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Effects of Land-use Types on Some Soil Properties in Tsinipanbe, Chunku, Wukari L.G.A, Taraba State, Nigeria

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Abstract: -
Purpose: This study aims to assess the effects of land use type on the properties of soil in this area. This study also aims to investigate the effects of long term cultivation on soil properties in the area.

Design/methodology/approach: This study uses the soil samples from the study area, which were subjected to laboratory analysis to obtain the data of the physical, morphological and chemical properties of the soil in the area. The obtained data was processed through analysis of variance.

Findings: The results of this study indicate that the soil morphology of the internal content of the land used generally appears to be very clear. It was also observed that sand dominated the soil in both the cultivated and fallowed land area of the studied pedons. The percentage base saturation mean indicates that the cultivated and fallowed land use is high and a bit acidic and the soil taxonomy shows that the soil in the area is Typic Kandiuustalfs of the order of Afisols

Keywords:- *Land-use, Soil, Physical properties, Chemical properties, Morphological properties, Soil taxonomy, Pedons.*

I. INTRODUCTION

Land use change is one of the main drivers of environmental change; it has become a major aspect of global environmental change as an important component in understanding the sequence of changes in the characteristics and the interactions of human activities in the environment (Karlen *et al.,* 2003). These changes influence the basic reserves of land and a variety of natural process, including the soils which are not static and hence more susceptible to change in their nutrient and moisture content. The dynamic soil nature describes the condition of a specific soil due to land use and management practices *(*Karlen *et al.*, 2003). Land use influences aggregation, aggregate stability and overall soil health (Castro *et al.,* 2002*;* Herrick *et al.*, 2001). Land use changes also have a great influence on many soils physical and chemical properties mostly soil organic matter thereby affecting its quality attribute and fertility. Land use practices also affect the distribution and supply of soil nutrient by directly altering soil properties and by influencing biological transformation on the rooting zone *(*Murty *et al.,* 2002). Land use changes are known to be important drivers for redistribution; and it influences surface runoff, erosion and sedimentation process. Many researchers have reported that change of land use, implemented locally such as long time cultivation, deforestation, urbanization, or overgrazing cause significant variation in soil properties, terrestrial cycles and reduction of output; and the conversion of natural forest and plantation to other forms of land use can cause soil erosion and lead to a reduction in soil organic matter content, loss of soil quality and modification of soil structure and its stability (Chen *et al.*, 2001*;*Conant *et al.*, 2003*;*Hacisalihoglu,2007*;*Khormoli *et al.*, 2009*;*Sarawathy *et al.*, 2007). The signs and magnitudes of these changes vary with cover and management *(*Baskin and Binkley, 1998*;*Celik, 2005). Most changes in land use affect the amount of carbon held in vegetation and soil, either in releasing carbon dioxide (a greenhouse gas) or removing it from the atmosphere. Human population pressure upon land resources and their demand for food has resulted in the increase of land use, and intensive agriculture (Houghton,1994*;*Geissen *et al.,* 2009); intensive land use may cause important changes in soil physical and chemical characteristic and can affect soil fertility increase or cause soil compaction (Geissen, 2009); land use changes through cultivation may rapidly diminish soil quality, as ecologically sensitive components of tropical soil are not able to buffer the effect of intensive agricultural practices *(*Islam and Weil, 2000). In the southern guinea savanna, particularly Taraba State which is regarded as the ''Natures gift to the Nation,'' farming is the predominant economic activity. The continuous unguided use of the soils for agricultural production and other benefits had exposed the soil to different forms of degradation. In Wukari, there are many land use activities which is driven by population growth, yet studies are limited on the effects of land use practices on soil physical and chemical properties. This study was aimed at observing the effects of land use on the soil physical and chemical properties in Wukari, Taraba State.

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II. MATERIALS AND METHODS

A. Location of study area

The study was conducted at **Tsinipanbea** along Ibi road in Wukari local government area, Taraba State. The study area lies between the coordinate 7º5627.77N, 9º4639.30E and 7º 5627.81N, 9º 4636.72E.

