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ANALYSIS OF SOIL QUALITY OF AGRICULTURE LAND OF PADAUKKHIN VILLAGE IN YEDASHE TOWNSHIP (MYANMAR)

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Abstract: *Environmental sustainability will only be achieved by maintenance and improvement of soil quality. Soil quality is considered as the capacity of a soil to function. Its assessment focuses on dynamic aspects to evaluate the sustainability of soil management practices. In research work, we have made analytical study of chemical parameters of agricultural soil of different location of Padaukkhin village in Yedashe Township Bago Region in Myanmar. Soil analysis is done by standard methods. The aim of this work is to study the fertility of soil of different agricultural land in this area by measuring soil parameters. Such as texture of soil (%), pH, electrical conductivity (EC), organic carbon "OC"(%), nitrogen "N", phosphorus "P" and potassium "K" were found to be in the range of 7.1 - 8.9, 0.29dS/cm - 0.57dS/cm, 0.37% - 0.78%, 52Kg/ha - 81Kg/ha, 32Kg/ha - 54Kg/ha, 234Kg/ha - 293Kg/ha respectively.*

Key Words: *Soil , Quality, Fertility, Agriculture Land in Yedashe.*

1. INTRODUCTION:

Myanmar is an agricultural country so, soil for cultivation needs to be free hazard elements for publish health. Soil is the main reservoir of nutrients from which plants absorb them directly for their growth and proper development. Nowadays, the cultivable lands are gradually becoming the sites for constructing houses and industries. Due to the emergence of population, we need more cultivable lands. Bringing soil samples to cultivation will add to the development of the economy of the country. Reclamation of soils without environmental pollution is the urgent need of the hour.

For analysis of soil, it is necessary to know the fundamental needs of soil. Soil is a natural medium which provides water, nutrients, air and heat to plants for its wholesome growth and give mechanical support to the plant. The aim of this analysis is to assess the surplus, adequacy or deficiency of available nutrients for growth of crop and to monitor change by farming of crop. Plant growth depends on fertility of soil and soil fertility is determined by the availability of nutrients either in the form of macro or micro.

The 17 essential elements for plant growth are as follow (Fitz Patrick, 1986).
Macroelements; carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, calcium, magnesium and sulphur.
Microelements; mangnese, copper, zinc, molybdenum, boron, iron, cobalt and chiorine.

The term "soil" is derived from Latin word "Solum", which means floor or ground. Soil is defined as the upper layer of earth, the loose surface material of the earth, it is the region supporting plant life (Donalol.1963). Man is almost wholly dependent upon plants as a food for himself and for the growth of animals (Gray and Williams,1971). Many of these plants are rooted in the soil, from which they obtain essential mineral nutrients that originate from dead plants animal remains and soil and rock minerals. The soil usually consists of four major components. These are soil mineral matter which is about 45% of the total volume, liquid (water) about 25%, gaseous (air) about 25% and organic matter about 5%.

Nutrients for healthy plant growth are divided into three categories; primary, secondary and micronutrients. Nitrogen "N", phosphorus "P" and potassium "K" are primary nutrients which are needed in fairly large quantities compared to the other plant nutrients. Calcium "Ca", magnesium "Mg" and sulphur "S" are secondary nutrients which are required by the plant growth than the primary nuentrients. Zinc "Zn" and maganese "Mn" are micronutrients, which are required by the plant in very small amounts. Most secondary and micronutrient deficiencies are easily corrected by keeping the soil at the optimum pH value (Nilar Aung, 2007).

Chemical soil testing may yield valuable information to increase the production of agricultural products (Jackson,1980). There are some inherent problems releated analyzing nutrient contents. For the plant, the total content of a certain nutrient may be obsorbed to minerals so stroung that is available to the plant roots. Therefore, some tests treat the sample with solvents in order to stimulate the fraction of the nutrient available to plant. However, the higher activity of soil organisms can result in a better available of the nutrient, thus the result of the test is not fully appropriate. The content of other nutrients such as nitrogen is extremely fluctuating within a few days, so that it highly depends on

the point of time when the sample is taken still. Chemical soil analysis can be used in some cases, e.g, to analyse the level of acidity of the soil pH or to detect deficiency of nutrients. Analysis of soil is carried out for the studies of various parameters like texture of soil (%), pH, electrical conductivity (EC), organic carbon (OC)(%), nitrogen "N", phosphorus "P" and potassium "K". The fertility of the soil depends on the concentration of N,P,K, organic and inorganic materials, and conductivity. The physicochemical properties such as moisture content, nitrogen, phosphorus and organic matter are required for the growth of plant. Potassium is used for flowering purpose, and required for building of protein, photosynthesis, fruit quality and reduction of diseases and phosphate is used for growth of roots in plants.

