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Research Article

Suitability Evaluation of Soils for Yam Cultivation in Coastal Plain Sands of Bodo, Gokana Local Government Area of Rivers State, Nigeria

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Abstract

This study was carried out at Bodo in Gokana local Government Area of Rivers State. It is located between latitude 04.60750 °N and longitude 007.26602 °E with an elevation of 7m above the sea level. The study was aimed at evaluating the land suitability of soils developed from coastal plain sand and alluvium for yam Cultivation in Bodo. The soils were predominantly fine textured, with sub-angular blocky structure Soil colour varied across the various soil horizons from dark brown, brownish yellow, dark yellow to yellowish brown. The bulk density varied in the different horizons. Cation exchangeable capacity (CEC) ranged from low to high (10.67 - 55.25 cmol/kg), while the soil pH was strongly acid in all the 3 pedons with a mean of 4.45. Organic carbon and Total Nitrogen of the soils were generally low in the 3 pedons. Exchangeable sodium and Calcium were very high in the 3 pedons, while exchangeable potassium was very low. The land was marginally suitable (S3) cultivation due to limitations in soil properties (texture and depth to water table in pedon 2), wetness (poorly drained in pedon 2 and 3) and fertility (low nitrogen, organic carbon and exchangeable K), thus, does not meet the required criteria for yam production. Soil condition would however be improved for sustainable yam production by the incorporation of crop residues and farmyard manure to enhance soils nutrient availability as well as application of recommended rate of inorganic fertilizers for yam production.

Keywords

Agricultural land, Deforestation, Flood, Humid Tropical Rainforest, Soil Colour

1. Introduction

Land evaluation is a systematic process of identifying and measuring land qualities and assessing them for alternative use, thereby assessing the value of each type of land present for each land use [4, 17]. Land suitability evaluation is the assessment of the ability of an agricultural land to provide optimal ecological requirements for certain crop production, aimed at sustainability [20]. It is also the process of evaluating the capability of land to enhanced optimum crop growth and development and maximum productivity; thus assessing crop needs requirement for sustainable crop production [4]. Soil suitability assessment also involves characterizing soils in a given area for specific land use, thereby providing an avenues for sustainable land use, hence, land will be used according to its capability to supports and sustain long term production of crops. [20]. According to [13], coastal plain sand are well drained soils which have inherent fertility problems as a result of nutrient lost through

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leaching under frequent rainfall. This inherent fertility problems and poor structural stability, necessitated the need for effective management of the soils for sustainable use to boost agricultural crop production [14]. Coastal plain sands are soils that are formed from deltaic marine deposit on the flood plain when water overflow its banks and flood the surrounding area with good agricultural potential for the production of crops. [15, 16]. Yam (*Dioscorea spp*) is one the major source of starchy carbohydrate staple food in Sub-Saharan Africa, where food security for the over growing population is a critical issue [9]. Yam is consumed as boiled, pounded and fried yam and, it can also be process into yam flour. Thus, sustainable yam production can be achieved in the study area, if appropriate evaluation procedure of land is being carried out to determine the suitability of the soil. As such, the evaluation of soil suitability for yam cultivation and its sustainability is imperative. Therefore, the main objective of this study was to evaluate the suitability of soils developed from coastal plain sand and alluvium for yam cultivation in Bodo, Rivers state.

2. Materials and Methods

The study was carried out in Bodo, Gokana Local Government Area of Rivers State. It is located between latitude 04.60750 °N and longitude 007.26602 °E with an elevation of 7m above the sea level. The study areas also experiences two seasons (dry and rain season) in the year characterize by humid tropical climate with mean annual temperature of 25-28 °C, an average rainfall of 2000 - 2500 mm per annum and mean relative humidity of 85% depending on the season of the year [5, 16]. Soils of the study area, are derived from the coastal plain sand and alluvial rich sediments [4, 16, 30, 16]. Generally, the vegetation of the study area is that of the humid tropics rainforest drastically altered by deforestation, oil exploration and exploitation activities and environmental pollution.