LANDUSE TYPE	COORDINATE	ELEVATION
Cultivated land (CL)	7º5627.77N 9º4639.30E	188metres
Fallow land (FL)	7º 5627.81N 9º 4636.72E	

Table 1: Coordinate and Elevation of the Study Area
Source: personal field measurement, (2022)

a. Geology

Wukari lies in the guinea savanna vegetation in the southern part of Taraba state, Nigeria. The northern part of the state consists of undulating hills and shrubs. Wukari is situated over cretaceous (fossils) sandstone which is possibly Bima- sandstone according to TSMEUD, (2005). Some of the geological activities are drilling of borehole and mining.

b. Hydrology

Wukari is govern by it headquarter in the town on the A4 highway, Wukari is bounded by the river Donga which flows through the Benue River and forms a boundary with Nasarawa state to the northeast.(Blench and Roger 2019).

c. Climate

The entire area is a gently undulating plain, with a mean altitude of 200 m above sea level. The drainage systems drain northward and serve as tributaries network to the River Benue while eastward discharge of rivulets and other smaller tributaries from Wukari town drains towards the Donga River, which is a major tributary of River Benue. The mean annual rainfall value ranges from 1000 - 1500 mm. The onset of the raining season is usually around April while the offset period is October. The mean maximum temperature is being experienced around April at about 40ºC while the mean minimum temperature occurs between the period of December and February at about 20ºC (NIMET, 2015).

d. Vegetation

Vegetation of Wukari Local Government Area falls within the Southern guinea savannah zone. The vegetation manifest seasonal pattern and it is mainly of tree savannah in which the dominant species is the large red heart (Hymeno cardia) providing a limited amount of shade. The accompanying shrubs and grasses are Guinea grass (Panicum maximum), speargrass (Imperata cylindrica), Morning glory (Ipomoea carnea), Pignut (Hyptis suaveolens), Bahama grass (Cynodon dactylon), Spiderwort (Commelina benghalensis), Wiregrass (Eleusine indica), Lemon verbena (Lippia dubai), sedge flower (Cyperus difformis) etc. There are also restricted areas of hard wood (Isoberlina) savannah woodland, which forms the forest reserves of the area. Other species include Eucalyptus (Eucalyptus camaldu- lensis), Neem tree (Azadirachta indica), Gmelina (Gmelina arborea), Locust tree (Parkia filicoidea), Guava (Psidium guajava), mango (Mangifera indica) and Cashew (Canarcadium occidentale) among others (Osujieke *et al.,* 2017).

e. Field Study

A reconnaissance survey visit was conducted in the study site. After which a base map was prepared using existing maps and other relevant materials as to facilitate or help in carrying out the field studies. The slope were divided into two physiographic land use unit namely Toe slope and mid slope. Two profile pits was dug, one at the cultivated land and the other on the fallowed land or secondary land. Also each horizon was described and sample was collected for analysis following the guideline of FAO (2006).Two profile pits was used for the study. Soil sample collected was air dried and sieved using a 2mm sieve before laboratory analysis.

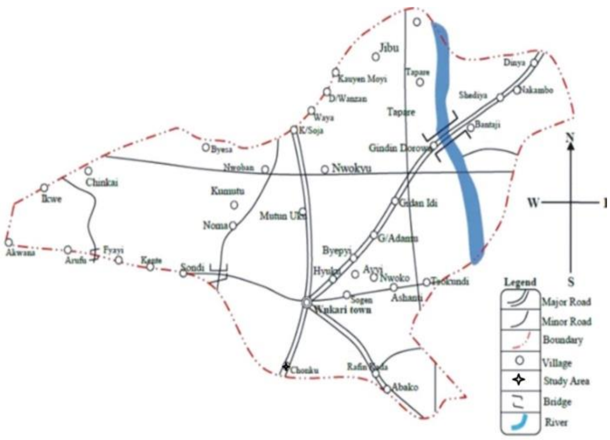

Fig 1: Map of Wukari Local Government showing the study area
Source: Oko *et al.*, 2017

