**CHAPTER ONE**

**INTRODUCTION**

**1.1 Background of the Study**

Biochar is charcoal obtained from biomass meant to be incorporated into the soil (Lemann et al., 2006). In the past years, biochar grew into one of the great promises to improve soil fertility and in addition, to migrate climate change through carbon sequestration (Roberts et al., 2010; Biederman and Harpole, 2013). Biochar has received particular interest for improving the inherently poor soils in the humid tropics, where large amount of fallow vegetation from shifting cultivation at present usually burned could be used to feedstock for charring (FAOSTAT, 2016). However, although considerable research on biochar in recent years has yielded promising results, these are in consistent and the mechanisms leading to better soil fertility and higher yields are not yet well understood (Shackley et al., 2009; Jeffery et al., 2011). The use of biochar has a good impact on the availability of water, improving soil nutrients that help increase plant growth. Biochar implementation can increase the growth of maize hybrid especially in the addition of crop height and nutrients absorption in the soil (Verdiana et al., 2017). Some studies show an interaction between biochar and fertilizer at the fresh weight of maize hybrid, this is because the provision of biochar is able to increase the quality and quantity of soil so that it affects plant growth (Praing et al., 2018).

Biochr a multifunctional porous material with a small particle size, high surface area, low bulk density, high absorption capacity, and abundant carbon content, has attracted much attention because of its great potential on improving soil physiochemical properties (Khalili et al., 2020; Obia et al., 2021; Hale et al., 2021; Tian et al., 2021). Several studies have addressed the positive effects of biochar treatment on soil physiochemical properties, crop growth and yield and water and fertilizer use efficiency (Lychuk et al., 2015; Li et al., 2018); Danso et al., 2019; Shahzad et al., 2019; Zhang et al., 2020). Additionally, for deficit irrigation, biochar addition/application to agricultural soils is effective in enhancing soil fertility, maize yield, water use efficiency and economic return under low rainfall conditions in Akure, Nigeria (Faloye et al., 2019). For continual biochar application under limited irrigation in arid and semi-arid regions, previous studies have reported improvement in crop yield, water productivity and fertilizer use efficiency through the use of straw biochar (Faloye et al., 2019); Danso et al., 2019; Khalili et al., 2020). It has been previously shown that a single application of 30+/ha of biochar in the first year was beneficial for an increase in crop yield and soil organic matter under the rainfall mulching (Yang et al., 2020).