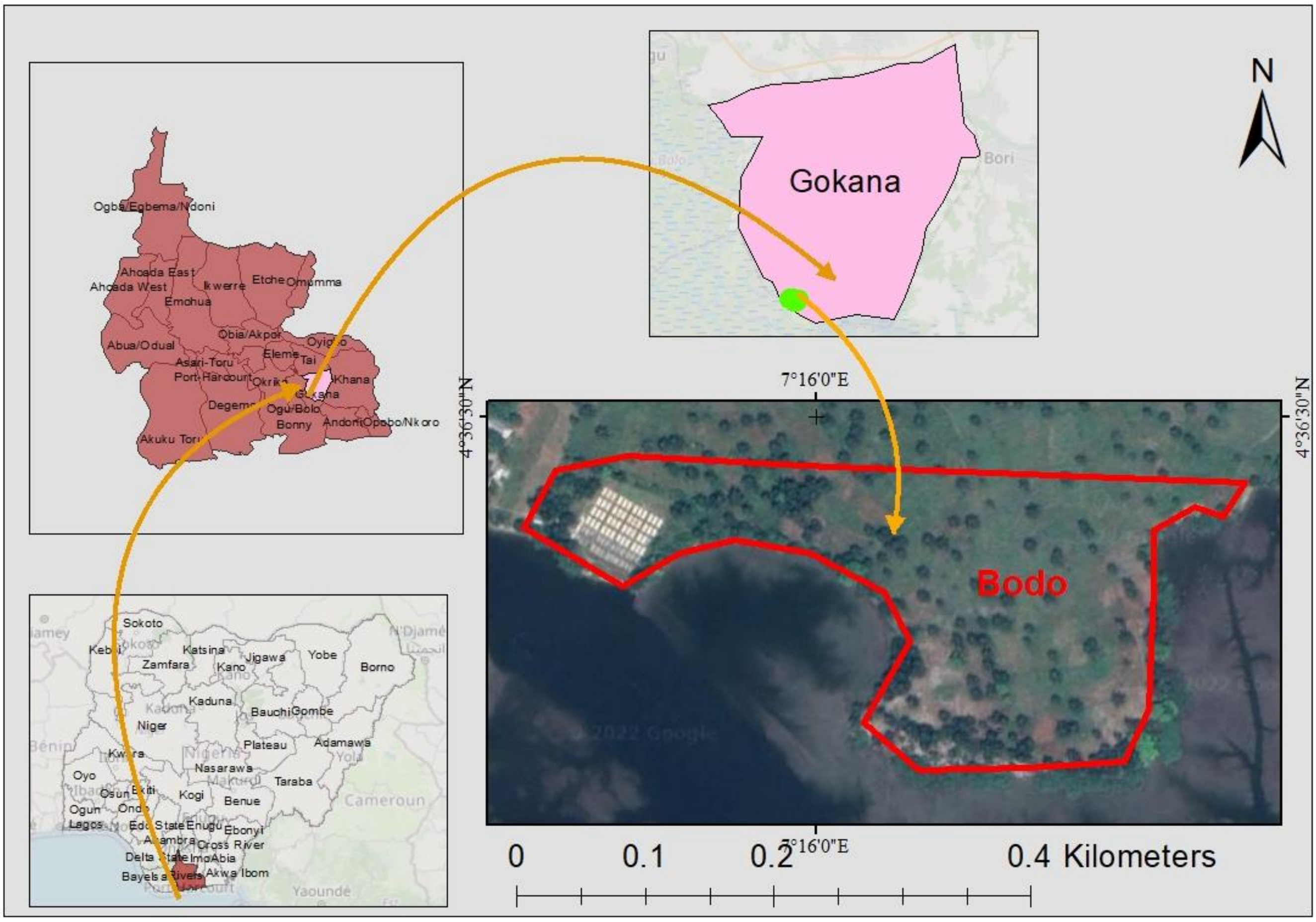

Figure 1. Map of Suigui-Bodo, Gokana LGA.

2.1. Field Studies

A preliminary study was carried out with the acquisition and interpretation of Landsat-ETM imageries with 30m resolution covering the entire study area. Digital elevation model was used to identified and delineate the land form of the study site from the land the form map (Figure 1) covering 20 hectares was selected for the study. A base map was prepared and gridded using the rigid grid methods at 100 m x 100 m interval. This was geo-referenced and the various coordinates was uploaded into a hand held GPS for detailed soil survey (ground truthing). Auger boring was done at 100 m x 100 m at depths of 0 - 30cm, 30 - 60 cm, 60 - 90 cm and 90 - 120 cm to ascertained soil color, drainage, texture (by hand feeling) and depth to water the table. Soils with similar characteristics were identified and grouped to form a mapping unit. Three mapping units were identified and delineated. One soil profile pit each was dug in each of the mapping unit and described according to the procedure described by [21]. Core samples were collected for bulk density determination; while other soil samples were collected from identifiable horizons for the determination of physical and chemical properties of the soils. The colour of the various soil horizon, was determined using munsell colour chart [12]. The soil samples collected were bagged and labeled properly and taken to the Soil Science Laboratory, Rivers State University, Port-Harcourt where they were air-dried, grounded and passed through a 2mm sieve and for laboratory analysis.

