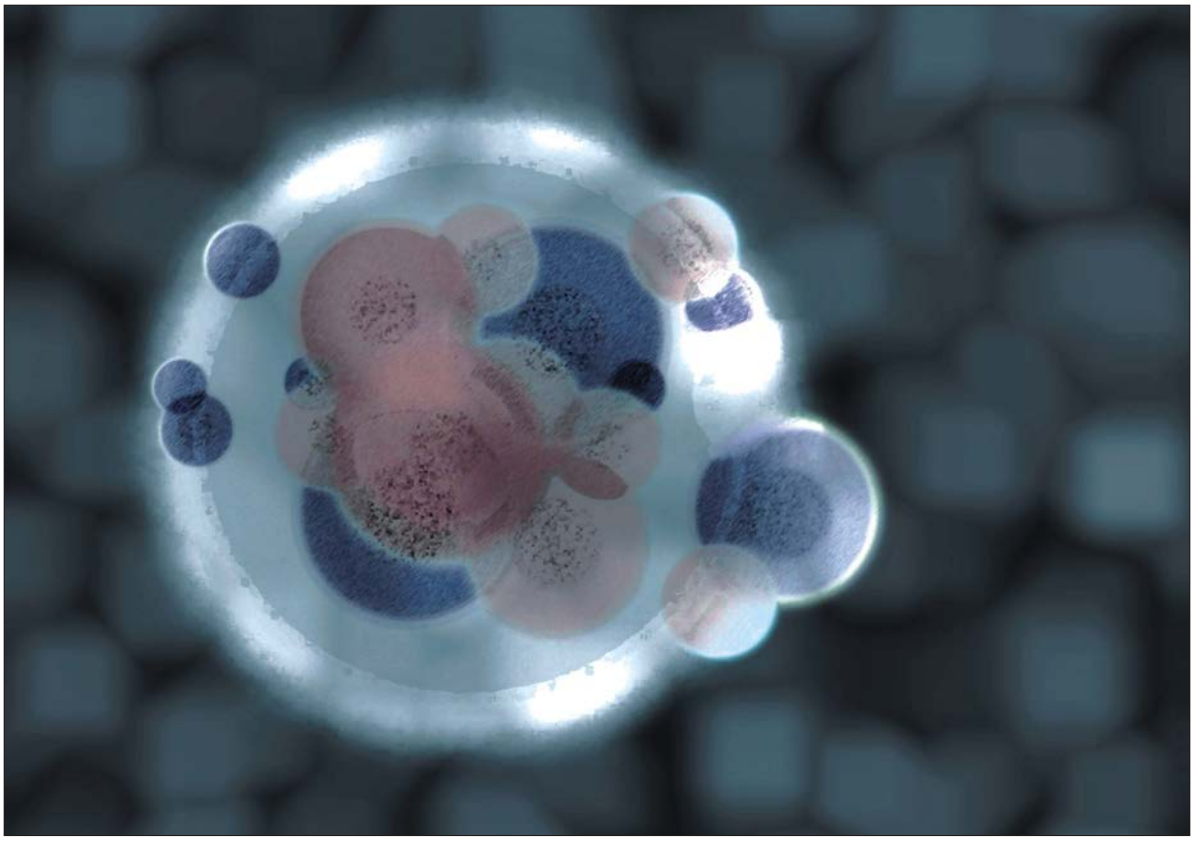

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Soil Fertility Status of Quaid-i-Azam University Islamabad, Pakistan

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Abstract: A study was conducted to investigate the soil fertility status of Quaid -I- Azam University Campus Islamabad for the provision of guidelines to researchers and farmers for better crop production. A total of thirty composite soil samples were collected, analyzed and classified for texture, soil pH, electrical conductivity (EC), organic matter, available phosphorus and potassium. Texture of the soil varied, sandy loam (10%), loam (47%), and clay loam (43%). The pH values ranged between 6.9-8.5.Out of total all soil samples were normal with no hazard of salinity. Organic matter was deficient or poor in 93% samples and satisfactory in 7% samples. Available phosphorus was poor in 77% samples, satisfactory in 3% samples and adequate in 20% samples. In available potassium 60% soils in Quaid-I-Azam University have satisfactory level anci 40% samples fall in adequate level. Fertilizer recommendations were advised according to soil condition and fertility status of the soil.

Key words: Fertility status, soil texture, soil pH, salinity/sodicity, arsenic matter status

Introduction

Soil supports all food and fiber production system without which human existence would not be possible on this planet. The fertility of the soil is dependent upon the amount and type of its constituents like air, water, mineral and organic matter and the microorganism (Fitzpatrick, 1986). The organic fraction of soil includes plants and animal residues at various stages of of their decomposition, which leads to mineralisation of soil. This mineralisation process is under the influence of animal, plant and microbial enzymes present there in (Ladd, 1978).

