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Role of women in decision making and adoption of climate smart agricultural practices (CSAPs)

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Abstract

Climate-smart agriculture (CSA) has a significant role to play in for women in agriculture. A targeted approach to address this can be useful in developing a women-responsive climatic risk management plan focused on reducing their labour burden in agriculture, especially in areas with high climate risks. The paper therefore presents a top-down approach to identify potential labour-saving CSA technologies for women farmers in areas facing high climate risks. To understand the role of women in agricultural activities to identify the suitable CSA options for reducing the levels of labour drudgery it often involves mapping women in agriculture, climate risks, and poverty hotspots. The study is illustrated for India where feminization of agriculture is rapidly increasing, a high level of climatic risks persists, and adaptive capacity to climate change is very low, especially among women farmers involved in agriculture.

This paper examines women farmers in terms of their ability to adopt mitigation and adaptation technologies in response to climate smart agriculture. The CGIAR research program on Climate Change, Agriculture and Food Security (CCAFS) has been introducing/promoting climate smart agricultural practices (CSAPs) in many States in India since 2010. Women play a crucial role in agricultural decision making. In India agriculture is becoming increasingly feminized due to male outmigration. Landholdings are small. We found that readiness to adopt CSAPs is higher in certain districts. Irrespective of the gender of the household head larger size of land holding had a positive association with the likelihood to adopt CSAPs. Discussions with women farmers provided a list of more than 15 CSA interventions with labour reduction as well as yield-improving potential. If we consider the local crop, social conditions, agro-climate, women's participation in different agricultural activities, CSA technologies and practices such as direct seeded rice (zero tillage and low tillage using machine), green manuring (GM), laser land levelling (LLL), and system of rice intensification (SRI) were found to potentially reduce women's drudgery in agriculture along with improvement in productivity and farm income.

Keywords: Climate smart agriculture practices (CSAPs), women farmers, India, agriculture and food security (CCAFS)

Introduction

The climate of our country India is being dominated by monsoon season, which is also being regarded as the most important season providing 80% or more than rainfall in India (Bagla 2006) [1]. The monsoon in India is regarded as the most productive season for Indian agriculture on earth. But from few decades the climate change shows the negative impact on Indian Agriculture. Climate change is affecting India in huge way and its impact are many and sievere irregular monsoons, changes in agricultural zones, spread of tropical diseases, increase in sea level, floods, drought, unavailability of fresh water, heat waves, storms, hurricanes etc. The concept of climate smart agriculture (CSA) was introduced by Food and Agriculture organization (FAO) in 2010 Hauge conference on food security Agriculture and climate change.

Women play a pivotal role in remodelling agricultural productivity and food security in the farming communities (Agarwal 2013; Aly and Shields 2010) [3, 4]. The Role of Women's entanglement in agriculture and their contributions to food security has been universally recognized in the developing countries. In the last few decades, women's involvement, access to productive resources, and decision-making roles in agriculture and allied sectors has been the focus areas of research and development in the global south. Social, economical, and gender dimensions in agriculture reveals a clear cut linkage within the three aforesaid dimension. (Peterman *et al.* 2014; FAO 2010a) [7, 8]. Agriculture is one of the most accessible sectors to climate change impacts.

Due to climate impacts women are more affected in agriculture as compare to men especially in the developing countries where their entanglement in agriculture is high (Goldsmith *et al.* 2013; Mac Gregor 2010; UNDP 2013)^[9, 10, 11]. Men and women's responsibilities, access to resources, priorities, and services at the community and household levels are responsible for the gender gap in agriculture. (Quisumbing *et al.* 2014; FAO 2011)^[7, 8].

However, the labor-intensive roles that women play in agriculture from sowing, weeding, to harvesting also determines the nature and severity of climate change impacts they face. Climate change impacts such as decreasing supply of crop residues and biomass for energy and livestock feed, increasing severity of weeds, crop resowing/ transplanting requirement, and loss of crop yields are likely to affect women more, given their involvement in related activities (Bradshaw and Linneker 2017; Nelson and Huyer 2016)^[12, 13]. Thus, there is a need to understand climate change impacts on women based not just on their social, cultural, and economic characteristics but also their role and responsibilities in specific agricultural activities (Nightingale 2011; Morton 2007)^[14, 15].