2. MATERIALS AND METHODS:

Soil Sample Collection Area

In this research work, soil samples were collected from Padaukkhin village in Yedashe Township, Bago Region various agricultural lands of the area. In total "ten" samples from different locations were collected randomly from Padaukkhin village. In order to collect soil sample (0-15cm dept) first removed grasses, litter and other plant residues from soil surface and collect soil samples by using soil collection tools. In each case, a triangular block was marked and soil samples were collected in plastic bags which were sealed and label properly. Soil samples were brought to the laboratory for analysis.

(Table.1) Soil quality parameters with their method

Sr.No.	Soil quality	Method	Unit
1.	Texture	Pipetting method	-
2.	pH	pH meter	-
3.	Organic carbon	Titrimetric method	%
4.	Nitrogen	Kjeldahl method	Kg/ha
5.	Phosphorus	Spectrophotometric method	Kg/ha
6.	Potassium	Atomic Absorption Spectrophoto meter(A.A.S)	Kg/ha
7.	Electrical Conductivity(EC)	Digital portable water analyzer kit	dS/cm

3. RESULTS AND DISCUSSION:

Texture

Texture refers to the relative proportion of primary particles of sand, silt and clay and other skeleton materials in the soil body (Lal and Green iand,1979). Soil particles have been classified according to size (Millar etal ,1958) as shown in (Table.2) .The nontechnical terms lightness and behaviourness refer to soil texture. Heavy soils are high in clay and other fine particles, light soil are low in clay and high in sand and other coarse particles (Janick et al.,1969). The rate and extent of many important physical and chemical reaction in soil are governed by texture because it determines the amount of surface on which the reactions can occur (Millar et al., 1958).Textural terms such as "Loam", "Sandy loam" and "Clay loam" are of ancient origin and referred originally to the ease with which a soil could be cultivated.

In this research work, the texture of the soil can be classified as loamy sand (0-10cm) and sandy loam (20-30cm) respectively (Table.3).

(Table.2) Sizes of soil separates

Separate	Diameter *(mm)
Very coarse sand	
coarse sand	2.00-0.20
Medium sand	
Fine sand	0.20-0.020
Very fine sand	
Silt	0.020-0.002

(Table.3) Texture of soil

Sample No.	Sand%	Silt%	Clay%
1	78	20	2
2	83	16	1
3	80	18	2
4	77	21	2
5	80	19	1
6	79	5	16

Clay	Below 0.002

*Internal Soil Science Society System

7	74	7	19
8	76	10	14
9	77	10	13
10	79	11	10

pH

The pH value of soil is one of a number of environmental conditions that affects the quality of plant growth. The soil pH value directly affects nutrient availability. Plants thrive best in different soil pH ranges. Azaleas, blue berries and conifers thrive best in acid soils (pH 5.0 to 5.5).The pH parameter of collected soil samples varies between the range 7.1 and 8.9 with the mean value of 7.97 (Table.4).pH can affect the availability of nutrients and activity of many essential micro-organisms. And most of the samples found alkaline, high alkalinity is not good for microbes.

Electrical Conductivity (EC)

Electrical Conductivity (EC) is varied from 0.29dS/cm to 0.57dS/cm with a mean value of 0.39dS/cm (Table.4). The values of electrical conductivity is in the range 0-2dS/cm.This shows that all samples are salt free (ref;Table.5).

Organic Carbon (OC)

Soil organic carbon, the major component of soil organic matter, is extremely important in all soil processes. Organic material in the soil is essentially derived from residual plant and animal material, synthesized by microbes and decomposed under the influence of temperature, moisture and ambient soil conditions. The annual rate of loss of organic matter can vary greatly, depending on cultivation practices, the type of plant/crop cover, drainage status of the soil and weather conditions. There are two groups of factors that influence inherent organic matter content; natural factors (climate, soil parent material, land cover and/or vegetation and topography), and human-induced factors (land use, management and degradation).

Organic carbon(OC) of the soil varies from 0.37% to 0.78% with a mean value of 0.62% (Table.4). It is very low (<0.50) in 10% soil samples, 80% soil samples are medium and 10% samples are with high value (>0.75) (ref; Table.5).

Potassium "K"

Of the three nutrients that all plants need in the large amounts, potassium is the least understood. Unlike nitrogen and phosphorus, it does not form any part of the plant, but exists in the soil, where it acts as a catalyst to enzyme reactions necessary for plant growth. But as with all beneficial soil components, too much potassium can be detrimental to plant growth, as it interferes

synthesis, stimulating root growth and neutralizing acids. with the uptake of other substances. There are ways to combat this, however, to assure that plants get all the nutrients they need and in the right amount.

The amount of potassium in the soil varies from 234Kg/ha to 293Kg/ha with a mean value of 264.6Kg/ha (Table.4). In case of potassium, no sample is low range. Among ten samples, 80% contains medium amount (108-280), whereas remaining 20% are with very high amount (>280) (ref; Table.5). It may be used of over fertilizers.

