Cation Concentrations of Anaocha, Ekwusigo And Ogbaru Local Government Areas of Anambra State And Its Contributions to Gully Erosion Menace in The Area.

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ABSTRACT: Soil samples collected from Anaocha, Ekwusigo and Ogbaru Local Government Areas of Anambra State were analyzed for their elemental compositions using Atomic Absorption Spectrophotometer. Physiochemical characteristics such as PH, particle size porosity, index/water holding capacity, moisture content and organic carbon were also analyzed. Results obtained from cation concentrations in mg/kg of the soils in Anaocha(A), Ekwusigo(E), and Ogbaru(O) were: K^+(O>A>E); Na^+(O>A>E); Cr^{3+}(A>E>O); Mg^{2+}(O>A>E); Ni^{2+}(E>A>O); Cu^{2+}(O>E>A); Zn^{2+}(E>A>O); Cd^{2+}(O>A>E); Pb^{2+}(O>A>E); Fe^{3+}(E>O>A) and Al^{3+} (E>O>A). Other physiochemical characteristics showed that Anaocha soils were acidic, pH (5.13); Ekwusigo, pH (5.79) moderately acidic and Ogbaru pH (6.99),almost neutral. Anaocha area had less clay particles of (8.69c), Ogbaru (13.67c) and Ekwusigo (22.65c). Statictical studies revealed that Cd, Cu, Pb and iron oxides were significant factors in the incidence of erosion in Anaocha area.
Keywords: Cation, concentration, gully, menace, erosion.

I. INTRODUCTION

Erosion has been seen as the gradual wearing away of land surface by water, wind, and other weather conditions. It is a systematic removal of soil and plant nutrients from the land surface by the various agents of denudation [1]. Erosion has been one of the most important ecological agricultural problems worldwide. Since the early 1970s, great emphasis has been given to non-point pollution (non-point refers to erosion from the land surface rather than from channels and gullies)[2]. Soil erosion removes top soil due to excessive rainfall.. It is evident when soil is removed through the action of wind and rain water splash at a greater rate than it is formed [3-4.] Soil may be defined as the earth covering land surfaces that has the important function of serving as subtraction for plants, animals and human life. A soil consists of a sequence of chemically and biologically differentiated layers called horizon that has been formed by the action of consolidated residence (regolith) of rocks and minerals on the earth's surface. The regolith itself is the result of weathering of the original massive rocks at the surface and may be consolidated to be incipient soil. Soil contains air, water, clay materials and organic substances. The properties of a particular soil depend largely on the preparations and composition of these components and how they interact with each other. Stability of aggregate in soil relates to the presence of various stabilizing agents.Clay materials, colloidal oxides of iron and aluminium and colloidal clay are groups of colloidal matter that serve as cementing material in aggregate formation. The oxides of iron and aluminium can build coatings on particles and bridge them together [5].Soil structure describes the arrangement of the soil particles [6]. Usually, the particles form aggregates which have a size and shape that are often characteristics of the soil. This work aimed at analyzing the cation concentrations of Anaocha, Ekwusigo and Ogbaru Areas.Local Government Areas.

II. METHODOLOGY

The samples were collected from the three Area of the State which were stored in polyethylene bags using hand auger. This was dipped one meter into the soil. Samples were air dried for two weeks in the laboratory. They were ground into fine particles and sieved through a 2mm sieve. The pH of the samples was determined by the method described by the Hendershot et al, 1963[7]. Particle size distribution and organic carbon was done using method described by Walker and Black [8-9]. Porosity index/water holding capacities were carried out as described by Ogieva . 5g of each of the samples were dried at 105^oC in an oven and reweighed when removed from desiccators until a constant weight was got to determine the percentage dry matter content. Extraction of metals from sample was by mixed acid digestion [10-16]. The digestion was carried out with 20ml of a mixture of conc. $HClO_4$ and HNO_3 at a ratio of 2:1(v/v) on a hot plate and the mixture heated to almost dryness. 20ml of 0.5M HNO_3 were added and the solution was filtered .Then filtrate obtained was made up to 50ml mark with distilled water and used for heavy metals determination using Buck Scientific Atomic/Emission Spectrophotometer 205.

III.   RESULTS AND DISCUSSION

The data for the various parameters analyzed has been shown in Table I. It was evident that soils of Anaocha were acidic with a mean average of pH (5.13), whereas those of Ekwusigo are moderately acidic while that of Ogbaru are almost neutral. Acidic soils have the unique tendency to be broken down and washed away due to the acidity nature. The reason being that acidity facilitates soil decay and their removal of cementing materials binding soils together such that the soil components are easily washed away.

Metals such as Cu, Cd, Pb, and Zn have been reported to have high tendency of binding tenaciously to organic matter contained in soil. Ogbaru has the highest concentration of Cu, Cd, and Pb but the least concentration of Zn, while Ekwusigo has the highest of Zn and least concentration of Cd and Pb. Anaocha on the other hand had the least concentration of Cu. This indicates that the soil of Ogbaru is least erosive whereas soil of Anaocha is most erosive followed by Ekwusigo Local Government Area.

Ogbaru had the highest concentration of Ca, K, Na and Mg while Zn, Fe, and Al were highest in thee soil of Ekwusigo. These high concentration of cations like Ca, K, Na, and Mg in Ogbaru area when compared with Ekwusigo and Anaocha are evident of the erosive nature of the soils of This tend to support studies which have shown that clay particles stick to one another in moist soils, the exception being alkaline soils in which sodium ions cause the clays to disperse.

Literature has also shown that the most stable aggregates are formed in neutral and calcareous soil (containing calcium carbonate) under grassland in the presence of sufficient clay, and in certain tropical spoils in which the primary mineral particles are cemented together by iron oxides . This was in agreement with the results obtained in Table I where the soil pH of Ogbaru was .Magnesium ion plays a part as the soil stabilizing agent when it combines with oxygen to form magnesium oxide that is why a mixture of magnesium oxide and mono-potassium phosphate with salt waste is often used as stabilizing agents for erosion control.High concentration of iron and aluminium in Ekwusigo area is an indication of less erosive of the area as the binding by humans, iron and aluminium oxides and clay particle from stable aggregates .

Table I: Showing cation concentrations of Anaocha, Ekwusigo and Ogbaru L.G.A.

Cation Concentration in Mg/Kg	Anaocha	Ekwusigo	Ogbaru
Ca	189.42	168.27	226.97
K	115.82	89.29	121.61
Na	905.34	239.20	1,078
Cr	118.39	77.96	45.72
Mg	501.44	107.95	618.89
Ni	12.26	21.37	11.89
Cu	4.56	5.22	6.19
Zn	159.11	380.47	134.33
Cd	6.79	6.65	8.08
Pb	18.00	16.80	37.20
Fe	5,242	10,273	5,732
Al	2,185	12,640	3,773
Ph	5.13	5.79	6.99

IV. CONCLUSION

The results from principal components analysis of the cation variables showed that copper and cadmium ions are selected in Ogbaru while aluminium ion is selected to be significant in Ekwusigo The paucity of these cations in Anaocha contribute to high erosive nature of the soil in that area.

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