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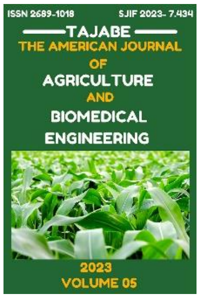

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Research Article

TOMB AND OPERATIVE EFFECTS OF NITROGEN FERTILIZER AND CULTIVATION ON MAIZE PERFORMANCE IN A HUMID ENVIRONMENT

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ABSTRACT

In 2017, a field trial was set up to see how different nitrogen fertilizer rates and land preparation methods tomb act to affect maize performance and yield in southwestern Nigeria. The trial was a 3 by 3 factorial; conducted in a split plot management with cultivation systems in a Randomized Complete Block Design. All treatments were replicated three times, with Convectional cultivation, reduced cultivation, and No-cultivation serving as the main plot and nutrient amendments rates serving as sub-plot factors. The parameters of growth and yield were the subject of an analysis of variance. Despite having the highest grain yield, no-till had the lowest plant height, stem diameter, and stover weight. At various N rates, grain yields did not statistically differ across all cultivation practices; however, the optimal N rate for maize production in the study area appears to be 60 kg N ha-1.

KEYWORDS

Properties of soil; culturing strategies; nutrient-rich fertilizer; tomb action between fertilizer.

INTRODUCTION

Food insecurity has resulted from the exponential increase in the global population and its corresponding rise in food demand. One of the global issues has been sustainable food production. The need to create food

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in the right amount and quality at reasonable costs stays a need in the vast majority of the non-industrial countries of the world particularly in every one of the sub-Saharan African nations. In addition to the fact that peasant farmers control the majority of agricultural production, the recent development of biofuel production from agricultural crops has increased the food deficit. To meet the ever-increasing demand for food products and biofuel materials, domestic commodity producers want to increase production. In Nigeria, maize is one of the primary agricultural products utilized in the production of biofuel. Zea mays L., or maize, is a member of the ponceau family; It is also used as animal feed and is one of the most important staple crops for the majority of sub-Saharan Africans, including Nigeria, with a per capita kg/year of 40. Cereals like maize are a good source of carbohydrates, proteins, vitamin B, and minerals. According to FAO reports, the total acreage dedicated to maize production in sub-Saharan Africa increased by over 60% between 1961 and 2005, resulting in a rise in maize yield of 10.6 million tons for the corresponding period. stated that Nigeria produced approximately 1% of the world's maize. stated that the majority of developing nations consume more than 50% of the maize that is produced. Maize is the third most important cereal crop in Nigeria, behind sorghum and millet. However, there is a domestic demand for maize that exceeds supply production by 2 million metric tons, with a domestic demand of 3.5 million metric tons. In addition to being a major energy source and offering the highest yield per man-hour invested of all cereals, it has a number of advantages over other crops.

Typically, during times of hunger, it is the first crop harvested for food; It can be grown alone or alongside other crops with ease; It doesn't break and is easy to harvest. It is also getting more and more used in the food, beverage, and livestock feed industries. In terms of Nigeria's food production, maize will continue to play a significant and significant role.

In the production of maize, nitrogen is the most essential but scarce nutrient. Nitrogen stimulates changes in the mineral composition of plants because it plays a crucial role in their nutritional and physiological status. The essential component of the chlorophyll molecule is nitrogen; A chlorotic plant condition will result from a lack of nitrogen. Nitrogen is likewise a primary constituent of cell walls. Soil fertility and crop yield are both enhanced by nitrogen fertilization. In addition, it boosts maize grain yield by about 25% and biomass yield by at least 15%, and nitrogen fertilization was found to boost soil residual nitrogen by 18 to 34%. Numerous studies have shown that nitrogen fertilization improves grain yield, photosynthesis, and biomass in maize plants. Both the rate at which nitrogen fertilizer is applied and the timing of its application have a significant impact on how efficiently nitrogen is used.

Notwithstanding plant nourishment, soil condition likewise assumes a critical part in crop foundation, development and yield. Cultivation is an important factor in improving the condition of the soil and has a significant impact on improving maize growth and grain yield. Numerous authors have established that intensive soil compaction hinders root growth, reduces the volume of soil explored by roots, and has a negative impact on soil water flow and storage. As a result, compaction also reduces the amount of Soil N that is available, resulting in less shoot.

