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Knowledge towards Climate Change (CC) among Postgraduate Women Research Scholars in State Agriculture Universities (SAUs) of Gujarat

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ABSTRACT

Indian women have major responsibilities to mention healthy family by supplying good and timely water, food, energy and nutrients. All these daily women activities are directly associated with the nature and affected by the climate change that leads to drought, uncertain rainfall, increased temperatures, fires and health disorders. Even though 43 per cent of rural workers are women but among them only 5 per cent of women have access to extension services directly rest are depending on husbands, neighbours, friends and relatives. In this situation it is most required for the staffing of agricultural extension services with women extension officers who could reach farm women directly. To educate the farm women towards climate change issues women extension workers should have proper knowledge towards climate change. To know the knowledge of women research scholars a special interview schedule was designed with 200 multiple choice questions related with various aspects of climate change with the help of major guide and all other scientists of agriculture and allied fields. It is observed that an average women research scholars having 41 to 60 per cent of knowledge across the four different concepts of climate change issues. To increase the knowledge of women research scholars towards climate change SAUs should guide the postgraduate woman research scholars to participate in the seminars, workshops or training programs by utilize the internet services available in the university campuses for the developing of positive attitude towards climate smart technologies that leads to increase the knowledge of the women research scholars towards climate change issues than they can train the farm women to mitigate the climate change problems.

Key words: *Climate change, Knowledge, Postgraduate Women Research Scholars*

INTRODUCTION

In the present condition world's largest consumers of natural resources are developing countries and they are among those who are facing major environmental, social, economic and health impacts. In the developmental process excessive consumption of resources like fossil fuels, coal, oil and gas leads to raise in green house gases emissions like carbon dioxide, carbon monoxide, nitrous oxide and methane.

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In addition to that methane and carbon dioxide gases are releasing from agriculture sectors through animal husbandry and paddy cultivation so there is a reciprocal relationship between agriculture and climate change. By amplifying these mass of gases leads to known as the green house effect.

Developing countries are generally more vulnerable to the effects of climate change than the developed countries, mainly due to their low capacity to adapt climate induced changes. Among the developing countries, India is a middle-income country with a current GDP growth rate of 4.8 per cent, 400 million people are remain under the poverty line[8], and it ranked 135th in the Human Development Index[7]. To become a developed country India consuming 50 per cent more natural resources that earth can replenish due to this it has to face complicated and integrated set of climate compatible developmental challenges. It is mainly because India is home to one third of the world's poorest people and 60 per cent of population is mainly depending on agriculture for their livelihood and agricultural activities are those which are very sensitive to climate and weather conditions. Because of all these problems India is acutely vulnerable to climate change and its vulnerability is set to increase between 2010 and 2030.

In support this background researchers identified that agricultural productivity is increasingly affected by changing temperatures, rainfall patterns and natural disasters. The study carried out by Sinha and Swaminathan[6], indicated that an increase in temperature of 2°C could decrease the rice yields by 0.75 tons/ha in the high yielding areas. According to Singh[5], 0.5°C increase in winter temperature would reduce wheat yields by 0.45 tons/ha. Agarwal[1]. said that the climate change has significant impact on agricultural, productivity of most cereals would decrease due to increase in temperature.

Increased in population, rapid urbanization and industrialization leads to decreasing per capita land availability that leads to decreases the agriculture production. In addition to this, research studies have been confirmed that production and productivity of major food crops will decrease due to climate change. To meet the demands of increasing population with the resources is the challenging task for the ecological, cultural, political and socioeconomic systems. Considering this challenging situation, climate change agencies involved in agricultural have started their efforts to develop the climate smart technologies to meet the difficult situation through their research, education, extension and management.

According to Swaminathan, the famous agricultural scientist, believe that it was woman who first domesticated crop plants and initiated the art of farming while men went out for hunting; women started gathering seeds and began cultivating from the point of view of food, feed, fodder, fibre and fuel. At present in India female population contains 48.26 per cent of the country's total population among them 36.09 crores live in rural areas by depending on agriculture in one or the other way and in over all farm production, women's average contribution is estimated at 55per cent to 66 per cent[4]. Along with this women play a key role in the conservation of basic life support systems such as land, water, plants, animals and environment because Indian women have major responsibilities to mention healthy family by supplying good and timely water, food, energy and nutrients. All these daily women activities are directly associated with the nature and affected by the climate change that leads to drought, uncertain rainfall, increased temperatures, fires and health disorders. All this situations makes the rural women more vulnerable and primary victims of climate change. The research findings supports that women living in developing countries who are currently dependent on subsistence agriculture to feed their families are affected by the lack of modern fuels and power sources for farming, and household maintenance due to climate change[2].Climate change could add water and food insecurity and increase the women's work levels particularly in developing countries[2].

