ACADEMIC INN INTERNATIONAL

ISSN NO : 2523-1189

Journal of AGRICULTURAL AND RURAL RESEARCH

open access

CLIMATE-SMART AGRICULTURE PROMOTING SUSTAINABLE AGRICULTURE IN BANGLADESH

Md. Shariful Islam, Md. Shahriar Kabir, A K M Kanak Pervez

To cite the article: Md. Shariful Islam[1], Md. Shahriar Kabir[1], A K M Kanak Pervez[2*], CLIMATE-SMART AGRICULTURE PROMOTING SUSTAINABLE AGRICULTURE IN BANGLADESH, *Journal of Agricultural and Rural Research*, 7(1), 1-7.

Link to this article:
http://aiipub.com/journals/jarr-230514-10074/

Article QR

Journal QR

CLIMATE-SMART AGRICULTURE PROMOTING SUSTAINABLE AGRICULTURE IN BANGLADESH

Md. Shariful Islam[1], Md. Shahriar Kabir[2], A K M Kanak Pervez[2*]
Corresponding Author's Email: kp@ru.ac.bd

ARTICLE INFO
Article Type: Research
Received: 02 Jan. 2023.
Accepted: 16 Mar. 2023.
Published: 16 Mar. 2023.

Keywords:
Agricultural Extension; Rural; Bangladesh; Sustainable Agriculture

ABSTRACT
Climate change is a significant threat to Bangladesh's agricultural production and food security, so promoting sustainable agriculture through climate-smart techniques is essential. This study will analyze the state of climate-smart agricultural practices in Bangladesh and offer suggestions for scaling up practical CSA projects. Climate-smart agriculture (CSA) aims to boost agricultural output, foster climate change resilience, and cut greenhouse gas emissions. It focuses on supporting methods that lower emissions from agriculture, such as integrated pest management, conservation agriculture, and using renewable energy in agriculture. Sustainable agriculture is a comprehensive method of farming that seeks to increase output while reducing harm to the environment and society. It involves soil health management, water conservation, biodiversity preservation, social fairness and inclusivity. Agroforestry, crop diversification, organic farming, and climate-smart agriculture are critical for Bangladesh's sustainable agriculture. CSA methods can increase agriculture's resistance to climate change while boosting output and halting environmental damage. Climate-smart agriculture is essential for advancing sustainable agriculture in Bangladesh and requires supportive policies, institutional frameworks, and financial mechanisms to encourage and facilitate farmers' adoption of CSA methods.

1. Introduction

Climate change is one of the most critical issues facing the world today, significantly impacting food production and consumption, access, and stability of food security pillars. Bangladesh, a country with a large population and a significant reliance on agriculture, is particularly susceptible to the negative consequences of climate change. As a result, the nation's agricultural production and food security are seriously threatened by rising temperatures, irregular rainfall, and extreme weather events. As a result, it is essential to promote sustainable agriculture through climate-smart techniques to ensure food security and boost resilience to the effects of climate change.

Climate-smart agriculture (CSA) aims to boost agricultural output, foster climate resilience, and reduce greenhouse gas emissions. CSA encourages sustainable farming methods that boost output, improve farmers' capacity for adaptation, and lessen the susceptibility of agricultural systems to

[1] Planning Monitoring Evaluation and Learning Lead, Cordaid, Bangladesh
[2] Dept. of Agronomy and Agricultural Extension
University of Rajshahi, Rajshahi-6205, Bangladesh

climate change (Sharp et al. 2002). This strategy supports the Sustainable Development Goals (SDGs) and promotes climate change mitigation, food security, and poverty reduction (Pervez et al. 2017).

Through several programs, the government, non-governmental organizations, private sectors and development partners have worked to promote climate-smart agriculture in Bangladesh (Pervez et al. 2015). However, to achieve significant impacts on food security and climate change resilience, it is necessary to scale up successful efforts and expedite the implementation of CSA technologies and practices. To promote sustainable agriculture, this study will analyze the state of climate-smart agricultural technologies and practices in Bangladesh, identify possibilities and difficulties, and offer suggestions for scaling up practical CSA projects. The paper is based on current research on CSA in Bangladesh, including reports from non-governmental groups, scholarly articles, and government initiatives.

Methodology

This article is based on a study of previous studies on climate-smart agriculture (CSA) and sustainable agriculture in Bangladesh that were published in peer-reviewed journals, papers, and policy documents. Academic databases, including Scopus, Web of Science, and Google Scholar were used for the literature search. "Climate-smart agriculture," "sustainable agriculture," "Bangladesh," and "agricultural practices" were among the search terms utilized.