f. Sampling and Sample Preparation

The total of two representative soil profile pits of depths, (0-15, 15-30, 30-53, 53-68, 68-100cm) and (0-20, 20-31, 31-52, 52-76, 76-100cm) for toe slope and mid slope respectively was dug in the land use. The coordinates was obtained using GPS. The field characterization of the profiles was carried out and the soil samples were obtained from the pedons horizons at the bottom of the profiles so as to avoid contamination. The samples were preserved in polyethylene bags and were taken to the laboratory for physicochemical and morphological properties. The soil sample collected from each horizon was air dried at room temperature, grading using mortar and pestle and was pass through 2mm sieve in the laboratory for all soil analysis except for soil organic matter (SOM) and total nitrogen, which was further pass through 0.5mm sieve. And the samples were analyzed for physical, chemical and morphological properties.

B. Laboratory Analysis

a. Physical properties: Particle size distribution was determined using disturbed soil samples by hydrometer method as described by Boyoucous (Gee and Or 2002**).**

a1 Bulk density was also determined by core method. Bulk density (Bd) which is defined as the mass unit of volume of dry soils and these volumes include both solids and pores (Brady and Weil, 1999).

b.2 Total porosity was calculated assuming a particle density of 2.65g/cm^3, the size distribution of aggregates was measured by wet sieving through a series of sieve (2.0, 1.0, 0.5, 0.25mm). The percent water stable aggregates (%WSA) on each of the size range were determined.

b. Chemical properties: Soil organic carbon was determined by the Walkley - Black method (Nelson and Sommer, 1996).

a1 Total nitrogen (TN) was determined by Kjeldahl (Brenner, 1996) method.

b2 Soil pH an electrical conductivity (EC) was measured by pH/conductivity method (Rhoades, 1996) in soil water solution.

c3 Available phosphorus extracted by Bray-1 extractant (Bray and Kurtz, 1945).

$Ca2^{+and}$ Mg^{2+} was read by atomic absorption spectrophotometer while K^+ and Na was read with flame photometer.

d4 Effective cation exchange capacity (ECEC) is the summation of exchangeable bases. The base saturation was then calculated as ratio of exchange bases to the effective cation exchange capacity (ECEC) expressed in percentage.

C. Statistical tools

One way analysis of variance (ANOVA) procedure was used to compare the effects of land use on soil physical and chemical properties. Means was compared by least significant difference (LSD) at $P<0.05$ levels and rejection or acceptance of hypothesis was made. Standard deviation and standard error was used to determine the error level of the analysis.

D. Soil classification

Soil taxonomy was categorized according to the basis of the keys of Soil Taxonomy by USDA till the level of sub-group.

III. RESULTS AND DISCUSSION

A. Morphological properties of the soil

The morphological characteristic of the soil in the study site are shown in table 2. All the horizons were well drained in the land used type. The surface was loose at the two pedons. The pedons have angular blocky structure at all the horizon. The physiographic position have different color matrix range, are described as follows: at the cultivated land area (CLA) observed across the horizon colour matrix range from dark reddish brown 2.5YR 3/3, dark red 2.5YR 3/6, light reddish brown 2.5YR 6/3, light reddish brown 2.5YR 6/4, light-reddish brown 2.5YR 7/3 at moist condition. At fallow land (FL), colour matrix range from dark reddish brown 2.5 YR 3/3, light reddish brown 2.5 YR 6/4, red 2.5 YR 5/6, yellowish red, 5YR 5/8, and yellowish red 5YR 6/6 also at moist condition. The drainage and physiographic condition may also influence the observation change in the colour matrix of the land used type. The internal content of the land used type generally appears to be very clear