The climate-smart agriculture (CSA) is an approach that seeks solutions for improving agricultural productivity, build resilient food production systems, and reduce greenhouse gas emissions (FAO 2010b; Steenwerth *et al.* 2014)^[16, 17]. CSA includes a range of technologies, practices, and services to minimize the impact of climate change in agriculture. Improving women's access to productive resources, capacity building, finance and knowledge, promoting off-farm employment, which can empower them to adapt to a changing climate.

43% of the labour force globally in climate smart agriculture is of women, and in India, 79% of rural women are engaged in climate smart agriculture as compared to only 63% of rural men. Yet, what picture comes to your mind when you think of agriculture and a farmer in India? Invariably of a man. The underappreciated role of women in agriculture over the decades has resulted in women not having access to resources knowledge, land, and finances. They usually take decisions regarding agriculture- what to grow, how to grow and when and where to sell and then women usually carryout manual jobs in their land – sowing, weeding, harvesting, threshing, cleaning and making bundles.

Our work with empowering women in agriculture made us realize women in the farming households are key to bring in the shift in existing agricultural practices to balance the need for cash income and securing food security and nutrition of the family. In our Women led Resilient Farming Model we have transformed women to become decision-makers in agriculture, revive traditional farming practices and address multipronged challenges of climate uncertainties. However, why women? Men are classically inclined to earn money for his family while women are more concerned about the food security, health, and nutrition of the family. So, their awareness of the realities of the kitchen helps them to decide what to grow in the farm ensuring food security in times of climatic stress. As mothers, women are inherently protective about the health and nutrition of their children and family and are more inclined towards chemical less farming.

What are components of Climate Smart Agriculture?

1. Productivity: CSA sustainably aims to increase the productivity and also the income from crop, livestock and

fish without having any negative impact on the environment.

- 2. Adaptation:** It is regarded as the principal way to deal with the effect of climate change. It has been shown well planned and early adaptation action saves money and lives later.
- 3. Mitigation:** It means implementing policies to reduce green house gases emission and to enhance sinks. Climate smart Agriculture should help to reduce or remove green house gas emission.

Why Climate Smart Agriculture is needed (CSA)?

As per FAO estimate, by the year 2050 the world population will be increased by one third and food required by food security by 60%. Agriculture has become a high risk profession farmer preferable refers to migrate. In India as per National Sample survey 2005 about 60% of farmers migrate to leave farming. There are already active programmes plans missions but they need to happen at bottom level and hence despite of their existence we need to start with CSA at bottom level. Majority of the women farmers are now being literate and capable of accepting new ideas so it is the local level development administration. They are capable of implementing climate smart agriculture. For environmental concern in situation of global warming with increasing emission of green house gases and non willingness of lead players to provide curb agriculture offers a way to mitigation. Through its single photosynthetic process, agriculture absorbs CO₂ from atmosphere and releases oxygen. There is no such technology which can do this. With increased productivity, increased in area under agriculture and multiple cropping world can reduce CO₂ from atmosphere and release oxygen at the same time provide sustainable livelihood and food security to hungry millions.

Current Indian Scenario

1. No significant change in monsoon rainfall at all Indian level, some regional variations is noticed.
2. Increased in surface air temperature by 0.510 during 1901-2007 accelerated warming during 1971-2009
3. Sea level rise in Indian Ocean 1.63mm/year during 1993-2009.

Review of literature

1. Concept of climate smart agriculture

FAO (2013) Climate Smart Agriculture is an integral approach which sustainably increases productivity, enhances resilience (adaptation), reduces/removes GHSs (mitigation) where possibly, and enhances achievements of national food security and development goals.

Lipper *et al.* (2014)^[19] CSA is an approach for transforming and reorienting agriculture development under the new realities of Climate Change.

2. Concept of adoption

Munang *et al.* (2017)^[20] that use of natural capital by the women farmers to adopt to climate change impact which also have multiple co benefits for mitigation protection of livelihood and poverty alleviation.

