

PDF - RESPONSE OF MAIZE (ZEA MAYS L) AND SOME SOIL PHYSICAL AND CHEMICAL PROPERTIES TO POULTRY MANURES AND TILLAGE PRACTICES IN AN ULTISOL - researchcub.info

ABSTRACT

A field trial was conducted to assess the response of maize and soil physical and chemical properties to the different tillage practices and poultry manure levels in an Ultisol in National Institute for Oil Palm Research Institute, Edo State between September to November, 2014.

The field trial was laid out as a two by three factorial experiment in a completely randomized design. Four replicates and treatment combinations formed the main plot treatments (till and no-till) and poultry manure was assigned to the subplot. Sub plot treatments were three poultry manure levels; control (no poultry manure), 4 kg/ha and 8 kg/ha. Tillage treatments included till and no till.

Results from the study showed that tillage and manure interaction did not show any significant difference at $p < 0.05$ but the application of 4 kg/ha of poultry manure of 121.75 cm with no tillage gave the highest mean plant height, for leaf number 8 kg/ha gave the highest mean leaf number, 4 kg/ha with tillage gave the highest mean stem girth of 8.91 cm while 8 kg/ha with tillage gave the highest leaf area of 657.9 cm² kg/ha of poultry manure increased the phosphorus content of the soil with tillage at 15-30 cm depth (31.37 mg/kg) and carbon content at 0-15 cm depth (30.75 g/kg)

CHAPTER ONE

1.0 INTRODUCTION

Foraminifera market research (2014) reported that most countries including Nigeria produce wide range of agricultural commodities which serve as a source of raw material for industrial production and food for human and animal consumption therefore increasing its demand and one of such crops is maize.

Maize (*Zea mays* L) is a member of the cereal family and has added great value to man. It is the third most important cereal following wheat and rice in world food production (Food and Agricultural Organisation, 2003) accounting for over 24% of the total cereal production (Salami et al., 2007).

Maize (*Zea mays* L.) is a widely grown crop in most parts of the world especially in the humid tropics and sub-Saharan Africa due to its adaptability and productivity. It constitutes the staple item of diet for humans and is extensively the main source of calories in animal feeds (Okoruwa, 1995). It is cherished by some species of animals, including poultry, cattle, pigs, goats and rabbits (DIPA, 2006). It is a source of raw material for the manufacture of many industrial products including: corn starch, maltodextrins, corn oil, corn syrup and products of fermentation and distillation industries.

Recently, it is being used as bio-fuel (Khaliq et al., 2004). Maize yield has continuously declined to as low as 1 t/ha due to factors such as rapid reduction in soil fertility, negligence of soil amendment materials and failure to identify high yielding varieties compatible to each agro-ecological zone (Kim 1997, Olakojo 1998, DIPA 2006), low soil organic matter and poor crop establishment (Jaliya et al., 2008, Amanullah et al., 2009). Other factors include: Insect pest attack, diseases, weeds infestation, irrigation, steady seasonal changes and post-harvest losses (Rosner et al., 2008).

Maize can be properly established with the modification of the soil structure through tillage. Tillage is aimed at optimizing the soil conditions for seed germination, emergence and growth, provision of a good soil tilth, improvement in soil water infiltration and retention, reduction in weed competition, minimization of soil erosion, control of pest infestation, encouragement of biological activities of soil micro-organisms and the recycle of soil organic matter through residue management (Adamu and Abdulrazaq, 2004; Aluko and Lasisi,

2009; Agbede, 2010), loosening of the upper layer of soil, mixing of the soil with fertilizer and organic residues and to create a suitable seedbed for germination and plant growth (Rasmussen, 1999). Ministry of Agriculture Food and Rural Affairs, Ontario (2014) referred to tillage as being useful for soils with relatively slow internal drainage used for maize production since it would significantly increase soil drying and warming, timely planting fast uniform emergence of the maize cultivated. Several organic materials such as cattle dung, poultry dropping, pig dung and refuse compost have been recommended to subsistence farmers in West Africa as soil amendments for increasing maize yield (Sobulo and Babalola, 1992; Olayinka, 1996; Ismail et al., 1999) due to low soil fertility. Maize and many other crop species respond well to organic manure application when compared with chemical fertilizer because organic manure enables maize to sustain its yield under continuous cropping on different soil textures (Maynard, 1991). In order to apply manure to fulfill the nutrient requirements of a crop, knowledge of the amount of nutrients mineralized following application is needed (Eghball et al., 2002). The addition of poultry manure to land cultivated with maize is regarded as an alternative way of adding fertilizer to increase soil fertility and maize productivity in organic farming due to its increase in the rate of chemical decomposition and availability to plants (Zorita et al., 2000). It is also a natural fertilizer that possesses high nitrogen content, other essential plant nutrients, and adds organic matter to the cultivated soil in order to increase maize yield (Hussein, 1997). The continuous application of manure or litter can increase the levels of nitrogen, phosphorus, potassium, carbon and magnesium in the soil (Wood et al., 1996; Ginting et al., 2003), thus creating a reservoir of soil nutrients for several years after application.

1.1 Objectives

Objective of this study were:

- (i). to evaluate the effect of poultry manure on chemical and physical properties of soil
- (ii). to evaluate the effect of poultry manure on the growth parameters of maize
- (iii). to evaluate the effect of tillage on growth of maize.
- (iv). to evaluate the combined effect of poultry manure and tillage on maize growth.

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