To mitigate these climate change problems active participation of women in the adoption and allocation of resources for climate change initiatives is critical, particularly at local levels. In this situation educating the farm women through women extension workers is most important to withstand and survive in closed cultural patterns like India. Even though 43 per cent of rural workers are women but among them only 5 per cent of women have access to extension services directly[3], rest are depending on husbands, neighbours, friends and relatives. In this situation it is most required for the staffing of agricultural extension services with women extension officers who could reach farm women directly. Programmes should be developed exclusively to train the women extension workers to develop skills to educate the farm women towards mitigating the climate change problems at grass root level and ensure technology, inputs and credit has to be ensured predominantly to the farm women through women extension workers.

With this background many experts have suggested that to develop agriculture as whole, there is need to encourage women entrepreneurs, educationists, women researchers, women extension educationists and women agricultural administrators to motivate and contribute significantly to develop the half of woman work force involved in the agriculture. In this way woman research scholars were the future generation of women workforce for agricultural development should have with 200 multiple choice questions related with various scientific knowledge towards climate change and its adoption technologies. In India State Agriculture Universities (SAUs) are responsible for the generating and training of existing and upcoming human resources for agricultural production, research, education and extension education related activities. With this background the present study was conducted to know the climate change knowledge of women research scholars studying in SAUs of Gujarat.

MATERIAL AND METHODS

The study has been under taken across four State Agriculture Universities (SAUs) of Gujarat The named Anand Agricultural University (AAU), Anand situated in Middle Gujarat, Junagadh Agricultural University (JAU), Junagadh located in Saurashtra, Navsari Agricultural University (NAU) Navsari situated in south Gujarat and Sardarkrushinagar Dantiwada Agricultural University (SAU), Sardarkrushinagar to cover the entire state. These four agriculture universities play important role in development of able and employable agricultural personnel to agricultural development and expansion.

Size

Across Sample the four agriculture universities obtained a list of the women research scholars studying in M.Sc. and Ph.D. degrees in agriculture and allied subjects. Using a random sample method proportional numbers of research scholars were selected as respondents based on the availability of research scholars at the time of data collection, for the study 79, 38, 48 and 30 woman research scholars were selected from AAU, JAU, NAU and SAU respectively with a sample size of total 195 respondents.

Data collection and analysis

To know the knowledge of women research scholars a special interview schedule was designed aspects of climate change with the help of major guide and all other scientists of agriculture and allied fields. The schedule consists two parts, first part contains the profile of the women research scholars and second part is to test the knowledge of women research scholars regarding various aspects of climate change. The selected 200 question was grouped in to four subheadings based on the climate change concepts like general aspects of climate change, knowledge towards Green House Gases (GHGs), impact of climate change on agriculture and animal husbandry, measures to be taken to minimize climate change impacts through power saving techniques. The responses were measured in terms of correct and incorrect answers and

score of 1 for correct and 0 for incorrect response were given for the each statement. The respondents were grouped in to five clusters in each section based on percentage of knowledge possessed by them in section like knowledge up to 20 per cent, 21 to 40 per cent, 41 to 60 per cent, and 61 to 80 per cent and above 80 per cent. The overall knowledge percentage of the respondents was calculated based on the total score obtained from all the 200 questions. Correlation technique was used to find the important variables that are contributing for the knowledge of women research scholars towards climate change.

RESULTS AND DISCUSSION

From the data knowledge of the women research scholars has been analyzed based on the different climate change concepts and grouped them in to different categories.

Knowledge of women research scholars towards general and basic aspects of climate change

It can be seen from the Table1 that slightly less than half (45.13 per cent) of the postgraduate woman research scholars had 21 to 40 per cent of the knowledge about general and basic aspects of climate change, followed by 41.03 per cent of them were with 41 to 60 per cent knowledge, 13.33 per cent of them had 0 to 20 per cent of knowledge about basic aspects of climate change. It was shocking to note that only one postgraduate woman research scholar (0.51 per cent) had more than 60 per cent of knowledge regarding basic aspects of climate change, while none of them were will excellent means above 80 per cent of the knowledge about general and basic aspects of climate change. The result indicates that there was substandard knowledge of majority of the postgraduate woman research scholars about general and basic aspects of climate change.