Soil fertility is related to the amount of available nutrients, while others measure it by the yield capacity and still others look it to be a function of organic matter or even soil texture. In brief soil fertility refers to the availability soil status of essential macro and micronutrients in the soil (Tisdale *et al*., 1993).

Qureshi *et al*. (2000) reported that 100% soil samples were poor in organic matter contents. Arshad and Akram (1999), reported in Central Rechna Doab that the soil is deficient in organic matter. It seems that slight variation in topography of the area has resulted in less accumulation of organic matter in these spots (Biere, 1996). The assay of soil fertility status is essential for judicious use of fertilizers and assurance of better crop yields. The diagnostic techniques for fertility evaluation include fertilizer trials, soil test and plant analysis. Out of these, soil test provides the most accurate information on the availability of various plant nutrients (Dahnke and Olson, 1990). Welch and Wiere (1987), Rashid and Memon (1996), necessitated that a soil testing program is beneficial to formulate specific fertilizer recommendations.

Farm yard manure (FYM) is specially beneficial as it takes care of the physical problems of soil and nutritional problems of the plants (Ghafoor *et al*., 1990) and its continuos use resulted in lowering of pH, increase in organic matter, Cation Exchange Capacity. The nitrogenous (N) fertilizers significantly depressed pH (Janzen, 1987).

It is a rapid and less expensive method for evaluation of fertility status of soils and recommendation of optimum fertilizer rates for economic crop production. The present study was undertaken to evaluate the soil fertility status of Quaid-i-Azam University Campus, Islamabad.

Materials and Methods

Thirty composite soil samples from different sites of University campus were collected from 0-15 and 15-30 cm depth for crops to asses soil fertility. Previous crop history was recorded for formulating the recommendations. Samples were air dried, ground and passed through 2 mm sieve and analyzed for physico chemical characteristic in soil fertility survey and soil testing institute, Rawalpindi. Soil texture was determined by measuring saturation percentage of soil (Malik *et al*., 1984). Soil pH was recorded (Schofield and Taylor, 1955) and electrical conductivity (EC) at 25°C was measured by preparing soil and water suspension (1:1). Samples were analyzed for organic matter (Cottenie *et al*., 1979), available phosphorus (Watanabe and Olsen, 1965). Exchangeable potash was determined by flame photometer. The following criteria were used for classification.

Soil texture

Saturation	Percentage	Textural Class
0	20%	Sand
21	30%	Sandy Loam
31	45%	Loam
46	65%	Clay Loam
66	100%	Clay

Soil salinity/sodicity

Status	E.C dS/m	pH
Normal	<4	<8.5
Saline	>4	<8.5
Saline Sodic	>4	± 8.5
Sodic	<4	>8.5

Nutrient status

Status	Organic Matter G/100grn	Extractable Phosphorus mg per kg	Available Potash mg/kg
Poor	<8.6	0-5	<50
Satisfactory	0.86-1.29	5-10	50-125
Adequate	>1.29	710	>125

Table 1: Number of soil samples analysed for soil texture, pH, salinity and sodicitt, organic matter, available P and K