Table 2: Soil Morphological Properties of the Study Area

Horizon	Depth	Munsell colour	Structure	Mottle	Horizon boundary	Texture	Consistency	Vegetation	Root presence
	Cultivated land								
AP	0-15	2.5yr-3/3 dark reddish brown	Granular	Nil	Diffuse	Smooth	Friable	Vegetation	Very fine
AB	15-30	2.5yr-3/6 dark red	blocky	Nil	diffuse	Smooth	Firm	Vegetation	Very fine, medium
Bt	30-53	2.5yr-6/3 light reddish brown	Blocky	Nil	diffuse	Silty	Loosely Firm	Vegetation	Fine
Bt_1	53-68	2.5yr-6/4 light reddish brown	blocky	Nil	diffuse	Silty	Friable	Vegetation	Coarse medium
Bt_2 **Fallow land**	68-100	2.5yr-7/3 light reddish brown	angular blocky	Nil	diffuse	Coarse	Friable	Vegetation	Medium

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AP	0-20	2.5yr-3/3 dark reddish brown	granular	Nil	diffuse	Smooth	Friable	Vegetation	Very fine
AB	20-31	2.5yr6/4 light reddish brown	Sticky	Nil	diffuse	Smooth	Friable	Vegetation	Fine
Bt	31-52	2.5yr 5/6 red	Blocky	Nil	diffuse	Smooth	Firm and sticky	Vegetation	Medium
Bt_1	52-76	5yr 5/8 yellowish red	angular blocky	Nil	Diffuse	Smooth	Firm and very sticky	Vegetation	Medium
Bt_2	76-100	5yr 6/6 yellowish red	angular blocky	Nil	diffuse	Silty	Very hard and sticky	Vegetation	Not any

B. Physical properties of soil pedons studied

Soil physical properties are important indicators to evaluate the activities of agricultural practices. The soil properties of different sizes are the factors that impact on crop root, growth and nutrient transport. The particle size distributions of the soil of the studied site are as presented in table 3. The sand percentages mean value range from **57.92%** for CLA and **49.84%** for FLA. Silt has a mean value of **29.60%** for CLA and **30.20%** for FLA. It decreases and increases irregularly with increasing depth, while clay content was observed to have a mean value of **12.48%** for CLA and **19.96%** for FLA respectively. The clay content decreases down the depth in CLA, which could be attributed to sorting of soil minerals by biological and agricultural activities. Therefore, sand dominated in both the CLA and FLA of the studied pedons.

Table 3: Soil Physical Properties of the Study Area

Horizon	**Depth (CM)**	**% SAND**	**% SILT**	**% CLAY**	**TEXTURAL CLASS (TC)**
		Cultivated land			
AP	0-15	57.60	37.80	4.60	SL
AB	15-30	43.20	48.80	8.00	L
Bt	30-53	53.60	33.80	12.60	SL
Bt_1	53-68	73.60	21.80	4.60	SL
Bt_2	68-100	61.60	5.80	32.60	SL
Mean		**57.92**	**29.60**	**12.48**	
		Fallow land			
AP	0-20	61.60	31.80	6.60	SL
AB	20-31	47.60	43.80	8.60	L
Bt	31-52	51.20	32.80	16.00	SL
Bt_1	52-76	37.20	28.80	34.00	L
Bt_2	76-100	51.60	13.80	34.60	SL
Mean		**49.84**	**30.20**	**19.96**	

Key: TC=textural class, MC=moisture content,L=loamy sand, SL= sandy loam.