2.2. Laboratory Analysis

Laboratory analysis of processed soils samples were done using routine laboratory procedure most appropriate. The particle size analysis was determined by hydrometer method as described by [28]. Textural class was determined using textural triangle, Bulk density was determined from the undisturbed core sampler [11]. Soil pH was determined in water by the pH meter electrode [25]. Total nitrogen was determined by the macro-kjedahl digestion distillation method [23, 25]. Organic Carbon was determined by the [10] method. Available phosphorous was determined using [27] method. Exchangeable Bases (Ca^{2+}, Mg^{2+}, Na^{+} and K^{+}) were extracted by $1NNH_4OAc$ buffered at pH7 [10]. Ca and Mg were determined using Ethylene diamine tetra acid (EDTA) titration method, while the concentration of Na and K were measured with the flame photometer method. Cation Exchange Capacity was determined by the summation method of sodium (Na), potassium (k), magnesium (Mg) and Calcium (Ca) after determination of their exchange values [29]. Effective Cation Exchange Capacity was determined by submission of exchangeable bases and total exchangeable acidity. Total Exchangeable Acidity was determined using the titration

2.3. Soil Classification

The various pedons were classified according to Soil Taxonomy [21, 24] and correlated with World [26] methods at order, suborder, great group and subgroup level.

2.4. Land Suitability Evaluation (LSE)

Land suitability evaluation of the study area was carried out using the guideline provided for yam cultivation. The potentials and limitations of five land attributes (climate, Topography, Wetness, soil physical properties and fertility) was used in the determination of the suitability of the soils identified for yam cultivation was done using the guidelines for yam cultivation by [7] modified from [25, 17, 19]. Land suitability class were obtained by matching some of land qualities with the land use requirement for yam cultivation in the study area. Aggregate suitability class of each pedon was obtained in line with the law of minimum which states that “performance is always determine by the least favourable characteristics or plant nutrient in the lowest supply [8]”.

2.5. Statistical Analysis of Data

The suitability of soils from the various pedons for yam cultivation was ranked using the spearman rho correlation.

3. Result and Discussion

3.1. Morphological Description of the Study Area

The results of morphological properties of the soils in the study area are presented in Table 3. The textures of the different soil horizons from each pedon ranged from sand to sandy loam, a reflection the parent materials from which the soils were formed which is also in line with the findings of (Peter et al, 2022). Several other authors have linked soil texture to the nature of parent materials from which the soils were derived and also to the rate and nature of some weathering processes [2, 3]. In pedon I, there were abundant roots in the Ah-horizon with a depth of 0-19cm; colour 10YR ¾ dark yellowish brown, had a plastic and friable consistence when dry respectively. The A-horizon had fewer roots with a depth of 19-52cm; colour 10YR $^{5/}{}_{8}$ yellowish brown, slightly sticky and non-friable consistence when moist and dry respectively. The AB-horizon also have fewer roots, sticky and non-friable consistence when moist and dry, soil colour was 10YR $^{6/}{}_{8}$ brownish yellow at a depth of 52 - 90 cm. B horizon had no roots, very sticky and non-friable consistence when moist and dry. Soil colour at B-horizon was 10YR $^{7/}{}_{8}$ yellow at a depth of 90 - 200cm. In pedon 2, soil consistence ranged from plastic to slightly sticky when moist and friable to non-friable when dry; there were abundant roots in the Ah-horizon in pedon 2 at depth of 0-28 cm; soil colour was 10YR $^{2/}{}_{1}$ Black with plastic and friable consistence when moist and dry. At the AB-horizon there fewer roots; plastic and friable consistence when moist and dry; soil colour was 10YR $^{3/}{}_{6}$ dark yellowish brown at a depth of 28 - 50cm. BW- horizon of pedon 2 had fewer roots, slightly sticky and non-friable consistence when moist and dry with colour matrix of 10YR $^{7/}{}_{3}$ dark brown at a depth of 50 - 75cm with mottles. In pedon 3, consistence ranged from plastic to slightly sticky when moist and friable to non-friable when dry. There were abundant roots in the AB horizon of pedon 3 at depth of 0-11cm, soil colour was 10YR $^{4/}{}_{3}$ dark brown with plastic and friable consistence when moist and dry. The BW-horizon in pedon 3, had abundant roots, slightly sticky and non-friable consistence when moist and dry; while soil colour was 10YR $^{3/}{}_{8}$ yellowish brown at depth of 11 - 57cm.