Climate-Smart Agriculture (CSA)

Climate-Smart Agriculture (CSA) aims to boost agricultural output, foster climate change resilience, and cut greenhouse gas emissions. The three fundamental pillars of CSA activities are increasing productivity and revenue, building adaptive ability, and lowering greenhouse gas emissions (FAO, 2010).

Promoting eco-friendly methods of managing land and water, enhancing crop and animal management, and assisting market-driven agriculture are all necessary for raising productivity and profitability. By implementing various techniques like crop diversification, water and soil conservation, and agroforestry, farmers and farming systems can better adapt to the effects of climate change. Promoting techniques that lower agricultural emissions, such as conservation agriculture, integrated pest management, and using renewable energy in agriculture, is one way to reduce greenhouse gas emissions.

Different agroecological zones in Bangladesh are favourable for several CSA methods. For instance, conservation agriculture has been encouraged in the drylands of northern Bangladesh to enhance soil health, water retention, and crop yield. It entails minimal tillage, soil cover, and crop rotation (Kabir et al., 2016). To boost resilience to cyclones, salinity intrusion, and sea-level rise, agroforestry, which involves incorporating trees into farming systems, has been advocated in coastal areas (Akhter et al., 2017).

Scaling up practical projects is difficult, even though CSA methods positively boost agricultural productivity and climate change resilience. Several obstacles must be overcome, such as insufficient legislative support, restricted access to financing and technology, and insufficient knowledge and expertise among farmers (Hossain et al., 2019).

Pillars of CSA

Climate-Smart Agriculture (CSA) aims to boost agricultural output, foster climate change resilience, and cut greenhouse gas emissions. The three primary elements of this strategy are as follows:

- Enhancing crop and livestock management, fostering market-oriented agriculture, and encouraging sustainable land and water management methods are the main objectives of this pillar's efforts to increase productivity and income. The objective is to raise agricultural income and productivity while fostering sustainability and lowering greenhouse gas emissions.
- Increasing adaptive capacity: This pillar aims to increase the capability of agricultural systems and farmers to adjust to the effects of climate change. This can be done by implementing agricultural diversification, water and soil conservation, and agroforestry. The objective is to make agricultural systems more resilient to climate change and less vulnerable to its effects.
- Reducing greenhouse gas emissions: This pillar concentrates on supporting methods that lower emissions from agriculture, like integrated pest management, conservation agriculture, and using renewable energy in agriculture. The objective is to increase efforts to mitigate climate change while reducing agriculture's contribution to greenhouse gas emissions.

Different agroecological zones in Bangladesh have been shown to be favourable for several CSA methods. For instance, conservation agriculture has been encouraged in the drylands of northern Bangladesh to enhance soil health, water retention, and crop yield. It entails minimal tillage, soil cover, and crop rotation (Kabir et al., 2016). To boost resilience to cyclones, salinity intrusion, and sea-level rise, agroforestry, which involves incorporating trees into farming systems, has been advocated in coastal areas (Akhter et al., 2017;).

Sustainable Agriculture

Sustainable agriculture is a comprehensive method of farming that seeks to increase output while reducing harm to the environment and society. It entails using agricultural methods that support social fairness, water conservation, biodiversity preservation, and soil health. In Bangladesh, sustainable agriculture is essential for ensuring food security, eradicating poverty and maintaining the environment (Islam et al. 2013).

Soil health management is a crucial aspect of sustainable agriculture. First, encourage soil health and fertility; this requires using techniques like minimal tillage, crop rotation, intercropping, and cover crops. These techniques enhance soil quality, lessen erosion, and improve water retention and soil carbon sequestration.

Given Bangladesh's susceptibility to flooding and droughts, water conservation is another crucial component of sustainable agriculture in Bangladesh. Therefore, farmers are urged to implement water-saving techniques like drip irrigation, rainwater collection, and adequate crop watering. Not only do these methods consume less water, but they also increase crop productivity and lessen sensitivity to climate change.

Another crucial component of sustainable agriculture in Bangladesh is the preservation of biodiversity. The nation has many plant and animal species crucial for food production and human subsistence. Crop diversification, integrated pest management, and other sustainable agricultural techniques can increase crop output, reduce the use of dangerous pesticides, and support biodiversity conservation.

