

# Assessment of Soil Conditions for Crop Production in Jibia Local Government Area, Katsina State

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**Abstract:** Soil plays a vital role to human lives. It is a resource of paramount importance in the sense that food production and other livelihood activities of man are derived from soil. The production of food and raw materials depend on the condition of the soil. This research examines the soil conditions for suitability of crop production in Jibia local government area. Soil samples were collected and analyzed in the laboratory. The result of the Laboratory analysis shows that the soil is deficient in nutrient contents. It also showed that they have more than 90% of sand, low values of Organic Matter and Organic Carbon. Statistical analysis recorded little difference in terms of variation among soil samples. However, these findings as mentioned above, led to the conclusion that the soil condition is not favorable. However, there is need for conservation measures to be taken such as, planting trees, periodic research, and enlightenment programs.

## I. INTRODUCTION

Land is one of the most important natural endowment to man. Although by land it implies all the condition of the physical environment (Young, 1993), yet there is the tendency among many to associate land with soil. Although this association may not be entirely correct but some substance could be attributed to it, if one considers the fact that the soil is perhaps the most dominating aspect of the physical environment, upon which most land use plans are based (USDA, 2002). For thousands of years, agriculture has been the economic activity which is most essential to human survival and well-being. It has also been the economic sector and is most dependent on the natural environment (F.A.O, 2005).

Soil quality is relatively a new concept that is gradually gaining popularity among land users, developers, planners, and soil scientist. Quality as explained is the essential character, distinguishing feature or property of an object, and is the feature which makes the thing useful or performs a task in a beneficial way. Soil quality has been defined in several ways (Eswaran et al, 2002). USDA, (2002) definition is how ever more related with conservation and it state that the term implies the capacity of a specific kind of soil to function within natural or managed ecosystem boundaries, to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation.

Soil quality could be degrading through two principal's ways; pollution and fertility deflation. The continuous use of these lands throughout the year for both irrigation and rain fed condition is what may likely trigger the problem of fertility depletion (Abu, 2000).

As the human population continues to increase agriculture is not fulfilling its vital function or feeding people, providing other basic agricultural commodities and generating stable incomes but the problem still remains that agriculture in developing countries has the following important characteristics. Farms are generally small and most countries

are suffering from a degradation of resources and the environment (Larson et. al, 1992).

It has been estimated that out of the agricultural population of developing countries, 54% were small scale farmers, this situation is even worse that at the first sight, because the majority of farmers occupying a disproportionality small proportion of the total arable area. Soil is a very important natural resource regarded by many as the cheap element of the land; soil has played a major role in the history of mankind, influencing the agricultural productivity capacity and the rate of growth and survival of population the distribution of settlement and movement of people and trade all over the world (Jones, 1975).

In order to meet the need of an ever-increasing population it is essential that the soil is put to the best use. In order to know this, it is necessary first to know the soil condition of an area in order to manage agriculture activities. Soil characteristic such as structure, texture, color, pH and nutrient structure cause soil to have a greater or lesser capacity to respond to land use management more especially farming activities in an area. Under studying soil types and condition can assist management from farm to regional and state wide scale in understanding soil capacity and in implementing best practice management.

