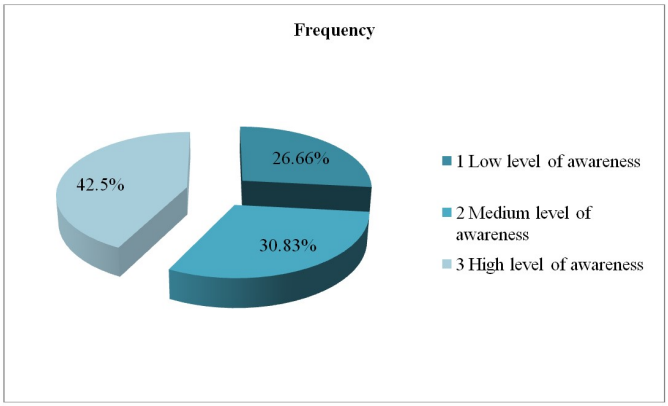

Fig. 1. Level of awareness of women farmers on climate change in rice crop.

Table 2: Distribution of respondents based on the rank order for each statement.

Sr. No.	Items	Aware %	Unaware %	Rank
1.	Changes in the climate over past few years	100	-	I
2.	Fluctuation in rainfall pattern in the last few	95.8	4.2	II
3.	Increase in the average temperature over the last few years	92.5	7.50	III
4.	Increased frequency of droughts over the last few years	57.5	42.5	X
5.	Increased frequency of dry spells over the last few years	41.7	58.3	XIII
6.	Increased frequency of winds over the last few years	75.0	25.0	VII
7.	Increased frequency of hailstorms over the last few years	50.0	50.0	XII
8.	Increased high temperature during day time leads to poor rice yield	79.2	20.8	V
9.	Terminal dry spell during flowering stage cause severe reduction in the rice crop yield	54.1	45.9	XI
10.	Strong winds cause lodging in rice crop	75.0	25.0	VII
11.	Flood tolerant varieties in rice like Swarna sub 1, FR13A	1.7	98.3	XVI
12.	Drought resistant varieties in rice(IET-7191, KHP-2)	20.0	80.0	XV
13.	Low temperature during pollen formation leading to spikelet sterility in rice	41.7	58.3	XIII
14.	Weed infestation like *Echinochloa crusgalli* has been increased due to high temperature in rice	70.0	30.0	IX
15.	High temperature, relative humidity and rainfall can make major pest infestation like BPH in rice	78.3	21.7	VI
16.	High nitrogen application lead to more disease and pest infestation in rice crop	77.1	28.3	VIII
17.	High relative humidity and temperature cause an increase in severity of diseases like Blast and Bacterial Leaf Blight in rice	81.7	18.3	IV
18.	Blast resistant varieties of rice like (jaya, rasi, mangala etc)	54.2	45.8	XI
19.	High rainfall and low temperature at the time of flowering cause an increase in severity of Smut disease in rice	36.7	63.3	XIV
20.	Smut tolerant varieties of rice like (BMR-MS-1-2-1)	1.7	98.3	XVII

Awareness about indications of climate change in rice crop. Women farmers, when questioned about awareness of climate change indications, they replied that awareness on changes in climate over a past few yew years ranked I followed by results showed that awareness on increased fluctuation in rainfall pattern in

the last few years (II), awareness on the increased average temperature over the last few years (III), awareness on increase in severity of diseases like Blast and Bacterial Leaf Blight in rice due to high relative humidity and temperature (IV), awareness on decreased rice yield due to high temperature during day time (V), awareness on increased major pest infestation like BPH due to high temperature, relative humidity and rainfall (VI), increased frequency of winds over the last few years (VII). The women farmers were made more aware of these climate change situations because they directly affect farming and high education, farming experience and farm size also contributed to their high awareness.

The lowest ranks were assigned on the statements like awareness on the smut tolerant varieties of rice (XVII), flood tolerant varieties in rice like Swarna sub 1, FR13A (XVI), drought tolerant varieties in rice like IET-7191, KHP-2 (XV), increased rainfall at the time of flowering and low temperatures causing severity of Smut disease in rice (XIV) and low temperatures during pollination leading to spikelet sterility in rice (XIII). Women farmers lack adequate information regarding these aspects due to lack of training programmes, source of information and lack of innovativeness.

Relation between characteristics of women farmers and their level of awareness on climate change in rice crop.

The coefficient of correlation was calculated to determine the relationship between selected characteristics of women farmers and their level of awareness of climate change in rice crop.

Data on the correlation between selected socio economic, personal and psychological characteristics comprised of age, education, farming experience, farm size, annual income, innovativeness, risk taking ability, sources of information, access to weather information, trainings undergone on Climate Resilient Agriculture (CRA) and their level of awareness towards climate change (Table 2).

Table 3: Correlation between the selected characteristics of women farmers and level of awareness about climate change in rice crop.

Sr. No.	Variables	Correlation coefficient (r)
1.	Age	0.248*
2.	Education	0.237*
3.	Farming experience	0.340**
4.	Farm size	0.238*
5.	Annual income	0.164
6.	Innovativeness	0.225*
7.	Risk taking ability	-0.025
8.	Sources of information	0.202*
9.	Access to weather information	0.186*
10.	Trainings undergone on Climate Resilient Agriculture (CRA)	0.196*

It is clear from the above table that out of ten independent variables selected to study the relationship with level of awareness of women farmers towards climate change, all the variables except risk taking ability were found to have positive (and significant) relationship with the dependent variable *i.e.,* level of awareness of women farmers. Further, one variables *i.e.,* farming experience – was found to have significant positive relationship with farmer's level of awareness at 1 per cent level of significance and the remaining eight variables were found to be significant at 5 per cent level of significance. It may be due to the reason that more the farming experience of the women farmer, greater is the exposure to wide range of weather extremes and encountered a wide range of scenarios of climate change and its impact on farming. Thus, age, education, farming experience, farm size, annual income, innovativeness, sources of information, access to weather information had a significant and positive relation with the level of awareness of women farmers towards climate change. On the other hand risk taking ability was negatively correlated with the level of awareness of the women farmers towards climate change.

CONCLUSION

The study concluded that women farmers had high level of awareness on climate change in rice crop. As the women farmers had high farming experience and undergone primary education they were exposed to climate change indications. Most of the women farmers indicated that television and radio were their main source of information on climate change. So the policy makers can make use of the potential of mass media to spread information on climate change and create more awareness about the cause and effects of the climate change as well as adaptation measures to combat climate change among the women farmers.

FUTURE SCOPE

— The present study is limited to only two districts in the state of Karnataka. A similar study might be conducted in other districts of the state.

— The present study is confined to assess the level of awareness of women farmers to climate change in rice crop. Attempts may be made to study the awareness of women farmers in other crops also.

— The study was carried out using some specific profile characteristics that may be confined to determine awareness women farmers to climate change and its impact on agriculture and other related activities As a result, future research may be expanded by introducing some more characteristics.

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