No of	Texture			pH		Salinity and Sodicity				Organic Matter			Available phosphorus			Available Potash			G.Total
Soil Samples	L	M	H	<8.5	>8.5	N	S	SS	SOD	P	S	A	P	S	A	P	S	A	
1	-	1	-	1	-	1	-	-	-	1	-	-	1	-	-	-	-	1	6
2	-	-	1	1	-	1	-	-	-	1	-	-	-	-	-	-	-	1	6
3	-	-	1	1	-	1	-		-	1	-		-	-	1	-	1	-	6
4	-	-	1	1	-	1	-	-	-	1	-	-	-	-	1	-	-	1	6
5	-	-	1	1	-	1	-	-	-	1	-	-	-	-	1	-	-	1	6
6	-	-	1	1	-	1	-	-	-	1	-	-	-	-	1	-	-	1	6
7	-	1	-	1	-	1	-	-	-	-	1	-	-	-	1	-	-	1	6
8	-	-	1	1	-	1	-	-	-	-	1	-	-	-	1	-	-		6
9	-	-	1	1	-	1	-	-	-	1	-	-	-	1	-	-	-	1	6
10	-	-	1	1	-	1	-	-	-	1	-	-	1	-	-	-	-	1	6
11	-	1	-	1	-	1	-	-	-	1	-	-	1	-	-	-	1	-	6
12	1	-	-	1	-	1	-	-	-	1	-	-	1	-	-	-	1	-	6
13	-	1	-	1	-	1	-	-	-	1	-	-	1	-	-	-	1	-	6
14	-	1	-	1	-	1	-	-	-	1	-	-	1	-	-	-	1	-	6
15	-	1	-	1	-	1	-	-	-	1	-	-	1	-	-	-	1	-	6
16	-	1	-	1	-	1	-	-	-	1	-	-	1	-	-	-	1	-	6
17	-	1	-	1	-	1	-	-	-	1	-	-	1	-	-	-	1	-	6
18	1	-	-	1	-	1	-	-	-	1	-	-	1	-	-	-	1	-	6
19	-	1	-	1	-	1	-	-	-	1	-	-	1	-	-	-	-	1	6
20	-	1	-	1	-	1	-	-	-	1	-	-	1	-	-	-	1	-	6
21	-	1	-	1	-	1	-	-	-	1	-	-	1	-	-	-	1	-	6
22	1	-	-	1	-	1	-	-	-	1	-	-	1	-	-	-	1	-	6
23	-	1	1	1	-	1	-	-	-	1	-	-	1	-	-	-	-	1	6
24	-	-	1	1	-	1	-	-	-	1	-	-	1	-	-	-	-	1	6
25	-	-	1	1	-	1	-	-	-	1	-	-	1	-	-	-	-	1	6
26	-	-	1	1	-	1	-	-	-	1	-	-	1	-	-	-	1	-	6
27	-	-	1	1	-	1	-	-	-	1	-	-	1	-	-	-	1	-	6
28	-	1	-	1	-	1	-	-	-	1	-	-	1	-	-	-	1	-	6
29	-	-	1	1	-	1	-	-	-	1	-	-	1	-	-	-	1	-	6
30	-	1	-	1	-	1	-	-	-	1	-	-	1	-	-	-	1	-	6
Total	3	14	13	30	-	30	-	-	-	28	2	-	23	1	6	-	18	12	180
%age	10	47	43	100	-	100	-	-	-	93	7	-	77	3	20	-	60	40	
Mean	1	1	1	1	-	1	-	-	-	1	1	-	1	1	1	-	1	1	
S.D.	0	0	0	0	-	0	-	-	-	0	0	-	0	0	0	-	0	0	

L = Light (Sandy loam) N = Normal P = Poor
M = Medium (Loam) S = Saline S = Satisfactory
H = Heavy (Clay loam) SS = Saline Sodic A = Adequate
Sod = Sodic S.D = Standard deviation

The data was subjected to statistical analysis for standard deviation and computation of means (Table 1) (Steel and Torrie, 1980).

Results and Discussion

The data concerning soil texture, soil pH, salinity and sodicity, organic matter, extractable phosphorus and exchangeable potash are given in (Table 1) and minimum, maximum and average values of all the determinations are given in (Table 2).

Table 2: Minimum, maximum and average values of different determinations

Determinations	Minimum	Maximum	Average
pH	6.9	8.5	7.7
Electrical- Conductivity	0.20	0.60	0.4
Organic-Matter	0.55	0.95	0.75
Available- Phosphorus	1.4	24.2	12.8
Available- Potassium	80.00	200.00	140.00

The soil analysis data of different sites indicate that pH values of the area varied from 6.9 to 8.5 (Table 2). These soil samples were considered normal, so all the soil samples were safe from the salinity hazards, thus the picture revealed by the total dissolved salts (TDS) that the area was free from salts in 1971 (Muhammad, 1978), but salinity and sodicity patches may develop later gradually due to application of brackish water either by pumped or collected from salts loaded run off in the reservoir.

Regarding texture 47% soil samples lies in the category of medium, 43% soil samples were Heavy and 10% soil samples falls in the category of Loam (Table 1). The data further revealed that 93% soil samples were deficient in organic matter and 7% were satisfactory while in available phosphorus 77% soil samples were poor, 3% were satisfactory and 20% soil samples were at adequate level (Table 1). In available potassium 60% soil samples were satisfactory and 40% soil samples were at adequate level (Table 1).

Keeping in view situation, the researchers/farmers were advised to keep practice of rotating guara *(Cyamopsis* spp.) and jantar, dahancha *ISesbenia* spp.) at maturity to enhance the soil fertility besides using recommended doses of chemical fertilizer to obtain full benefits. Application of FYM once in every two years will promote the crops yields by improving physical, chemical, biological and nutritional properties of the soil. The productivity of the soil is declining due to imbalance use of fertilizer but awareness about balanced fertilizer usage should be propagated among the farmers.

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