

Chapter 2

Climate–Smart Agriculture for Resilience and Profitability

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ABSTRACT

The agricultural sector faces considerable challenges as a result of climate change requiring the implementation of new and sustainable methods. This chapter delves into climate-smart agriculture (CSA), an all-encompassing strategy for boosting agricultural resilience and profitability that incorporates environmental, economic, and social considerations. Various agricultural settings are taken into account with topics including soil, water, crop, livestock, forest, and fisheries management.

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Precision farming, reforestation, and animal husbandry are all examples of CSA methods. Increased productivity, stable food supplies, lessened vulnerability, and lower expenses are just some of the ways it boosts economic benefits. The results of successful CSA programs can be learned from case studies. Challenges and future prospects are discussed in the latter section of the chapter, along with calls for further study, technical advancements, and policy changes.

1. INTRODUCTION

1.1. What Is Climate-Smart Agriculture?

Climate-smart agriculture (CSA) represents a paradigm shift in agricultural practices, recognizing that traditional methods are increasingly vulnerable to the impacts of climate change. It embodies an integrated approach that aims to transform agriculture into a more sustainable, resilient, and adaptable system in the face of evolving climate patterns. CSA is a holistic and forward-thinking approach to farming that aims to address the significant challenges posed by climate change in the agricultural sector (Angadi, 2019). In this chapter, we will delve deeper into the concept of CSA, its core principles, and the key components that define it.

1.1.1 Three Pillars of Climate-Smart Agriculture

CSA is founded upon three pivotal three pillars as shown in figure 1. Firstly, it places a strong emphasis on Sustainable Productivity, striving to elevate agricultural output in a manner that is both ecologically sustainable and economically viable. This approach involves the careful selection of crop varieties tailored to local conditions, the implementation of efficient irrigation methods, and the integration of precision agriculture technologies to maximize yield potential while minimizing detrimental environmental impacts. Secondly, CSA prioritizes the crucial need for Adaptation to Climate Change within the agricultural sector. This entails the implementation of strategies like crop and livestock diversification, adjusting planting schedules, and utilizing climate-resilient varieties. Additionally, it advocates for the development of early warning systems and the establishment of climate-resilient infrastructure to fortify against the impacts of extreme weather events. Lastly, CSA is dedicated to Mitigating Greenhouse Gas Emissions, recognizing the significant contribution of agriculture to these emissions. Through practices such as conservation tillage, agroforestry, and enhanced livestock management, CSA aims to reduce emissions (van Wijk

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