C. Soil chemical properties in the studied pedons

Table 4 displays the laboratory chemical analysis of the soil from the studied area. The mean value of pH across the area is 6.9 in CLA and 6.8 in FLA. This shows that the soil is acidic. The acidic condition of various land use types could be attributed to severe leaching by high rainfall and low organic matter content. The soil organic matter content has a mean value of 0.48 in CLA and 0.56 for FLA respectively. Both show low content of organic matter, than in the critical level (1.5%-2.0%) for tropical soils of Nigeria. The values were less equally at variance with the critical value of 3% for northern Nigeria Soils. This can be attributed to management practices such as frequent bush burning, continuous farming and runoff by water. Organic matter has a positive influence on soil pH, cation Exchange capacity, base saturation, water holding capacity and ECEC (Akamigbo, 1999). The total nitrogen content was increased by the land uses over the critical values of 0.15%. It has been observed that the main cause of nitrogen deficiency in tropical soil is intense leaching and erosion due to high rainfall and absorption of some nutrients by the plants. And the content of available phosphorus in the analysis of the soil obtained in the study area at CLA showed a decreased of trend of about 15.76 at CLA and 16.83 at FLA which depicts a low level of occurrence<15mg/kg. This could be attributed to local or natural manner of fertilizer application. Exchangeable bases values showed that Sodium (Na), Potassium (K), Calcium (Ca) and Magnesium (Mg) were low in both the CLA and

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FLA soils except Ca which shows moderate amount present in both. The mean values of Ca, Mg, K, and Na are indicated as follows (4.26 cmol/kg, 0.8 cmol/kg, 0.3 cmol/kg and 0.2cmol/kg) for CLA and (4.36 cmol/kg, 0.8 cmol/kg, 0.3 cmol/kg and 0.2cmol/kg), FLA. The rating indicated that Na, K, Mg were very low in the Studied land use types, the low values in basic cations could be attributed to the type of parent material present, high rainfall runoff or erosion, and leaching (Chude *et al.*, 2011). The changes in the soil properties are attributed by the management activities such as cultivation and fertilizer application. The total exchangeable acidity mean values were obtained to be 0.332cmol/kg for CLA and 0.136cmol/kg in FLA respectively. Therefore, it can be understand that the changes of physioco-chemical properties observed in the study soil pedons of the area were the results of different cultivations and fertilizations. The result of the study area shows that, percentage base saturation (%BS) mean value range from 97.70-80.09%) for CLA and FLA respectively. The percentage base saturation mean indicates that the CLA and FLA use types is high. The result of the percent BS indicates that basic cation dominates the cation exchange capacity in all the land used types of the soil studied pedons.The finding may indicated that on the percentage base saturation of the studied pedons or land used types could be attributed to the effects of parent material, weathering and global climate change.

Table 4: Chemical Properties of the Soils Studied

Horizon	**Depth (cm)**	**P^H H₂0 1.25**	**O.m**	**O.C**	**TN**	**CN**	**AVP**	**TEA**	**Ca**	**Mg**	**K**	**Na**	**TEB**	**ECEC**	**%BS**	**Ca/ Mg**
Cultivated land																
AP	0-15	6.93	1.47	0.85	1.7	0.5	17.39	0.15	4.3	0.86	0.32	0.22	5.7	5.85	97.44	5.37
AB	15-30	6.94	0.33	0.19	1.6	0.12	16.37	0.15	4.2	0.86	0.32	0.22	5.6	5.75	97.39	4.88
Bt	30-53	6.9	0.38	0.22	1.6	0.14	11.45	1.12	4.3	0.71	0.32	0.21	5.54	5.66	97.88	6.06
Bt_1	53-68	6.78	0.12	0.07	1.6	0.04	16.94	0.12	4.2	0.81	0.31	0.21	5.53	5.65	97.88	5.15
Bt_2	68-100	6.77	0.12	0.07	1.6	0.04	16.67	0.12	4.3	0.76	0.31	0.21	5.58	5.7	97.89	5.66
		6.864	**0.484**	**0.28**	**1.62**	**0.168**	**15.764**	**0.332**	**4.26**	**0.8**	**0.316**	**0.214**	**5.59**	**5.722**	**97.696**	**5.424**
		1.20	**116.50**	**116.40**	**2.76**	**113.80**	**15.48**	**132.8**	**1.286**	**8.15**	**1.73**	**2.56**	**1.21**	**1.43**	**0.26**	**8.42**
Fallowland																
AP	0-20	6.82	0.38	0.22	1.8	0.12	15.62	0.19	4.4	0.86	0.34	0.26	5.86	5.99	97.83	5.11
AB	20-31	6.82	1.47	0.85	1.7	0.5	18.62	0.15	4.3	0.84	0.32	0.25	5.17	5.86	97.44	5.12
Bt	31-52	6.81	0.52	0.3	1.6	0.19	14.92	0.12	4.5	0.81	0.32	0.26	5.89	6.01	98	5.56
Bt_1	52-76	6.82	0.12	0.07	1.6	0.04	17.33	0.12	4.3	0.81	0.32	0.24	5.67	5.79	97.93	5.31
Bt_2	76-100	6.79	0.33	0.93	1.6	0.58	17.65	0.1	4.3	0.82	0.31	0.24	5.67	5.77	9.27	5.24
		6.812	**0.564**	**0.474**	**1.66**	**0.286**	**16.828**	**0.136**	**4.36**	**0.828**	**0.322**	**0.25**	**5.652**	**5.884**	**80.094**	**5.268**
		0.19	**93.34**	**82.21**	**5.39**	**83.76**	**9.03**	**25.79**	**2.051**	**2.62**	**3.40**	**4.00**	**5.10**	**1.89**	**49.43**	**3.48**

