Chapter 13
Climate Change and Crop Production in Africa

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ABSTRACT

Agriculture, particularly crop production, is an economic activity that is highly dependent upon weather and climate in order to produce the food and fiber necessary to sustain human life. The vulnerability of agriculture to climate change and variability is an issue of major importance to the international scientific community. Greenhouse gas (GHG)-induced climate change would very likely result in significant damage in the agricultural sector in sub-Saharan Africa because the region already endures high heat and low precipitation. General circulation models (GCMs) are the primary source of climate change scenarios which make projections about the degree and timing of climate change. Agriculture has always been dependent on the variability of the climate for the growing season and the state of the land at the start of the growing season. The key for adaptation for crop production to climate change is the predictability of the conditions. What is required is an understanding of the effect on the changing climate on land, water, and temperature.

INTRODUCTION

Climate change impacts and adaptation strategies are increasingly becoming major areas of scientific concern. Climate variability is one of the most significant factors influencing year to year crop production, even in high yield and high-technology agricultural areas (Kang *et al.* 2009; Herrmann *et al*, 2018).The two fundamental response options to the risks posed by anthropogenic climate change are mitigation of climate change and adaptation to climate change. Mitigation refers to limiting global climate change by reducing the emissions of greenhouse gases (GHGs) and enhancing their sinks. Adaptation primarily aims at moderating the adverse effects of climate change through a wide range of actions that are targeted at the vulnerable system (Füssel 2007; Egbetokun et al, 2018; 2020). This implies mitigation addresses causes while adaptation addresses effects.

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Adaptation has now emerged as an urgent policy priority, prompting action both within and outside the climate change negotiations (Parry et al., 2004). Owing to the significant differences in temporal and spatial scales at which mitigation and adaptation take place, and in their respective information needs, policies are formulated independently of each other (Cairns *et al.* 2012). This separation is also reflected in the structure of the Intergovernmental Panel on Climate Change (IPCC), where Working Group III addresses mitigation. In contrast, the assessment of adaptation lies within the responsibility of Working Group II.

However, adaptation has recently been covered more extensively and has an essential place in the fourth assessment report of the IPCC (2007). As a result, the Parties to the United Nations Framework Convention on Climate Change have identified adaptation as one of the fundamental key building block required to strengthen the future response to climate change (Israel climate change information Centre (ICCIC 2014; Akinyemi et al, 2019). In the face of these challenges, the paradigm is envisaged to advance beyond 2012 successfully with the incorporation of some initiatives and rearrangement (Rahman 2013). In the aspects of the literature, adaptation to climate change is given increasing international attention as the confidence in climate change projections is getting higher.

High temperatures under condition of global warming will encourage high rates evapotranspiration. Consequently, there may be decrease in the length of the growing season. In contrast, high temperatures would increase the length of the growing seasons in the middle and high latitudes as well as areas of high elevations as the number of frost-free days would increase. The sub-humid climatic zone of Africa permits the cultivation of a variety of crops in a pattern that emerged earlier centuries in response to local conditions (Karienye *et al.* 2018). This vulnerability is particularly high in Africa where agriculture production is the primary source of livelihoods for 66 percent of the total active population (Osabuohien, 2020).

This study provided an understanding of the relationship between rainfall variability and farmers' adaptation strategies to rainfall variability for crop production that would lead to high yields hence improving the family livelihoods. Furthermore, the study will serve as a useful reference material and guide to future prospective researchers who would want to research into similar thematic areas related to climate variability influence and adaptation in various regions in the world. Specifically, the study will benefit the ministry of Agriculture, farmers, and policy implementers in improving crop production in areas that are characterized by varying rainfall patterns.

CLIMATE CHANGE IMPACTS AND ADAPTATION STRATEGIES

In spite of recent technological and scientific advances, weather is still the most important variable in crop production. The climatic factor affects crop and determines the adequacy of food supplies into major ways. One is through weather hazards to crops and the other is the control exercised by climate on the type of agriculture feasible or viable in a given area. Climatic parameters have an influence on all stages of the crop production chain including land preparation, sowing, crop growth and management, harvesting, storage, transport and marketing. To improve communities' resilience, decision-makers must anticipate the impacts and encourage decisions that improve the region will enhance to cope and adapt, such as the development of early warning systems. Adaptation can either be proactive or reactive, and the form, of response, can take place within natural systems or within humans. Reactions within the human system can be motivated by either public or private interests, and they can be planned or autonomous.