Knowledge regarding Green House Gases (GHGs) towards climate change

It is observable from Table 1 that slightly less than (45.64 per cent) of the postgraduate woman research scholar respondents had 41 to 60 per cent of knowledge regarding GHGs, followed by 40.00 per cent of them were with 21 to 40 per cent of knowledge, 12.31 per cent of them with 0 to 20 per cent and only 4 students are having (2.05 per cent) of them were with 61 to 80 per cent of the knowledge regarding GHGs. It was very alarming to note that none of the postgraduate woman research scholar was with excellent knowledge regarding GHGs.

Knowledge on impact of climate change on agriculture and animal husbandry

The information presented in Table 1 indicates that slightly less than half (48.21 per cent) of the postgraduate woman research scholar had 41 to 60 per cent of knowledge about impact climate change on agriculture, followed by 70 (35.90 per cent) of them were with 21 to 40 per cent of knowledge and 12.82 per cent of them were with up to 20 per cent of knowledge about impact of climate change on agriculture. It was seen that 3.07 per cent of the postgraduate woman researchers were with respectable level of knowledge about impact of climate change on agriculture, however it was very discouraging to observe that knowledge regarding impact of climate change on agriculture. The result indicates there is an urgent need to sensitize the postgraduate woman researchers towards agricultural problems caused by climate change.

Knowledge on control measures to minimize climate change impacts through power saving techniques

The power is one of the major inputs for industrial growth and development. In India power consumption has been increased in these days. The inconsiderate consumption of power has created big role in creating climate change problem. To overcome this situation there is a need to proper utilization of power without waste. In the study this section includes various questions related to power usage and it's saving to measure the knowledge towards power consumption and its saving. The data collected from researchers are presented in the Table 1. It can be seen that slightly less than half (46.66 per cent) of them had 21 to 40 per cent of knowledge about power and it's saving, followed by 70 (35.90

per cent) of them had 41 to 60 per cent of knowledge and 27 (13.85 per cent) of them had only up to 21 per cent of the knowledge regarding power consumption and usage. It was observed from the table that only 3.59 per cent of the postgraduate woman research scholars were with respectable knowledge regarding power consumption and it's saving, surprisingly none of them was with outstanding knowledge about saving and consumption of power. It might be due Gujarat state being sufficient power production state to meet the daily requirements of the people young research scholar citizens have not realized need to create awareness about saving and consumption of power. However considering serious role of disorganized consumptions of power in creating climate change, there is a need to save power by its systematic consumption, there is need to educate the researchers on this aspect.

Overall knowledge about climate change issues among the postgraduate woman research scholars

The data presented in Table 2 indicate that slightly more than half (51.29 per cent) of the postgraduate woman research scholars had average level of knowledge regarding various aspects related to climate change, followed by 38.46 per cent of them were with stumpy knowledge and 9.74 per cent of them were with deprived knowledge regarding climate change. It was very unfortunate to note that only one (0.51 per cent) postgraduate woman research scholar was with excellent level and none of them was with superior degree of knowledge regarding various aspects related to climate change.

The results of knowledge related all the tables indicate that there is an urgent need to motivate the postgraduate woman research scholars studying in SAUs of Gujarat to utilize the available facilities more effectively to update their knowledge regarding climate change for the proficient adaptation and mitigation of climate change problems through research.

Relationship of the knowledge of the postgraduate woman research scholars about climate change with their profile

The data shown in Table 3 clearly demonstrate that in case of personal characteristics like age, education and professional zeal were observed positively significant with level of knowledge of the postgraduate woman research scholars about climate change issues. When increase in the age, education and professional zeal (publications of articles and attending the seminars or workshops in related with the climate change) leads to increase the climate change knowledge among the post graduate women research scholars. From the results of Table 3 it can be concluded that the postgraduate woman research scholars who were interested to perceive doctoral degree for feature career are more interested to develop their professional zeal and they are more experience in terms of age, education and professional zeal were more knowledgeable about climate change issues.

The data demonstrated in Table 3 clearly explain that in case of communicational characteristics, internet exposure observed positively significant with level of knowledge of the postgraduate woman research scholars about climate change issues. From the analysis it can be concluded that the postgraduate woman research scholars with high level of internet exposure were more knowledgeable about climate change issues. In these days internet is the one of the important channel to learn by accessing the information across the world sitting at home. In the Table 3 relationship between psychological variables with the climate change knowledge clearly indicates that attitude towards IPM was observed positively significant with level of knowledge of the postgraduate woman research scholars about climate change issues. From the results it can be concluded that the postgraduate woman research scholars with positive attitude towards eco-friendly agricultural technique of plant protection like IPM were more knowledge about climate change issues.