Phosphorus "P"

Phosphorus is an essential macro-element, required for plant nutrition. It participates in metabolic processes such as photosynthesis, energy transfer and synthesis and breakdown of carbohydrates.

Phosphorus is found in the soil in organic compounds and in minerals. Phosphorus is needed for cell division, hence to promote root formation and growth, vigorous seedlings, flowering, crop maturity and seed production and to improve winter hardiness in fall plantings. Phosphorus is important in fat, carbon, hydrogen and oxygen metabolism, in respiration and in photosynthesis. It is stored in seeds and fruit. High phosphorous level in soils are usually the culprit of over fertilizing or adding too much manure. Not only does excessive phosphorus harm plants, it can also stay in soil for years. Phosphorus of the soil varies from 32Kg/ha to 54Kg/ha, with amean value of 43.2 Kg/ha (Table.4).It is observed that phosphorus in all samples are of high range (>24.6) (ref; Table.5)

Nitrogen "N"

Nitrogen is one of the most important nutrients for plant growth and is needed in relatively large amounts by all plants so a standard nitrogen recommendation is routinely provided for vegetable gardens. Chemical manufacturing of nitrogen fertilizers is nowadays another pathway for atmospheric nitrogen to get into plant available forms. For plants nitrogen is the nutrient in most demand but too much is as bad as too little excess of nitrogen or an imbalance of nitrogen

compared with other nutrients can make plants more prone to pest and disease attack. There is a well-known direct relationship between the amount of chemical nitrogen fertilizer applied to plants and aphid attack, the higher the amount of nitrogen, the more aphids on the plants. Most of the nitrogen in the soil exists in the form of organic matter of some kind. When organic matter breaks down the nitrogen ends up as ammonium (NH4+) which can turn into ammonia gas under alkaline conditions (pH above 7). Nitrogen of the soil varies from 52Kg/ha to 81Kg/ha with a mean value of 74Kg/ha (Table.4). It is observed that nitrogen in all samples are of low range (ref;Table.5).

(Table.4) Soil quality of selected sample from the study area

Sample No.	N (Kg/ha)	P (Kg/ha)	K (Kg/ha)	OC %	pH	EC dS/cm
1	81	48	254	0.68	7.5	0.3.
2	52	40	250	0.67	7.9	0.34
3	69	44	264	0.59	7.6	0.29
4	84	44	272	0.78	7.1	0.44
5	72	35	270	0.74	8.3	0.44
6	65	32	234	0.68	8.7	0.57
7	69	37	283	0.57	8.4	0.35
8	81	48	293	0.66	7.8	0.47
9	83	50	268	0.37	8.9	0.49
10	85	54	258	0.49	7.5	0.30
Mean	74	43.2	264.6	0.62	7.97	0.39
Minium	52	32	234	0.37	7.1	0.29
Maximum	81	54	293	0.78	8.9	0.57

(Table.5)General Interpretation of soil Parameters

pH	EC	OC	K	P	N
<4.6 Extremely Acidic	0-2 Salt free	<0.5 Low	<108 Low	<10 Low	51-100 Low
4.6-6.5 Strongly Acidic	4-8 Slightly saline	0.5-0.75 Medium	108-280 Medium	10-24.6 Medium	101-150 Medium
5.6-6.5 Moderate Acidic	9-15 Moderate saline	>0.75 High	>280 High	>24.6 High	151-300 Better
6.6-6.9 Slight Acidic 7 Neutral	>15 Highly saline				>300 Sufficient
7.1-8.5 moderate Alkaline					
> 8.5 Strongly Alkaline					

4. CONCLUSION:

The most important elements that are required by plant from the soil are nitrogen, phosphorus, and potassium (NPK) because these three elements are essential for the growth of plant. Nitrogen is an essential and important constituent of the plant's body. Likewise, phosphorus is another important constituent. Potassium is not a constituent element of the plant body. It however, occurs in the plant as soluble salts. Its role is catalytic.

Leaf crops like cabbage require abundant nitrogen, a fair amount of phosphorus but not much potassium. Root crops required a good amount of potassium, fair amount of phosphorus but very little nitrogen. Seed bearing plants such as peas, beans and tomatoes require a good amount of phosphorus and potassium but little nitrogen. Fruiting and seed formation require higher potassium but very little nitrogen. This study shows that the study area is free from salt, not even acidic in nature. It is moderately alkaline in nature. Very high value of potassium and phosphorus indicates much use of fertilizers. Electrical conductivity (EC) of study areas are fairly good for agriculture.

The result of the study reveals the values or percentages of physicochemical parameter and physicochemical study of soil is important to agricultural chemists for plants growth and soil management. The results of present study will help to identify the type and degree of soil related problems and to suggest appropriate reclamation measure and also to find out suitability for growing crops. It will also help to study the sol genesis. On the basis of this study, farmers can get approximate idea about the amount of which fertilizers and nutrients needed to soil for increase the percentage of crops.

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