Table 1. *Criteria/Limitation for Evaluating Soil-site Suitability for Yam.*

Soil-site Characteristics	Degree of Limitations (L) and Suitability class					
Topography	**S1**	**S2**	**S3**	**N1**	**N2**	
Slope (%)						
1	0-1	1-2	2-4	4-6	-	
2	0-2	2-4	4-8	8-16	-	
3	0-4	4-8	8-16	16-30	30-50	
Wetness						
Flooding	F0	-	-	F1	F2	
Drainage	Good	Moderate	Imperfect	Poor & aeric	Poor but drainable	
Soil physical characteristics						
Texture (clay %)	L, SCL	SC, SiL, SiCL, CL, si, SL, Co	C < 60s, Ls, Lfs	C>60v, LcS, C>60s, SiC, C>60V, fs	S, Cs, Cm, SiCm	
Coarse fragment (vol %)						
Surface	0-1	1-3	3-15	15-35	-	>35
Depth (cm)	0-3	3-15	15-35	35-55	-	>55
Soil depth (cm)	>90	90-60	60-40	40-20	-	<20
CaCO3 (%)	0-5	5-10	10-15	15-30	-	>30
Fertility						
Base saturation	65 - 50	50-35	<35	-	-	-
pH(H2O)	6.3 - 6.0	6.0-5.6	5.6-5.2	5.2-4.8	<4.8	-
Organic carbon (%)	>1.5	1.5-0.8	1.2-0.8	<0.8	-	-

Source: Vinay, 2007 and Peter, 2021.

Table 2. *Land Requirement for the Cultivation of Yam (Dioscorea spp).*

Land requirements/ land characteristics	Land Suitability Class (s)			
	S1	**S2**	**S3**	**N1**
Climate(c)				
Annual rainfall (mm)	_>2000	1300-1999	1000-1299	600-500
Moisture Availability (m)	_>5	4	3	<3
Length of growing season (Days)	_>200	130-200	100-150	<100
Mean temperature (℃)	21_28	25-30	30-35	>35
Topography (t)				
Slope (%)	0-4	4-8	8-16	16-30

Land requirements/ land characteristics	Land Suitability Class (s)			
	S1	S2	S3	N1
Wetness (W)				
Flood hazard	F0	F1	F2	>F2
Drainage	Well drained	Moderate	Moderate	Poorly drain
Soil physical Characteristics (s)				
Texture(surface)	LS, SCL	SC, SiC& SiCL	Cs, Lfs, LS, LSC &Fs	Cs,S & CS
Soil depth (cm)	Deep(>200)	>100	>75	>55
Fertility (f)				
Total N g/kg-1	>1.5	<1.2	0.6	<0.6
pH(H20)	>5 - 6.5	4.5-5	4.44	<4.0
ECEC(cmol/kg)	>12	Any	8-5	<5
Base saturation (%)	>60	>40-60	20-30	<20
Exchangeable K(cmol/kg	>2.0	1.5	1.0	<1.0
Organic matter (g/kg O.C)	>15	8-15	<8	<5

Symbol used for soil texture and structure are defined as follows; Sc: structure clay, Cm: massive clay, SiCi: silty clay, blocky clay, SiCL: Silty Clay loam, CL, Clay loam, Si: silt, SIL: Silty loam, SC: Sandy clay, L: Loam, SCL: Sandy clay loam, Lfs, Loamy fine sand, LS loam Sand, LSC: Loamy coarse sand, Fs: fine Sand, S: sand, CS: coarse Sand. Source Eze (2014) Modified from sys et al. (985)