OC= Organic carbon, OM= Organic matter, TN= Total nitrogen, AvP= Available phosphorus, TEA= Total exchangeable acidity, TEB= Total exchangeable bases, ECEC= Effective cation exchange capacity, BS= Base saturation

D. Interpretation of Correlations among Soil Physico-Chemical Properties Studied

Table 5 indicated that clay is negatively correlated with pH, OM, TN, at the value of 0.49, 0.47, and 0.49 and positively related with available phosphorus with a value of 0.16, while the total exchangeable acid (TEA) showing that it is highly significant with available phosphorus with value of 0.858 at the probability level of 1%. Silt is significant with clay at 5% of probability level with the value of 0.675. Silt clay ratio is highly significant with clay at 1% probability level with the value of 0.888. pH of H_20 is showing a positive correlated with OM, TN, TEA with a value of 0.39, 0.10, and 0.38 and is negatively related with available phosphorus with the value of 0.30. Organic matter (OM) is correlated significantly with SCR, OC, and CN at 5% probability with the value range of 0.633, 0.756 and 0.730.Potassium (K) is highly significant with total nitrogen (TN) at probability of 1% level with a value of 0.799. Ca/Mg ratio is significantly related with available phosphorus at 5% with a value of 0.710 and the available phosphorus is highly significant with total exchangeable acid (TEA) at probability of 1% with a value of 0.858. Magnesium (Mg) showing significantly related with total exchangeable acid (TEA) at 5% probability with a value of 0.720, but calcium is positively related with total exchangeable bases (TEB) with a value of 0.56. Effective cation exchange capacity (ECEC) is highly significant with calcium (Ca) at 1% probability level with a value of 0.816, and also highly significant with sodium (Na) at 1% probability level with a value of 0.890. Furthermore, potassium is significantly correlated with effective cation exchange capacity (ECEC) at probability of 5% level with a value of 0.670 respectively.

Table 5: Correlations among Soil Physico-Chemical Properties Studied

	Clay	PH	Om	TN	AVP	TEA	TEB	ECEC
Ph	-0.49	-	-	-	-	-	-	-
Om	-0.47	0.39	-	-	-	-	-	-
TN	-0.49	0.10	0.49	-	-	-	-	-
AVP	0.16	-0.30	0.32	0.16	-	-	-	-
TEA	-0.16	0.38	-0.07	-0.13	-0.858**	-	-	-
TEB	0.12	0.01	-0.37	0.08	-0.29	-0.14	-	-
ECEC	-0.18	-0.03	0.37	0.61	0.12	-0.36	0.47	-
SAND	-0.36	-0.34	-0.11	0.20	-0.09	0.00	0.08	-0.19
SILT	-0.675*	0.741*	0.54	0.31	-0.08	0.15	-0.18	0.33
SCR	-0.888**	0.655*	0.633*	0.53	0.14	-0.05	-0.14	0.17
OC	-0.06	0.15	0.756*	0.28	0.42	-0.16	-0.26	0.25
CN	-0.03	0.14	0.730*	0.25	0.41	-0.15	-0.25	0.24
Ca	0.10	-0.24	0.11	0.29	-0.26	-0.03	0.56	0.816**
Mg	-0.36	0.19	0.41	0.54	0.663*	-0.720*	0.14	0.55
K	-0.43	0.28	0.18	0.799**	-0.24	0.11	0.36	0.670*
Na	0.04	-0.27	0.21	0.48	0.20	-0.35	0.30	0.890**
BS	-0.51	0.27	0.13	0.20	-0.24	0.15	-0.08	0.09
CaMg	0.25	-0.02	-0.12	-0.32	-.710*	0.715*	0.09	-0.23