Both natural and human-caused influences have the potential to alter the physical, chemical, and biological properties of soil. The general term "cultivation" refers to the mechanical or physical manipulation of the soil and plant residues in order to produce grains for

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human and animal consumption, reduce weed competition with crops, and create favorable conditions for seedling emergence and root development. It is essential to carry out cultivation operations in the most favorable soil conditions for the best outcome. It will reduce the total amount of energy required for a given cultivation system and the number of subsequent cultivation operations that are required. By increasing infiltration, decreasing evaporation, and eliminating weed cultivation, appropriate cultivation systems can make more water available for crops to use. Soil manipulation or cultivation can also cause significant changes in the fertility of the soil, which can affect how well or poorly crops do. In some agro-ecological zones of Nigeria, some researchers claimed that crops grown on tilled plots were superior to those grown on zero-tilled plots. This work fills a void left by the lack of widespread coverage of the tombaction between NPK 15-15-15 at 250 kg/ha and cultivation practices.

MATERIALS AND METHODS

The physical setting of the study site was the Institute of Agricultural Research & Training in Ibadan, Nigeria, in the southwest. Ibadan is momentary between the tropical rainforest and guinea savannah. The climate of the study area is transitional between humid and subhumid tropical with a bimodal rainfall pattern—one of 1888.3 millimeters falling in June and the other of 2000 millimeters falling in September—five dry months, a mean annual temperature of 26.3 degrees Celsius, 75% relative humidity, and potential evapo-transpiration of 109 millimeters. The first growing season began in May and ended in July, and the dry season began in August and ended the acid-pre-Cambrian basement complex, which primarily consists of granitic gneiss, migmatites, mica-schist, quartzite, and marbles embedded within smaller bodies of granite or syenite, as well as the intrusion of more basic amphibolites and olive rich dykes, underplays the study area

Design of the experiment: i. Field study: Three cultivation systems served as the primary plot in the Randomized Complete Block Design experiment, and three rates of nutrient amendments served as sub-plot factors.

There were three replications of each treatment factor. No-cultivation, reduced cultivation, and conventional cultivation were the three cultivation systems, and the three levels of nitrogen fertilizer were 0, 60, and 120 kgNha-1. Disk plowing to a depth of 30 centimeters twice and harrowing for seedbed preparation are the components of conventional cultivation, reduced cultivation, and no cultivation, with surface residues remaining. Each block was further divided into three sub-plots with three replicates each for each treatment, forming a 3x3 factorial experiment with three blocks for main plots and three sub-plots. The experiment was conducted on a 480 m2 experimental field. Plots were isolated by a cushion of 1 m.

Cultural and plant practices

Maize was used as the test crop. The Institute of Agricultural Research and Training, Ibadan, Nigeria, provided the maize seeds with a maturity period of 70 days and resistance to maize smut diseases. Two seeds were planted at spacings of 0.75 meters by 0.25 meters. After that, the seedlings of maize were reduced to just one plant per stand to create a plant population of 53,333 plants per hectare. Split applications of the fertilizer were made at two and six weeks after sowing. For 60 and 120 Kg Nha-1as N1 and N2, respectively, urea fertilizer was used. Before planting, weeds were controlled with (i) glyphosate, a

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non-selective systemic foliar herbicide, at a rate of 3Lha-1. ii) non-selective contact herbicides at 5Lha-1, and iii) manually to lessen the competition between crops and weeds for space, soil moisture, light, and nutrients. In addition, the field borders were kept clean to prevent pests from entering.

Methods of soil sampling and laboratory data collection

Before sowing, random bulk soil samples representing each cultivation system were taken from an experimental block.

The hydrometer method was used to determine the distribution of particle sizes. Using a stainless-steel cylindrical core that was 5 cm long and 5 cm in diameter, bulk density samples were collected. In order to guarantee that the samples maintain their original water content from the field, they were placed in a well-labeled, airtight polythene bag. After being weighed, the samples were oven-dried to a constant weight at 105°C. According to, the bulk density was calculated as the water content corrected mass to volume ratio using the relation b = Mod/VT, where Mod is the mass of oven-dried soil and VT is the total volume. The gravimetric water content was calculated using the relation g,=Mw/Mod, where Mw is the mass of water and Mod is the mass of oven-dried soil. The porosity was calculated using the