Table 3. *Morphological Properties of Soils of the Study Area.*

Pedon Design	Horizon depth (cm)	Colour (moist)	T.C	Structure	Consistence	Drainage	Boundary	Roots
PEDON 1 (Summit)								
Ah	0-19	10YR $\frac{3}{4}$ D Y B	Sand	Coarse	Non-sticky,	W.D	Very visible	Very Present
A	19-52	10YR $\frac{5}{8}$ YB	Sandy Loam	S.A. B	Sticky	W.D	Moderately visible	Present
AB	52-90	10YR $\frac{6}{8}$ BY	Sandy Loam	S.A. B	Sticky	W.D	Visible	Moderate Present
B	90-200	10YR $\frac{7}{8}$ Y	Sandy Loam	A. B	Very Sticky	W.D	Visible	Absent
PEDON 2 (Middle Slope)								
P3Ah	0-28	10YR $\frac{2}{1}$ B	Sand	Coarse	Non- Sticky	P.D	Very Visible	Very Present
P3AB	28-50	10YR $\frac{3}{6}$ DYB	Sand	S. A.B	Non- Sticky	P.D	Moderately Visible	Present
P3Bw	50-75	10YR $\frac{4}{3}$ DB	Sand	S.A. B	Moderately Sticky	P.D	Visible	Moderate Present
PEDON 3 (Valley bottom)								
AB	0-11	10YR $\frac{4}{3}$ DB	Sandy Loam	Coarse	NS	D	AC	VP

Pedon Design	Horizon depth (cm)	Colour (moist)	T.C	Structure	Consistence	Drainage	Boundary	Roots
BW	11-57	10YR $\frac{3}{8}$ YB	Sandy Loam	SAB	SS	P.D	D	VP

S.A B - Sub-Angular Blocky, A.B - Angular Blocky, M.P-Moderately Present, M.V - Moderately Visible, W.D - Well Drained, P.D Poorly Drained. S- Sand, SL- Sandy Loam, D.Y.B- Dark Yellowish Brown, Y.B - Yellowish Brown, B-Y- Brownish Yellow, Y- Yellow, B- Black, D.B- Dark Brown, NS = Non-Sticky, SS = Slightly Sticky, AC = Abruptly Clear, VF = Very fine, D = Drained.

3.2. Physical Properties of Soils in the Study Area

Table 4 revealed several variations in soils of the different horizon across three pedons. Sand content varied across the different soil horizons from 806-880 g/kg in pedon 1, while in pedon 2 sand ranged from 890 - 920 g/kg and ranged from 843-891g/kg in pedon 3. The high proportion of sand could be attributed to the parent materials. This collaborated with report with finding of [5]. The silt content also varied from 4 - 40 g/kg in pedon1, while in pedon 2, it varied from 20-40g/kg and from 21-36g/kg in pedon 3. Clay content also varies across the various horizon (80-190g/kg, in pedon 1, 60 -70 g/kg in pedon 2 and 73 - 136g/kg in pedon 3) respectively. Sand values were high in all the pedons, followed by clay and silt. The increase in clay content down the profile was an indication that eluviation/ illuviation processes resulting to the accumulation in the sub-surface horizons as reported by [14, 16, 20]. Bulk density varied among the different soil horizons across pedons. In pedon 1, bulk density ranged from 0.74-1.30 g/cm^3, 1.33-1.52 g/cm^3 in pedon 2 and 0.8-1.4 g/cm^3. Pedon 2 had highest bulk density (1.33-1.52 g/cm^3). The soil total porosity decreased down the horizon in pedon 1 (69 - 54%), there were variations in pedon 2 and 3 (43 - 50% and 54-66%) respectively. It was also observed that pedon 1 had the highest total porosity (1 (69 - 54%),). Textural class in pedon 1, 2 and 3 ranged from sand to sandy loam. Soil structure in pedon 1 ranged from sub-angular blocky to angular blocky; coarse to sub-angular blocky in pedon 2 and 3. The soil in the different horizons in pedon 1 were well drained, while pedon 2 was poorly drained and pedon 3 ranged from well drained to poorly drained in all the different soil horizons.