Finally, social fairness and inclusivity are essential to Bangladesh's sustainable agriculture. Social, economic, and cultural barriers frequently prevent women and smallholder farmers from obtaining the services and resources necessary for sustainable agriculture. Initiatives for sustainable agriculture that

are inclusive and gender-sensitive can help remove these obstacles and advance more just and sustainable farming systems.

Sustainable Agricultural Practices in Bangladesh

In Bangladesh, ensuring food security, lowering poverty, and protecting the environment depends on sustainable agricultural techniques. The following are some instances of sustainable farming methods that the nation can support:

To control pests and diseases, a variety of techniques are used, such as crop rotation, the use of resistant varieties, biological control, and a reduction in the use of synthetic pesticides. While preserving crop production, integrated pest management can help lessen the detrimental effects of pesticides on human health and the environment (Khatun et al., 2018).

Conservation agriculture combines techniques that encourage little soil disturbance, crop rotation, and soil cover to enhance soil health, increase water retention, and lessen erosion. As a result, reduced greenhouse gas emissions and adverse effects of intensive tillage on soil health can be achieved through conservation agriculture (Kabir et al., 2016).

Agroforestry is the practice of incorporating trees into farming systems to boost biodiversity, soil fertility, and climate change resilience. In addition, by creating non-timber forest products, agroforestry can offer other income sources (Akhter et al., 2017).

Crop diversification: To lower the risk of crop failure and boost resilience to climate change, a range of crops are grown on a single field or across multiple fields. Additionally, crop variety can offer farmers and their families a diet that is more wholesome and well-balanced (Akter & Juraimi, 2019).

Natural inputs and methods are used in organic farming to preserve crop production and soil health while limiting the use of artificial fertilizers and pesticides. As a result, organic farming can produce healthier, more nutrient-dense crops while reducing the harmful effects of synthetic inputs on the environment and human health (Khatun et al., 2017).

Several efforts have been started in Bangladesh to promote sustainable agriculture methods. For instance, the Department of Agricultural Extension's Integrated Pest Management Program has instructed thousands of farmers to use natural pest management techniques (Khatun et al., 2018). Similarly, the Food and Agricultural Organization's Sustainable Agriculture and Rural Development Program has encouraged agroforestry and conservation agriculture methods in several parts of the nation (FAO, 2013).

Role of Climate-Smart Agriculture for Sustainable Agriculture in Bangladesh

The promotion of sustainable agriculture in Bangladesh is greatly aided by climate-smart agriculture (CSA). CSA technologies and practices can increase agriculture's resistance to the effects of climate change while boosting output and halting environmental damage. Here are some instances of the CSA's contribution to Bangladesh's sustainable agriculture:

Crop varieties more tolerant of climatic extremes like drought, floods, and salinity are developed and used as part of CSA. This can lower the likelihood of crop failure, boost food security, and maintain crop production in the face of changing climatic conditions (Rahman et al., 2019).

Water use efficiency: CSA techniques like drip irrigation and water harvesting can assist farmers in maximizing water use and minimizing water waste. This is crucial in Bangladesh, where water scarcity and flooding provide significant agricultural issues (Akter & Juraimi, 2019).

Improved soil health: CSA techniques, including organic farming, agroforestry, and conservation agriculture, can help boost soil carbon sequestration, prevent soil erosion, and promote soil health.

This can increase agriculture's adaptability to climate change while boosting long-term productivity (Kabir et al., 2016).

Climate-smart livestock management can also involve techniques that enhance animal control to lower greenhouse gas emissions and boost output. For instance, better feeding and breeding procedures, manure management, and using renewable energy can lessen the impact of livestock production on the environment (Khatun et al., 2017).

Access to timely, reliable meteorological and climate information is essential for CSA activities to make knowledgeable crop management decisions. Through its network of meteorological stations and cell phone services, the Bangladesh Meteorological Department offers weather and climatic information to farmers (Akter & Juraimi, 2019).

To encourage CSA practices, several initiatives have been started in Bangladesh. For instance, the World Bank-funded Climate-Resilient Agriculture and Food Security Project has aided in the creation and spread of climate-resilient crop types and the implementation of CSA practices in a number of the country's areas (World Bank, 2021). Similarly, farmers have received training and assistance from the USAID-funded Agro-Inputs Project to enhance soil health, water management, and climate-resilient crop types (USAID, 2021).