3. Socio economic and communication profile of the respondent

Age

Shelat N.K. (2014)^[21] revealed that 48% of the respondents

are of old age group followed by 32% of middle age group and rest 20% of young age group.

Singh B. (2017) ^[22] revealed 17.5% responded young age group followed by 64.20% in adult age group and 18.30% of old age group.

Education

Singh (2011) ^[23] revealed 67.5% of respondent found to be illiterate whereas 17.5 13.3 and 1.7% had primary middle and secondary level of education.

Chandawat *et al* (2014) ^[24] found that majority 21.0% respondent were educated upto secondary level and 20% illiterate and 36% were educated up to primary level.

Other Countries Background on CSA

A larger population of households around the world are affected with poverty and most of them depend on small-scale farming for their daily living. Small-scale farming is known for its ability to sustain families through food production as well as source of income through manual labour in the farms. However, the major challenges that faces the developed world is lack of land or inability to access land due to poverty or cultural barriers. According to World Bank (2015) ^[25], many places in India have experienced climate change like any other countries around the world. This change has led to scarcity of resources like water and food shortages until late 1990s. As results the country has tried to implement, some CSA technologies as way of mitigating and adapting to climate change. Due to increase of greenhouse gases, the climate has become unstable and there is no longer consistence when it comes to climate weather patterns. However according to the research by Yu *et al* (2011) ^[26], indicated that in India greenhouse gas emission is low as compare to other countries. They further indicated that these gases were from livestock manures, usage of land and forestry activities. India being a country that relies on rains for agriculture, the impact of climate change has caused many of the smallholder women farmers to be affected on food provisions to their families. Prolong drought has affected both the arid and semi-arid areas with the country leading to food shortages. The country has experience floods, mud slides and erratic rains that have cause so many destruction in the agriculture sectors leading to losses of crops. The government is implementing policies in order to help farmers to have accessibility to land for farming. Furthermore, women farmers have been organized in community-based cooperatives so as they can have accessibility to information such as weekly forecast on weather while at the same time being able to help each other in adoptions of CSA technologies. One of the actions that is required to ensure CSA is implemented is the formulation of policies and frameworks to ensure there is gender equality in land ownerships and that there is a clear guidance on agricultural practices that are favourable to the ecosystem. This strategy has shown a dramatic change in the rates at which CSA technologies are adopted by the farmers in general (Thornton & Herrero 2014) ^[27]. Furthermore, the Government is implementing CSA technologies to help the women farmers to produce food in a commercial system. The technologies are planting hybrid that provides farmers with seeds that can withstand the climate, soil conservation to address the infertility problem that is caused by soil erosion. In addition, there is also implementation of crop rotation and intercropping to boost the food production at the same time improves soil

fertility. Research has shown that the smallholder's women farmers in India have been able to implement the CSA technologies due to accessibility of infrastructures, credit facilities and input services. As results there has been a lot of empowerment to the women farmers on these new technologies.

Material and Method

A research methodology is always necessary in every research since it states on the different methods that the researcher used in collecting and analyzing the data.

Method: A research design is a mode in which it helps the researcher to achieve the research objectives. It can be defined as a means for a study and the plan by which the research is to be executed.

Population: Population may be categorized in terms of gender, age, geographical location or any other common characteristic.

Target Population: Target population was made up of all potential participants that could be used for study purposes In this research target populations consisted of single women, women from male headed households, women from female-headed households and because the research focuses on female smallholders.

Sample size: Sampling to be a procedure that a researcher uses to gather people, places or things in order to study. It is a way of selecting a portion of population so as to draw some conclusion about the entire population.

In this study the data collected is analyzed and discussed in details. There were focus group discussion (FGD) were conducted. In each district there were two FGD in which one was for men and the other women. The main purpose of FGD was to get opinions and information about the adoption of CSA technology among the female small holder's farmers in district. By using FGD, it would be able to get the exact information regarding the role of women farmers in adoption of CSA technologies. Research indicates that FGD are normally used to enhance the validity of data since it encourages faces to face interactions with the respondents.