Table 4. *Physical Properties of Soils of the Study Area.*

Pedon Design	Horizon Depth (cm)	Sand →	Silt gkg^{-1}	Clay ←	Bulk Density (g/cm^3)	Total Porosity (%)	Textural Class
PEDON 1 (Summit)							
Ah	0-19	880	40	80	0.74	69	Sand
A	19-52	816	24	160	1.25	53	Sandy loam
AB	52-90	826	14	160	1.30	51	Sandy loam
B	90-200	806	4	190	1.21	54	Sandy Loam
PEDON 2 (Middle Slope)							
P3Ah	0-28	920	20	60	1.33	50	Sand
P3AB	28-50	900	30	70	1.48	44	Sand
P3Bw	50-75	890	40	70	1.52	43	Sand
PEDON 3 (Valley bottom)							
AB	0-11	891	36	73	0.8	66	Sandy Loam
BW	11-57	843	21	13.6	1.4	54	Sandy Loam

3.3. Chemical Properties of Soil in the Study Area

The chemical properties of soils of the study area are shown in Table 5. Soil reaction (pH) ranged from 4.54 - 4.8 in pedon 1, 54.17 - 94.61 in pedon 2 and 4.05 - 4.20 in pedon 3. Thus, from the results, it is revealed that the soil ranged from very strongly acidic at the soil surface to strongly acidic at sub-surface pedon 1 to 3 respectively. This is also in line with the findings of Peter *et al*, [18, 16, 20], who reported that the coastal plain sand commonly called ogoni sands are acidic in nature even down the soil sub-surface region due to the high level of leaching occurring in the area. Organic matter content of the soil varied from 0.53 -2.76g/kg in pedon 1, 1.02 - 2.02g/kg in peodon 2 and 1.04-2.67 g/kg in pedon 3. It was also observed that the organic carbon ranged from very low to moderate, a characteristics of the coastal plain sand of the humid tropics [20]. Total nitrogen content of the soils ranged from 0.01 - 0.08 g/kg in pedon 1, 0.003-0.30 g/kg in pedon 2 and 0.04 - 0.09g/kg in pedon 3. The soils total nitrogen was low based on the rating by [6]. Available phosphorus content of the soil varied from 5.61-19.65mg/kg in pedon 1, 2.81 - 19.65 mg/kg in pedon and 8.47 - 18.64mg/kg in pedon 3 respectively (very low to moderate). The available phosphorous decreased down the profile in all the pedons. The exchangeable calcium Ca^{2+}) content of the soils varied from 4.00 - 8.00cmol/kg in pedon 1, 2.00 - 8.00 cmol/kg in pedon 2 and 6.21 - 8.01cmol/kg in pedon 3 (moderate to high in pedon 1, 2 and 3) respectively. Magnesium level varied across the peons (1.00 - 3.80 cmol/kg in pedon 1, 2.60 -4.20 cmol/kg and 2.46 - 3.79cmol/kg in pedpn 3). Sodium level varied from 0.56 - 13.04 cmol/kg in pedon, 5.21 - 43.47 cmol/kg in pedon and 4.67 - 12.01 cmol/kg in pedon 3. The concentration of magnesium and sodium in very high in pedon 1 - 3, except in pedon 1 horizon B, that was very low. Potassium level varied from 0.41 - 1.02 cmol/kg in pedon 1, while in pedon 2, 0.77 - 1.92 cmol/kg in pedon 2 and 0.89 - 1.22 cmol/kg in pedon 3. CEC in pedon 1 varied from 10.67 - 21.86 cmol/kg in pedon 1, 14.58 - 55.25 cmol/kg in pedon 2 and14.23 - 25.03 cmol/kg in pedon 3. ECE decreased down the profile in pedon 1 and pedon 3 and increased down the profile in pedon 2; while ECEC varied from 12.07 - 23.46 cmol/kg, 15.56 - 56.16 cmol/kg in pedon 2, and 5.83 - 25.77 cmol/kgs in pedon 3. There was a decreased down the profile in pedon 1 and 3 and increased down the profile in pedon 2. Base saturation also varied from 80 -93% in pewdon 1, 94 - 100% in pedon 2 and 90 - 97% in pedon. Pedon 2 had the highest base saturation compared to pedon 1 and 3.