*=Significant at 5% probability level, ** = highly significant at 1% probability level

- *The Crops that will be Suitable in land use of the Soil Studied Area*

According to the result of the analysis obtained both for cultivated land area and fallow land area maize, millet and sorghum are the identified crops that are suitable to use in the studied area due to the available nutrient element present in the pedons studied because they are micronutrients which the plants required in small quantity. The available nutrients are obtained with a mean value range for TN=1.62, AvP=15.764, Ca=4.26, Mg=0.8, K=0.316, Na=5.722 for cultivated land area (CLA) and for fallow land area (FLA) the mean value range for TN=1.66, AvP=16.828, Ca=4.36, Mg=0.828, K=0.322, Na=0.25 respectively. Also, the result showed that the crops can thrived well in both of the studied pedons at the pH value range of 6.9-6.8 which indicated that the soil is slightly acidic. Furthermore, there is a reduction in crops yield due to low organic matter (OM) and organic carbon (OC) contents in both of the studied pedons and sand have the highest mean value range from 57.92% in cultivated land area (CLA) and 49.84 for fallow land area (FLA) of the studied pedons. This showed that sand dominated the soil separates of silt and clay in the studied area

E. Taxonomy Classification of Soils in the Studied Area

The soils of the studied area were classified using USDA soil taxonomy system, Soil Survey Staff (2014) and correlated with world reference base (IUSS, 2015). Pedon 1 was classified as Typic Kandiustalfs (Hypereutric Lixisoils), while pedon 2 was classified as Arenic (Kandiustalfs Loamic Lixisol).

PEDON 1

Features: sandy particles class throughout a layer and the epipedon has a texture class of sand loamy throughout, high base saturation >50%, ustic soil moisture regime, isophyerthermic soil temperature, Kandic horizon, argillic horizon.

Order	Afisols
Sub-order	Ustalfs
Great group	Kandiustalfs
Sub-group	Typic Kandiustalfs (HypereutricLixisols)

PEDON 2

Features: Loamy particles throughout the layer extending from the mineral soil surface from the top of a Kandic horizon at the depth of 52-76cm, argillic horizon, high base saturation >50%.

Order	Afisols
Sub-order	Ustalfs
Great group	Kandiustalfs
Sub-group	Typic Kandiustalfs (Hypereutric Lixisols)

IV. CONCLUSION

The study was carried out to determine the effects of land use types on some physico-chemical properties of the soils of Tsinipanbea, Chunku Wukari local government area of southern Taraba State Nigeria. Two profile pits were dung on a flat terrain for the physico-chemical properties. Data were analyzed statistically using one way ANOVA. The study site especially cultivated land of the pedons have low organic matter, (O.M), organic carbon (O.C), available phosphorus (AvP), total nitrogen (TN) and ECEC. The result of the research finding also reveal that the fallow land had the highest content of organic matter, organic carbon, TN, AvP and ECEC. This attributed to the accumulation of litter on the surface of the soil which recycles nutrients and makes them available in the soil. Therefore, farmers may periodically fallow their land to sequester organic matter, stabilized soil aggregates, and improves nutrient cycles for sustainable agricultural production.

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