Result and Discussion

Adoption of CSA technologies from the research the researcher started by finding out how many of the women farmers are adopting and practicing CSA technology. On the basis of interview and survey conducted which included both women farmers and men with 65% and 33% respectively stating that they were aware of the CSA technologies. This results showed that a number of the farmers have heard about CSA technologies in one way or another. Only 1.67% of the farmers interviewed has no clear understanding of what the CSA technologies was all about. In a further analysis, 26.67% of the total interviewed farmers were female who stated that they are not practicing CSA technologies while 36.67% of the women farmers are practicing. This analysis is important since it helped to understand the role and adoption of climate smart technologies among female smallholder's women farmers in the area.

Most of the female farmers indicated that they played a major role by creating awareness among other farm women in adoption of CSA technologies in their area like Zero tillage,

mulching, planting of improved and short duration varieties, use of such type of varieties which are resistant to flood, drought, salinity and high temperature stress moreover adoption of some other CSA technologies like pit planting, crop diversification, box ridges agroforestry so as to combat losses in agriculture production due to sudden climatic change at global level.

However it was clear that 38% of the female farmers were not aware about rainwater harvesting and only 3% of women farmers were practicing it.

The community members indicated that most of the female adopters have adopted multiple technologies given that they are complementary and that the women farmers have the ability to handle them all together. Common CSA technologies in the area include mulching, zero tillage, pit planting, box ridges, agroforestry and manure making. Women farmers are implementing the first three technologies to counter the impact of prolonged dry spell although on secondary basis the technologies enhance soil fertility. Box ridges are a means of controlling erosion while enhancing water infiltration in the soil. Agroforestry (especially fertilizer trees) and manure making are primarily for fertility enhancement although they can equally play other vital roles like minimizing evapo transpiration and controlling soil erosion.

Furthermore, the women farmers stated that there are reasons for adoption and practicing the underlined CSA technologies to be as follow:

- Mulching:** holds soil moisture, increases soil fertility and high productivity on a small piece of land.
- Pit planting:** It harvests water to hold soil moisture even if the rains stop coming.
- Crop diversification:** high productivity because if one crop does not grow well, other crops can grow well.
- Box ridges** also hold soil moisture.
- Planting hybrid:** crops mature early and the crops are strong compared to local crops.
- Irrigation:** surplus food. The women said that some of them belong to a farmer club where they use treadle pumps and watering canes for irrigating their crops.

The female farmers ranked the CSA technologies on the basis of adoption and use in their farms in the order of importance as follow: (1st) Mulching; (2nd) pit planting; (3rd) box ridges; (4th) planting hybrid; (6th) Irrigation; (7th) agroforestry; (8th) crop diversification.

Discussion

Farmers to adopt agriculture technologies, it all depends on land availability and economic status of the farmer as revealed by the research work carried out. This is because CSA technologies may require a large portion of land for it to be effective while at the same time it needs huge capital for the inputs (Chirwa 2004) [28]. From the research, it was clearly indicated that some CSA technologies were preferred as compared to others. The most commons technologies were mulching, zero tillage, crop diversification, agroforestry, pit planting, intercropping and crop rotation. Similar finding were obtained by Mc Carthy *et al* (2011) [29]. These technologies were preferable because they were consider to holding moistures and improving soil fertility. A good example is agroforestry that the women farmers stated helps in mitigating the effects of climate change. The farmers

indicated that these technologies help them to counter the effects of climate change such as early cessation of rains, prolonged dry spell and soil erosion.

Conclusion

From the entire research the following points were concluded

- Training, education and empowerment should be given a key priority by the government and its agency to ensure more and more women farmers get enlighten on the CSA technologies which will play a crucial role for women's in decision making and adoption of CSA practices and hence, it will help the female smallholder farmers to adopt more CSA technologies
- Financial support to the women farmers so that they can easily adopt CSA technologies.
- It is evident that a lot of research should be carried out concerning CSA technologies and smallholder farmers. Respective authorities should encourage research to enhance accurate information to be available.
- Based on this study there is a need of provision of education to the farmers so that, farmers can understand and get more knowledge on CSA technologies such as rain water harvesting, pit planting and other types of CSA technologies. The respective authorities should create a public website where farmers can receive information concerning these technologies.

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