

# Climate Smart Agriculture Strategies among Crop Farmers in North Central Nigeria: Implication on farm Productivity

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**Abstract:** With the aim of identifying the various CSA strategies used by farmers and assessing the productivity effects of identified CSA practices on farm productivity in Kogi State, North Central, Nigeria, this study assessed the productivity effects of Climate Smart Agricultural (CSA) practices on arable crop farmers. Data were gathered from three hundred and fifty (350) farmers using a "three stage sampling technique" and standardized questionnaires. The data were analyzed using "descriptive statistics", "Total Factor Productivity (TFP)," and least squares regression. The farmers were majorly male (86%), married (91.14%) with mean age of 54years and had secondary school education (40.25%). Prevalent Climate smart Strategies were cover cropping (20.86%), Organic manure (16.0%), and minimum tillage (15.14%), crop rotation with legumes (14.86%), mulching (14.57%), Inorganic fertilizer (12.0%) and improved varieties (6.57%). Determinants of TFP estimate reveals the following factors as having a significant contribution to productivity at different levels of significance in the study area; age (-1.328), education (0.427), farm size (0.41), organic fertilizer (0.48), access to extension (0.342), cover cropping (0.023), Inorganic fertilizer (.47), improved varieties (0.503), Crop rotation with legumes (0.54), Amount of credit accessed (0.273). While age impacted negatively on productivity, all others impacted positively on productivity. The study concluded that Climate Smart Agriculture strategies had positive impacts on crop productivity. Promoting sustainable Climate smart Strategies is recommended.

**Keywords:** Arable crop; Climate Smart; Determinants; Nigeria; Productivity

## I. INTRODUCTION

Nigeria's long coastline, tropical climate, reliance on agriculture, and low family capacity for climate change adaptation all contribute to the country's vulnerability to shocks, particularly those related to climate change (Tambo & Abdoulaye, 2012). The World Bank General Household Survey report (2016) states that "agriculture is the most prevalent income-generating activity in many Nigerian households," which is consistent with the Maplecroft Report (2013) finding that countries susceptible to climate change depend significantly

on agriculture. As a result, rural livelihoods in Nigeria are extremely sensitive to climate change.

Climate change is already having an effect on food production, particularly cereal such as rice, wheat, sorghum, and maize (Maplecroft Report, 2015; Khatri-Chhetri, et al., 2017). Through changes in the adaptability of crops grown and agricultural biodiversity, climate change distorts agricultural production. Additionally, it results in a decline in input usage efficiency and a rise in the prevalence of pests and pathogens (Khatri-Chhetri, et al., 2017).

Nigeria's economy is still mostly dependent on agriculture, which generates 22.36 percent of the nation's GDP and employs almost 70 percent of the labor force (Bernard & Adenuga, 2017; National Bureau of Statistic [NBS], 2022). Agricultural sector grew at the rate of 4.1 percent in 2016 and it accounted for 75 percent of non-oil exports. To improve the sectoral performance, the "Federal Ministry of Agriculture and Rural Development" (FMARD) has approved Agriculture Promotion Policy (APP), building on the Agricultural Transformation Agenda (ATA) developed under the administration of President Goodluck Ebele Jonathan. The key themes of this policy are supporting productivity enhancements; crowding in private sector investment and FMARD's institutional realignment with a focus to improving the ease of transacting business in Nigeria's agricultural space (Oredipe, 2017). Also the National Agricultural Resilience Framework (NARF) paper was created by the Nigerian government in 2013. This was done in order to deploy "new agricultural production strategies and risk management mechanisms," both of which aimed to increase resilience in the agriculture industry.

Despite the aforementioned policies and research outputs, there are still many areas where there is a lack of understanding regarding climate-smart adaptation measures. Crop-specific methods, their frequency of use, and their efficacy in relation to farm productivity and the types of climatic hazards farmers in Nigeria confront are of interest. Information about the various climate-smart adaptation techniques used by smallholder