## II. MATERIALS AND METHODS

### A. Study Area

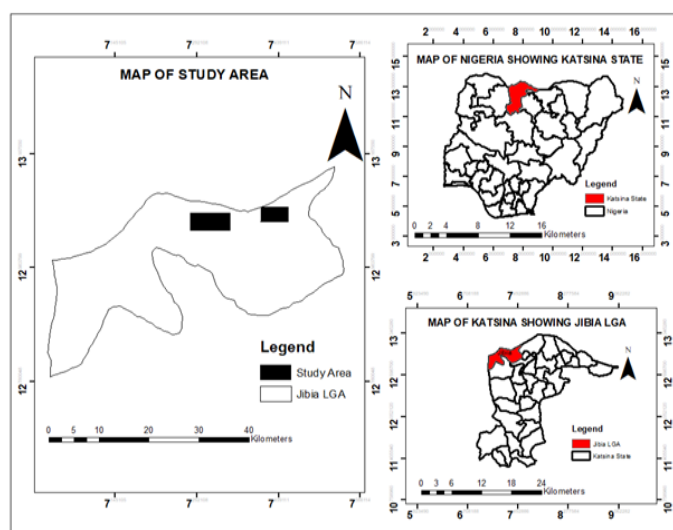


Figure 1: Map of Study Area

The study was carried out in Jibia Local Government area of Katsina State. Located on the central plain of Hausa land of Northern Nigeria and lies at Latitude  $13^{\circ} 05' 30'' N$  and Longitude  $7^{\circ} 13' 35'' E$  with an area of  $1,037 km^2$ . It is situated on the extreme part of Northern Nigeria, bordering Niger Republic to the North, Katsina and Kaita Local Government Areas to the East, and to the South by Batsari and Batagarawa Local Government Areas.

**B. Soil Sampling and Analysis**

The main method used involves the collection and analysis of soil samples in the laboratory to test the different desired parameters i.e., some physical, chemical and biological properties of soil. The research subject involves the assessment of soil conditions for crop production in Jibia Local Government Area, and the major objective of this study was to investigate some physical and chemical properties of the soil in different wards. FarunMaje and Far Faru wards respectively. Stratified random sampling was used for the purpose of collecting soil samples; a 4m-by-4m square size plots were demarcated both at Far Faru and FarunMaje ward which is divided into 12 equal size grid squares. At midpoint of the square, soil samples were taken from 0-15cm depth using soil auger. This in effect amount to eight samples collected from the six identified plots selected. Each collected sample was placed in a polythene bag appropriately marked and labeled and then transported to the laboratory for further analysis.

The soil samples were dried, grounded and passed through a 2mm sieve for the laboratory analysis. The sieved samples were then used to estimate and determine soil condition between the four systems. Laboratory analysis was conducted specifically on the properties of the soil such as; soil pH, Organic Carbon (OC), Textural Class (TC), Exchangeable Base (EB), Particle Size Distribution (PSD), Water Holding Capacity (WHC) and Electrical Conductivity (EC).

**III. RESULTS AND DISCUSSION**

From the results of laboratory analysis, this research investigated the Physical and Chemical properties of the soil in Jibia L.G.A. The pH value recorded are slightly acidic which is below standard. The result of other properties of the soil such as Organic Carbon (OC), Total Nitrogen (TC), Electrical Conductivity (EC), Organic Matter (OM) were also analyzed. The value when compared to the standard values indicated low level of fertility of the soil.

Table1: Summary of the Laboratory Analysis

Samples	Location	PH	OC	Total N%	O.M%	EC	PSD		
							Clay%	Silt%	Sand%
A1	Farunmaje	6.2	2.19%	0.10	3.76%	2.81	1.52	4.24	94.24
A2	Farunmaje	5.4	2.18%	0.10	3.69%	3.58	1.52	4.24	94.24
A3	Farunmaje	5.7	1.99%	0.09	3.40%	2.38	0.48	5.28	94.24
B1	Far faru	4.7	2.47%	0.12	4.24%	3.49	1.52	8.24	90.24
B2	Far faru	6.1	2.23%	0.11	3.83%	2.29	0.48	5.28	94.24
B3	Far faru	5.8	2.63%	0.13	4.52%	3.38	0.48	5.28	94.24

However, lack of vegetation cover and manure application can lead to the leaching of soil solution, which can affect all the soil properties as mentioned above. All the soil samples have over 90% sand composition in texture, which clearly confirmed that the soil texture can be classified as sandy soil. The absence of vegetation cover promotes desertification which encourages soil erosion that can lead to deposition of more sand into the soil. The values of silt and clay recorded in the soil samples are very minimal. Therefore, the low values of silt and clay could influence the decrease in water holding capacity, shortage of nitrogen and phosphorus, which may cause high soil deterioration and increased land degradation.

**CONCLUSION**

The study was designed with the aim of investigating some physical and chemical properties of the soil. A methodology was employed using stratified random sampling, where soils sample were collected and analyzed in the laboratory. Considering the above findings from this research, it

can be concluded that soil fertility in Jibia Local Government area is very low. Therefore, measures should be taken to address the problems of agricultural production and environmental conservation in order to improve the economic development, standard of living and environmental development.

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