Table 5. *Chemical Properties of Soil in the Study Area.*

Pedon Design	Horizon Depth (cm)	pH (H_2o)	O.C →	O.M gkg^{-1}	T.N ←	Av.Pm g/kg	Ca →	Mg	Na Cmol/kg	K ←	Al	H	TEA →	CEC	ECEC Cmol/kg ←	B.S %
						PEDON 1 (Summit)										
Ah	0-19	4.57	1.60	2.76	0.08	19.65	4.00	3.80	13.04	1.02	0.84	0.32	1.66	21.86	23.46	93
A	19-52	4.80	0.59	1.02	0.01	8.42	6.00	2.40	4.30	0.77	0.68	0.74	1.42	13.47	14.89	90
AB	52-90	4.61	0.33	0.60	0.03	5.61	8.00	1.00	4.17	0.41	0.80	0.51	1.31	13.58	14.89	91
1B	90-200	4.54	0.31	0.53	0.01	8.42	8.00	1.60	0.56	0.51	0.64	0.76	1.40	10.67	12.07	80
						PEDON 2 (Middle Slope)										
Ah	0-28	4.61	1.17	2.02	0.30	19.65	6.00	2.60	5.21	0.77	0.00	0.98	0.98	14.58	15.56	94
AB	28-50	4.17	0.30	1.95	0.02	2.81	2.00	4.20	34.78	0.92	0.00	1.08	1.08	41.90	42.98	97
Bw	50-75	4.49	0.59	1.02	0.003	16.84	8.00	2.60	43.47	1.92	0.00	0.91	0.91	55.25	55.25	100
						PEDON 3 (Valley Bottom)										
AB	0-11	4.20	1.52	2.67	0.09	18.64	8.01	3.79	12.01	1.22	0.140	0.34	0.74	25.03	25.77	97
BW	11-57	4.05	1.0	1.04	0.04	8.47	6.21	2.46	4.67	0.89	0.88	0.72	1.60	14.23	15.83	90

4. Land Suitability

The factor rating requirements for yam (Tables 1 and 2) were matched with the properties of the studied soils [1]. Table 5 shows the individual scores (ratings) of the land characteristics and the aggregate suitability classes of the soil for yam cultivation [22]. Table 6 revealed that wetness (poor drainage), soil physical properties (texture and soil depth to water table) and fertility (low total nitrogen, low pH, ECEC, Exchangeable K and organic carbon) were the severe limitations to soils of the study area. Thus soils of the study area were marginally suitable (S3) for yam cultivation due to limitations in wetness, soil physical properties and fertility in pedon 2 and 3 (See Table 6). The suitability sub-classes showed that soil fertility such as organic matter, total nitrogen and exchangeable potassium were generally low in the study site; thereby limiting yam production. Therefore, the land was marginally suitable (S3) to yam cultivation in the study area.

Table 6. Summary Table for Land Suitability Evaluation for Yam (Dioscorea spp) Cultivation in Pedon 1-3.

Land Requirements	P1	P2	P3
Climate(c)			
Mean Annual rainfall (mm)	2500 mm (S1)	2500 mm(S1)	2500 mm(S1)
Moisture Availability(m)	85(S1)	85(S1)	85(S1)
Mean Annual temperature (℃)	25-28(S1)	25-28(S1)	25-28(S1)
Topography (t)			
Slope (%)	7(S2)	7(S2)	7(S2)
Wetness (w)			
Drainage	Well drained(S1)	Poorly drained (S3)	Poorly drained (S3)
Soil Physical Characteristics			
Soil texture (surface)	SL (S1)	Sand (S3)	SL (S1)
Soil depth	52-90(S2)	50-70(S3)	11-57 (S3)
Fertility (f)			
Total N g/kg-1	0.03(S3)	0.11(S3)	0.06(S3)
pH (H_2O)	4.63(S2)	4.42(S3)	4.13(S3)
ECEC (cmol/kg)	16.35(S1)	37.93(S3)	20.80(S1)
Base saturation (%)	88.50(S1)	97(S1)	93.50(S1)
Exchangeable K (cmol/kg)	0.68(S3)	1.20(S3)	1.06(S3)
Organic matter g/kg O.C	1.23(S3)	1.66(S3)	1.86(S1)
Aggregate Suitability Class	S3(f)	S3(f,w)	S3(f,w)

5. Conclusion

The result of the study revealed placed the site suitability for the cultivation of yam as marginally suitable (S3) due limitations in wetness, soil physical properties and soils fertility. However, some of these limitations can be remedy through integrated soil management approaches for yam cultivation in the study area.

Conflicts of Interest

There is no conflict of interest please.

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