

Effect Of Tillage Practices On The Growth And Yield Of Groundnuts (*Arachis Hypogea*) At Dambatta, Kano, NIGERIA.

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ABSTRACT: A field trial was conducted during 2010 rainy season at the Research and Teaching farm of Audu Bako college of Agriculture Dambatta, to evaluate the influence of different tillage practices on the growth and yield of groundnut (*Arachis hypogea*). The tillage practices evaluated were maximum tillage (primary and secondary), minimum tillage and zero tillage practices. The combination was replicated three times in a Randomized Complete Block Design (RCBD). Hand-held hoe was manually used to prepare the soil to the specific depth. The result of this work indicates that zero tillage was significantly different from all the parameters measured which include plant height, canopy spread, shelling percentage, one hundred seed weight and pod yield in which 26.86cm, 57.30cm, 48.32%, 60.25g and 200.28kg/ha as against 23.49cm and 20.84cm, 50.05cm, and 43.54% and 32.42%, 52.32g and 50.14g and 160kg/ha and 110.25kg/ha, respectively obtained under minimum and maximum tillage respectively.

Keyword: maximum tillage, minimum tillage, zero tillage, canopy spread shelling percentage.

INTRODUCTION:

The global fear of the reduction in the use and fluctuating prices of Oil has led to a greater focus of attention on agriculture in Nigeria and other Oil producing countries in Africa. The soil is the bedrock on which agriculture depends. Farmers feed off the soil by growing our crops in it and by grazing domestic animals on the vegetation supported by it. We also gather fuel and renewable buildings materials from the trees which grow on it. Modern civilization also depend on the soil productivity to produce adequate food and even surplus, thus freeing those who do not farm to spend their time on other productive activities. If Nigeria is to actually achieve greatness both industrially and otherwise, governments must take adequate measures to protect one of our greatest natural resources which is the soil. For maximum productivity the soil has to be well managed. Such management involves cultivation practices imposed on soil to reduce soil losses as in the case of erosion. Erosion involves the removal of soil by such natural agents as rainfall and wind. Erosion by rainfall is more severe in the wetter regions, while wind erosion is found mostly in drier regions. Wind erosion is caused by high wind velocity. The wind picks up loosed particles and rolls them along the ground or puts them in suspension. This phenomenon creates the spectacular storms carrying dust and silts thereby washing away the top soil. The wind erosion occurs between November and early May in the northern parts of Nigeria. Several factors influence soil erosion, the factors include climate, topographic, vegetation, soil and human. Human factors include the type of tillage practices used in crops cultivation.

With the increasing demand for locally grown food and other agricultural produce for human consumption and industrial raw materials, it is obvious that the peasant farmers are no longer capable of meeting the needs of the population. Even though, the peasant farmers form a greater percentage of the farming population, they have not gotten the required amount of farm power and resources to cultivate a large hectare of land during the growing season. In recent years, there have been an increasing number of large scale farmers using expensive machineries. Some of the peasant farmers have access to the farm tractors for their soil preparation through the state Tractor hiring units. Soil preparation, which is the first step in farming, can be very costly if not properly managed. Conventional tillage is a tillage system that combines primary and secondary tillage operation suitable for growing a particular crop in a given location. Such operation includes the use of the following implements/activities:

- (i) Mould board plow
- (ii) Discplow
- (iii) DiscHarrow
- (iv) Planting and fertilizer application
- (v) Cultivating or using rotary hoe once or twice
- (vi) Spraying with herbicides once, and
- (vii) Spraying with insecticide once or twice depending on the crop

More tillage is done than is necessary to maximize net income, which sometimes leads to reduction in yield especially in area where the start and pattern of occurrence of the rain are unpredictable. Very often farmers panic and plant in an attempt to cultivate as much land as possible only to find themselves having to replant because their crops have been hit by drought. Soil compaction caused by machine traffic as a result of the sequence of primary and secondary operations is very common. The compaction increases soil degradation. Braide et al (1986), in their study on vehicular traffic on the soil physical properties, found that there was a definite increase in soil bulk density of irrigated soils at Kadawa in Kano State. Moisture retention capacity was much higher for soils under heavy traffic than soils with little vehicular traffic. This suggests that soils under conventional tillage system will reach their

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saturation point much faster than those under minimum tillage and thus, easily experience erosion. The soil under conventional tillage are more susceptible to wind and water erosion because all the vegetation cover have been removed. High labour and energy inputs are observed in the conventional tillage system. Onwuji and Braide (1983) have showed that the energy savings in conservation tillage was about one – third of that in the conventional tillage system. Taking the above problems, a study was carried out at Research and Teaching Farm of Audu Bako College of Agriculture Dambatta with the aim of evaluating the effects of different tillage practices on the growth and yield of groundnut

