GLOBAL JOURNAL OF AGRICULTURAL AND ALLIED SCIENCES (2024) VOL 5, S1, PAGES 17-18

EXTENDED ABSTRACT
NAPA 2024 Conference Special Issue

Climate-Smart Agricultural (CSA) Practices in Nepal: A Review of Adaptation and Mitigation Strategies

Manita Thapa * ***and Sudarshan Adhikari***

Department of Agricultural Communication, Education, and Leadership, The Ohio State University, USA

Abstract history:
Received: May 14, 2024
Revised: October 20, 2024
Accepted: December 29, 2024

Keywords: Adaptation, Barriers, CSA, Mitigation

Climate change poses a significant threat to Nepal's agricultural sector, which is the backbone of the nation's economy. The rural communities engaged in subsistence-level farming in Nepal experience significant consequences, particularly in rain-fed agriculture, due to the impacts of climate change. Alterations in farming schedules, diminished water supply, increased cost of irrigation, and an elevated prevalence of pests and diseases, all contribute to a decline in agricultural output. Tackling climate change and its consequences necessitates the adoption of Climate-Smart Agricultural (CSA) practices. While studies on CSA exist, they often provide smart practices separately rather than in a comprehensive resource. A knowledge gap exists in identifying CSA practices, assessing their suitability for specific climatic events in Nepal, and understanding the barriers to their widespread adoption in a comprehensive manner. The objective of this study was to provide an overview of CSA practices adopted by or recommended for Nepalese farmers to adapt to and mitigate the impacts of climate change, as well as to explore the barriers to their adoption. This study was based on a systematic review of literature concerning CSA practices in Nepal, adhering to the steps outlined in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol. The PRISMA protocol serves as a widely recognized and used standard for conducting and reporting systematic reviews through the process of identifying, screening, and selecting information sources. Using this protocol, we reviewed a total of 41 sources to gather the required information (Fig. 1).

Based on the literature review, we identified 28 CSA practices that were adopted in or recommended for Nepal. Major practices included the use of improved crop varieties, organic farming, resistant crop varieties, plastic tunnels and greenhouses, and integrated pest management. The identified CSA practices were categorized across seven typologies: water-smart, energy-smart, nutrient-smart, carbon-smart, weather-smart, climate-smart, and planting-smart. Water-smart practices included practices such as improved irrigation, water harvesting, cover cropping, mulching, and soil and water conservation practices that address challenges posed by erratic rainfall patterns and prolonged droughts. Energy-smart practices such as zero tillage and conservation agriculture, played a crucial role in sustainable farming. They reduced the cost of fuel, labor, and machinery; conserved soil moisture; and minimized soil erosion. Nutrient-smart practices included organic farming, integrated nutrient management, intercropping with legumes, and composting. Carbon-smart practices such agroforestry and the use of plastic tunnels were beneficial in reducing greenhouse gas emissions significantly. Agroforestry systems increased soil organic matter content, reduced erosion and runoff, enhanced physical properties of soil, and promoted efficient nutrient cycling. Weather-smart practices, including crop insurance schemes demonstrated a proactive approach to managing climate-related risks. Knowledge-smart practices such as using resistant and improved varieties highlighted the importance of leveraging agricultural innovation for resilience. Planting-smart practices such as timely planting, crop diversification and mixed cropping provided adaptive strategies to enhance overall agricultural sustainability. The findings highlighted the multifaceted nature of CSA practices in Nepal, with each category of practices playing a specific role in building resilience and ensuring sustainable food production. Table 1 presents the number of reviewed sources that supported the identified CSA practices.

The adoption of CSA practices in Nepal faced various barriers reflecting a complex tapestry of socio-economic, cultural, and environmental factors that influence agricultural dynamics in the country. These barriers were found to hinder the implementation of strategies that are suitable for mitigating and adapting to the impact of climate change in the agriculture sector. The barriers associated with the implementation of CSA practices were categorized into financial constraints, knowledge gaps, and resource limitations. Smallholder farmers, who constitute a significant proportion of Nepal's agricultural community, often lacked the financial resources to invest in CSA. Apart from initial investments, higher costs are associated with input expenses such as the purchase of seeds for improved or resistant varieties, fertilizers, and other maintenance expenses. In many instances, while benefits of the CSA practices in enhancing resilience and productivity were clear, the associated upfront costs often deterred adoption. Lack of awareness about suitable practices for different climatic conditions, coupled with inadequate access to extension services and climate change information, further complicated adoption efforts. Limited access to technology, quality inputs, and essential resources posed additional challenges. In some cases, farmers lacked access to the necessary tools and technologies, credit facilities, water resources, weather related information, and agricultural markets required for implementing certain CSA practices.