Conclusion and Policy Implication

In summary, climate-smart agriculture is vital for advancing sustainable agriculture in Bangladesh. It can assist in increasing agriculture's resistance to the effects of climate change while boosting output, halting environmental damage, and boosting food security. Supportive policies, institutional frameworks, and financial mechanisms are necessary to encourage and facilitate farmers' adoption of CSA methods.

One policy conclusion is the requirement for a supportive policy climate that encourages CSA practices. This could involve the development of policies and regulations that support the dissemination of climate-resilient crop varieties, encourage the adoption of efficient water use practices, promote sustainable soil management practices, and support the development of climate-smart livestock management practices. Another policy aspect is the requirement for awareness- and capacity-building programs to encourage farmers to adopt CSA techniques. To help farmers make educated decisions regarding crop management, this may entail offering training and extension services to farmers on CSA practices. It could also involve disseminating weather and climate information.

Finally, it is critical to remember that CSA is not a solution to all of Bangladesh's agricultural problems. Instead, it is a component of a larger package of tactics and approaches required to advance sustainable agriculture, such as financial support for agricultural R&D, upgrades to rural infrastructure, and the promotion of rural livelihoods.

References

Akhter, M., Khatun, K., Hoque, M. A., & Singh, R. K. (2017). Agroforestry-based livelihoods in the coastal belt of Bangladesh: Status, prospects, and challenges. Journal of Agriculture and Environment for International Development, 111(2), 281-299.

Akter, S., & Juraimi, A. S. (2019). Sustainable agriculture practices in Bangladesh: A review. Environment, Development and Sustainability, 21(1), 155-186.

FAO. (2010). Climate-smart agriculture: Policies, practices, and financing for food security, adaptation, and mitigation. Retrieved from http://www.fao.org/3/i1880e/i1880e00.htm

FAO. (2013). Sustainable agriculture and rural development in Bangladesh. Retrieved from http://www.fao.org/3/a-i3138e.pdf

Hossain, M. A., Kabir, M. H., & Rabbani, M. G. (2019). Climate-smart agriculture practices in Bangladesh: Current status and future prospects. Journal of Agriculture and Environment for International Development, 113(1), 111-125.

Islam, M. R., Rahman, M. M., Pervez, A. K., & Kamaly, M. H. (2013). Perception of extension agents about sustainable agricultural practices in Bangladesh. International Journal of Agricultural Extension, 1(1), 15-19.

Kabir, M. H., Hossain, M. A., & Rabbani, M. G. (2016). Conservation agriculture in Bangladesh: Potential, status, and prospects. Journal of Agriculture and Environment for International Development, 110(2), 209-227.

Khatun, K., Roy, R. N., & Akhter, S. (2017). Sustainable agriculture in Bangladesh: Challenges and opportunities. In H. R. Khan (Ed.), Sustainable agriculture reviews (pp. 1-27). Springer.

Khatun, K., Roy, R. N., Alam, M. J., & Das, B. (2018). Integrated pest management: A sustainable approach for crop protection in Bangladesh. Sustainable Agriculture Reviews,

Ministry of Agriculture. (2019). Climate-smart agriculture in Bangladesh: Progress, challenges, and opportunities. Retrieved from https://moa.gov.bd/sites/default/files/files/moa.gov.bd/publications/Climate-Smart-Agriculture-in-Bangladesh-Progress-Challenges-and-Opportunities.pdf

Pervez, A. K. M. K., Gao, Q., & Uddin, M. E. (2015). Rural women's awareness on indigenous technical knowledge: Case of northern Bangladesh. The Anthropologist, 21(3), 415-426.

Pervez, A. K. M. K., Gao, Q., Zeng, Y., & Uddin, M. E. (2017). Hybrid rice: Bangladesh's failure and China's success. *Journal of Agriculture and Ecology Research International*, *10*(1), 1-10.

Rahman, M. H., Hasan, M. R., & Hasanuzzaman, M. (2019). Climate smart agriculture in Bangladesh: Opportunities and challenges. Journal of Agriculture and Environment for International Development, 113(1), 49-67.

Sharp, J., Imerman, E., & Peters, G. (2002). Community supported agriculture (CSA): Building community among farmers and non-farmers. The Journal of Extension, 40(3), 6.

USAID. (2021). Agro-Inputs Project. Retrieved from https://www.usaid.gov/bangladesh/fact-sheets/agro-inputs-project

World Bank. (2021). Climate-Resilient Agriculture and Food Security Project. Retrieved from https://projects.worldbank.org/en/projects-