Materials and Methods:-

The experiment was carried out at the research and teaching farm of Audu Bako College of Agriculture Dambatta, Kano State, Nigeria. The area lies between latitude 13°N and 11° S and longitude 8°N and 10° E. the climate is characterized by an alternate hot rainy season from late June to early September with a mean annual rainfall of 464mm and cold dry season in the other months, mean temperature of 31°C, the soil textural classes had been characterized as sandy (85.8% sand, 7.43% silt and 6.77% clay). The treatments comprises of three different tillage practices, thus as maximum tillage (plowing, harrowing and ridging), minimum tillage (ridging and planting), and zero tillage in which only seed holes were made. The combination was replicated three times in a Randomized Complete Block Design (RCBD). Hand-held hoe was manually used to prepare the soil to the specific depth. The groundnut (*Arachis hypogea*) variety used was the erect type (Virginia Cultivar *Yar Dakar*). Poultry droppings were used as source of organic manure at a rate of 20,000 Kg/ha (on dry basis). The field was manually planted at 0.25 X 75 spacing, 0.05m deep, and two seed per hole, and thinned down to one seed per hole one week after emergence. Lost stands were replaced. Data collected were plant height, canopy spread, 100-seed weight, shelling percentage and pod yield, the data was subjected to statistical analysis of variance using SAS software (SAS Institute, Inc; 1985).

Results and Discussion:-

Effect of different tillage practice on plant height and canopy spread of Groundnut at Dambatta:-

The result of the effect of tillage practices on plant height and canopy spread of groundnut in the study area, is shown in Table 1. It shows that Zero tillage had the highest plant height as well as canopy spread (cm) of 26.86cm and 57.30cm as compared to other types of tillage practices (maximum and minimum tillage) which had 20.84cm, 23.49cm and 43.37cm and 50.05cm respectively. This could be ascribed to the fact that the soil has a higher percentage of sand (85.8%) and was characterized as sand, and it was believed that a soil of that nature is such loose enough to allow for a rapid plant growth without tilling, another probable reason could be due to compaction of the soil below the cultivated layer due to pressure from the cultivating implements and the tractor wheels (Dunham, 1981). However, as the tillage is being reduce from

maximum to minimum, the result of plant height and canopy spread keep on increasing (Table 1) from a value of 20.84 cm to 23.49cm and 50.05cm to 43.37cm, respectively. The higher plant height and canopy spread can equally be attributed to the high value of water sportive which was resulted from absence of crusting and preservation of the macrospore system, (Ogban, et al; 2007)

Effect of different tillage practice on shelling percentage, one hundred seed weight and pod yield of groundnut at Dambatta.

Shelling percentage, 100 seeds weight and pod yield were statistically higher in the zero tillage plots than other tillage practices as shown in Table 2. There was a decrease of shelling percentage from 48.32% to 32.42%, weight of 100 seeds from 60.25g to 50.14g and pod weight from 200.38Kg/ha to 110.25Kg/ha as the tillage practices are increased from zero tillage to maximum tillage, respectively (Table 2). This was made possible by the fact that three types of soil damages were identified due to intensive cultivation of soil as observed by Dunham, 1981, which include;

- (i) formation of a surface crust as a result of the exposure and pulverization of the surface soil leading to loss of structure
- (ii) Homogenization of the cultivated layer resulting in discontinuity of the conducting pores and
- (iii) Compaction of the soil below the cultivated layer due to the pressure from the cultivating implements and the tractor wheels.

Furthermore, similar studies conducted on the Alfisol of the rainforest regions of West Africa showed a marked decrease in organic matter content, increase in bulk density, decrease in porosity and considerable soil loss due to intensive tractor cultivation (Cunningham, 1963; Lal 1976 and Lal and Cunnings, 1979, Aina, 1979, Agboola, 1981), which could influenced shelling percentage, one hundred seed weight and pod yield as the case in this research.

Conclusion:

Considering the result obtained from this study, it can be concluded that tilling soil in an area with higher sand percentage of the textural grouping is not necessary for groundnut production as the soil is already loose and any soil tilled could result in three soil damaged as identified by Dunham, 1981 as cited above.

Table 1: Effect of different tillage practice on plant height and canopy Spread of Groundnut at Danbatta.

Treatments	Plant height (cm)	Canopy spread (cm)
Maximum tillage	20.84	43.37
Minimum tillage	23.49	50.05
Zero tillage	26.86	57.30
SE±	1.18	2.24

Table 2: Effects of different tillage practice on shelling percentage, one hundred seed weight(g)and pod yield (Kg/ha) of groundnut at Dambatta.

Treatments	Shelling Percentage (%)	One hundred Seed weight	Pod yield (Kg/ha)
Maximum tillage	32,42	50,14	110,25
Minimum tillage	43,54	52,32	160,50
Zero tillage	48,32	60,25	200,38
SE±	1,78	1,58	3,07

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