To effectively implement CSA plans and actions, it is imperative to provide support aimed at enhancing farmers knowledge, awareness, skills, capacities, and access to resources, including financial assistance,

* *Corresponding author.* E-mail address: thapa.59@osu.edu

https://doi.org/10.35251/gjaas.2024.012

institutional mechanisms, and alternative livelihood options. The practical implications of this review offer guidance to policymakers, development organizations, and stakeholders engaged in Nepal's agricultural sector. Policymakers can use the identified climate-smart agricultural practices and associated barriers to formulate targeted policies that directly address the challenges faced by farmers. Aligning CSA objectives in various sectoral policy goals and determining the scale of commitments are important steps in addressing these limitations. This process helps identify priority areas for interventions and resource allocation. Again, CSA strategies should be developed, considering the diverse climatic conditions across the country. CSA practices are new and evolving strategies for combating climate change. Therefore, there is not sufficient scientific evidence supporting CSA practices. Further research is needed to explore its effectiveness across different agro-ecological zones, soil types, rainfall patterns, and farming systems. Also, future studies should focus on societal and environmental aspects of identified CSA practices.

Table 1. Climate-Smart Agricultural (CSA) practices adopted in and recommended for Nepal

Type of CSA	CSA practices	Number of sources	Percentage
Water Smart Practices	Improved irrigation methods	15	36.59
	Water harvesting and storage	14	34.15
	Cover crop	13	31.71
	Mulching	12	29.27
	Rainwater harvesting roofs	8	19.51
	Soil and water conservation	12	29.27
Energy Smart Practices	Zero tillage/Minimum tillage	11	26.83
	Conservation agriculture	13	31.71
	Solar powered irrigation/ energy	10	24.39
Nutrient Smart Practices	Organic farming	18	43.90
	Integrated nutrient management	8	19.51
	Inter cropping with legumes	5	12.20
	Composting	4	9.76
Carbon Smart Practices	Agroforestry	12	29.27
	Plastic tunnels and green houses	15	36.59
	Integrated Pest Management	15	36.59
Weather Smart Practices	Crop insurance schemes	12	29.27
	Climate information services	3	7.32
Knowledge Smart Practices	Resistant varieties	17	41.46
	Improved varieties	32	78.05
	Adjustment in planting season	7	17.07
	Recommended doses of fertilizer	3	7.32
	Extension Services/Farmers training and capacity building	4	9.76
Planting Smart Practices	Crop rotation	10	24.39
	Crop diversification	14	34.15
	Mixed cropping	6	14.63
	Shade nets	3	7.32
	Windbreaks	4	9.76

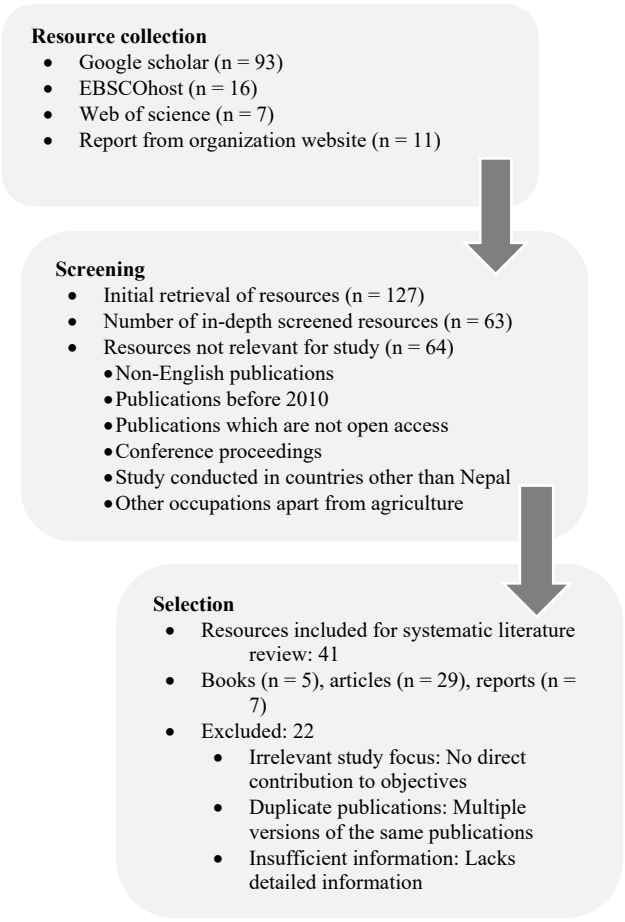

Figure 1. Identification and selection methodologies of relevant sources using PRISMA protocol.

Citation: Thapa, M., & Adhikari, S. (2024). Climate-Smart Agricultural (CSA) Practices in Nepal: A Review of Adaptation and Mitigation Strategies. *Global Journal of Agricultural and Allied Sciences,* 5(S1), 17-18. https://doi.org/10.35251/gjaas.2024.012