

PDF - OPTIMIZED INORGANIC FERTILIZER APPLICATION ON SORGHUM YIELD AND NITROGEN USE EFFICIENCIES IN THE NIGERIAN SAVANNA - researchcub.info

CHAPTER ONE

1.0 INTRODUCTION

Sorghum (*Sorghum bicolor* (L.) Moench) is an important staple food grain among many smallholder farmers of the Nigerian savanna (Ofor et al., 2009). It occupies about 44% of the total land area devoted to cereals in Nigeria (Ajeibe et al., 2010). The land area put into cultivation of sorghum in Nigeria is 6.7 million hectares (FMARD, 2012b).

Decline in yield has been identified as major constraint to sorghum production. Average yield is estimated at 0.6-1.7 tons per hectare against potential yield of 4.0-5.0 tons per hectare of sorghum (FMARD, 2012b). The yield gap is attributed to poor inherent soil fertility and low fertilizer use. (Vanlauwe and Giller, 2006).

Smallholder farmers apply little to no fertilizer to their land due to socioeconomic factors including timely access to fertilizer (SSA-CP, 2005). Improper types of fertilizers, ineffective extension system and inappropriate fertilizer recommendation which limit the efficiency of fertilizer use reduce farmers income and increase poverty and food insecurity in the Northern Guinea Savanna of Nigeria (SSA-CP, 2005).

Nitrogen use efficiency (NUE) is important in developing fertilizer recommendations for profitability and environmental sustainability (Kaizzi et al., 2012). Low nitrogen use efficiency in crop production is due to excess application of N. Deficiency of phosphorus (P) and other essential nutrients limit crop growth due to biotic and abiotic factors (Bekuda et al., 2007; Kaizzi et al., 2012). Several attempts to provide fertilizer recommendations to smallholder farmers often lead to inappropriate fertilizer rates that lower the NUE of crops.

1.1 Justification of the Study

Current fertilizer recommendations are aimed at maximizing yield rather than profit. The fertilizer rate needed to maximize net returns is a function of fertilizer cost relative to grain prices as the fertilizer prices increase relative to the prices, the economic optimal rate (EOR) is expected to decrease. Therefore, they need to maximize net returns for a given amount of money they have to invest in fertilizer which can be maximized by identifying the right combinations of nutrient, and application rate that will give highest value to cost ratio (VCR).

1.3 Objective of the Study

The general objective of this study was to provide recommendations for optimizing crop yield and profit from fertilizer use for financially constraint and small holder sorghum farmers in the northern guinea savanna zone of Nigeria. The specific objectives are:

To evaluate the yield response of sorghum to N, P and potassium (K) at the selected sites in the Northern Guinea Savanna of Nigeria.

To determine the economically optimal nutrient rate for N, P and K and the corresponding value to cost ratio (VCR) at different fertilizer cost to grain price ratio.

To determine the N use efficiency (NUE) of sorghum at the selected sites in the Northern Guinea Savanna of Nigeria.

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