From the Table 3 social variables and economic variables are insignificantly related with level of knowledge of women research scholars. It can be concluded that

irrespective in the level of involvement in extracurricular activities, father's education and mother's education are not related with the knowledge climate change issues postgraduate woman research scholars with irrespective levels of their economic condition were more or less similar in knowledge about climate change issues.

From the Table 3 social variables and economic variables are insignificantly related with level of knowledge of women research scholars. From the table it can be concluded that irrespective of the research scholar's level of involvement in extracurricular activities, father's education, mother's education economic condition like family income and father's occupation are not related with the knowledge climate change issues. Irrespective of the level of involvement in extracurricular activities, father's education, mother's education family income and father's occupation the climate change knowledge of women research scholars is same.

Table: 1 Postgraduate woman research scholars according to climate change related sub aspect wise overall knowledge n=195

Sl. No.	Degree of Knowledge	Respondents as per knowledge of various aspects of CC issues			
		General & Basic aspects of CC	Greenhouse Gases related	Impact on Agriculture	Control measures with Power saving techniques
1	0 to 20 %	26 (13.33 %)	24 (12.31 %)	25 (12.82 %)	27 (13.85 %)
2	21 to 40 %	88 (45.13 %)	78(40.00 %)	70 (35.90 %)	91 (46.66 %)
3	41 to 60 %	80 (41.03 %)	89(45.64 %)	94 (48.21 %)	70 (35.90 %)
4	61 to 80 %	01(00.51 %)	04 (02.05 %)	06 (03.07 %)	07 (03.59 %)
5	Above 80 %	00 (00.00 %)	00 (00.00 %)	00(00.00 %)	00 (00.00 %)
Total		195 (100.00)	**195 (100.00)**	**195 (100.00)**	**195 (100.00)**

Table: 2 Respondents according to level of overall knowledge about towards climate change n=195

Sl. No	Overall knowledge level of respondents to CC	Number	Per cent
1	Poor (up to 20 per cent)	19	09.74
2	Low (21 to 40 per cent)	75	38.46
3	Average (41 to 60 per cent)	100	51.29
4	Good (61 to 80 per cent)	00	00.00
5	High (above 80 per cent)	01	00.51
Total		**195**	**100.00**

Table: 3 Association between profile of the postgraduate woman research scholars and their level of knowledge towards climate change issues n = 195

No	Variables	Correlation coefficient (r)
A.	**Personal variables**	
1	Age	0.230*
2	Education	0.310**
3	Academic performance	0.010^{NS}
4	Native place	-0.050^{NS}
5	Languages known	-0.020^{NS}
6	Professional zeal	0.130*
B.	**Social variables**	
7	Involvement in extracurricular activities	-0.040^{NS}
8	Father's Education	-0.050^{NS}
9	Mother's education	0.080^{NS}
C.	**Communication variables**	
10	Information collection habit	0.040^{NS}
11	Library exposure	0.040^{NS}
12	Internet exposure	0.150*
D.	**Economic variables**	
13	Family income	0.030^{NS}
14	Father occupation	-0.030^{NS}
E.	**Psychological variables**	
15	Scientific orientation	0.030^{NS}
16	Innovation proneness	0.050^{NS}
17	Self confidence	0.100^{NS}
18	Attitude Towards IPM	0.150**

*Significant at 0.05 level of probability ** Significant at 0.01 level of probability

CONCLUSION

During the study it was observed that knowledge of the postgraduate woman research scholars across all the aspects of climate change was not encouraging. From the research findings it is observed that an average women research scholars having 41 to 60 per cent of knowledge across the four different concepts of climate change issues like general aspects of climate change, knowledge towards Green House Gases (GHGs), impact of climate change on agriculture and animal husbandry, measures to be taken to minimize climate change impacts through power saving techniques. It was shocking to note that level of knowledge of postgraduate woman research scholars was underprivileged in case of impact of climate change on agriculture even though the students are perusing their postgraduate degree in agricultural universities. It was expected that postgraduate research scholars perusing higher research based education in agriculture and allied fields should have proper knowledge on adverse effect of climate change on agriculture.

Agricultural women research scholars are the feature leaders of extension workers to train the farm women towards adoption and mitigation of climate change issues. Because of this SAUs should train the postgraduate woman research scholars to participate the seminars, workshops or training programs by utilize the internet services available in the university campuses for the developing of positive attitude towards climate smart technologies that leads to increase the knowledge of the women research scholars towards climate change issues. These

knowledgeable women research scholars can educate the farm women for the adoption and mitigation of climate change problems.

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