All samples were air-dried and sieved with a 2 mm sieve prior to laboratory soil analysis. The Coleman's pH meter was used to measure pH in a 1:1 ratio of soil to water. The sulphury acid and aqueous potassium dichromate mixture method was used to estimate organic carbon, and organic matter was estimated by multiplying organic carbon by 1.724. The procedures described in were used to determine the exchangeable cations, and the Bray1 method, as described in, was used to extract the available phosphorus and read it from the atomic absorption spectrometer. b. Growth and yield parameters: At various stages of crop growth and development, the days until emergence, plant height, stem girth, cob weight, number of cobs, number of maize ears, and ear weight, as well as grain yield, were all monitored.

Information examination

GENSTAT statistical analysis software was used to conduct an analysis of variance on the collected data for a split-plot design with cultivation serving as the primary plot factor and N-level serving as the sub-plot factor. At a 5% level of probability, the Least Significant Difference and the Duncan New Multiple Range Test were used to compare the means.

RESULTS AND DISCUSSION

Soil attributes before planting texturally, the dirt's were loamy sand in all the culturing the executives' plots (Table 1). However, their distribution of particle sizes, bulk density, and soil pH were all different from one another; Despite this, their proportions of rock fragments and organic carbon were comparable. All of the cultivation plots had significantly different amounts of sand and clay.

Effects of Cultivation and Fertilizer on the Growth and Yield of Maize The percentage of germination was statistically different for each cultivation management system; diminished culturing had the most elevated and No culturing delivered the base germination rate. Noticed plant level in diminished culturing the board framework is fundamentally higher than other noticed levels, it is 1.17 and 1.13 times more prominent than the noticed plant level in no culturing and ordinary culturing separately; Also, different N-rates produced significant differences, with the highest height in N120

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plots being 151.5 cm, 1.19 times higher than the lowest height in No plots, 127.4 cm.

Impacts of Culturing and Compost on Maize Advancement and Yield

Plant level: When N levels were averaged, the average plant height for no-cultivation was between 111 and 150 centimeters, while the average plant height for reduced cultivation management was between 158 and 160 centimeters.

Size of the Stem: Reduced cultivation at N0 and N60 and conventional cultivation at N120 had the highest stem girth across all N rates. N0 had the lowest stem girth of the three cultivation management systems, while N120 had the highest stem girth of conventional and no-cultivation, while N60 had the highest stem girth of 4.5 cm for reduced cultivation.

Discussion of the effects of fertilizer and cultivation on the growth and yield of maize.

Yield The yields of various cultivation systems are frequently compared, and authors frequently report higher yields that can be achieved with conventional cultivation compared to other non-conventional cultivation systems (reduced, conservation, and no-till or zero till). In addition, Borin and Sartoil reported that in the cultivation of maize, conventional cultivation, minimum cultivation, and no-till yielded the highest yield. Zamir et al.'s findings back up these findings as well as Khan et al. Ahmad et al., in contrast to other reports that conventional cultivation grain yield is superior to that of no-cultivation, reported a higher maize grain yield in the No-cultivation crop as compared to conventional and deep cultivation crops. and Halvorson and colleagues. In a similar vein, Hussain et al. observed a 5% decrease in corn yield, whereas Beyaert et al. stated that NT's grain yield was 35% lower than CT's. From 0 kg, grain yield increased with increasing N content. NT and RT yields may decrease above 120 kg.ha-1, with the exception of conventional cultivation, where yields decreased above 60 kg.ha-1. Despite this, this result was consistent with other findings from Beyaert et al. that, contrary to Halvorson et al., the delay in early crop growth and development caused by NT had no adverse effects and did not result in biological consequences significant enough to affect reproductive yield.

that compared the NT system's lower grain yield to the CT system's slower early crop growth. Despite yield differences on highly erodible soils, no cultivation remains an extremely important tool for reducing soil erosion.

CONCLUSION

On a tropical alfisol, this study shows how nitrogen fertilizer and various cultivation systems tomb act. With the exception of convectional cultivation at N120, it was determined that there were significant differences between the levels of nitrogen fertilizer and the various cultivation systems, which led to an increase in maize grain yield and some measured parameters as the level of nitrogen fertilizer increased. The highest maize grain yield was achieved with convectional cultivation at N60, while the highest yield was achieved with no-cultivation at N120.

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