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Organic Matter Status of Gujar Khan Tehsil

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Abstract: A study was conducted to investigate the organic matter status of Tehsil Gujar Khan of district Rawalpindi. Forty eight composite soil samples were collected from different sites of Tehsil. These samples were analyzed for organic matter. Organic matter was deficient or poor <0.86% in all the soil samples analyzed. The maximum organic matter of 0.8% were recorded at Bardiana site and minimum organic matter of 0.25% were observed at Gulliana site. The average maximum organic matter of 0.6% were observed at Bardiana and Daultala sites in the Tehsil. The low organic matter at most of the sites may be due to eroded nature of soils in this area. Fertilizer recommendations were advised to farmers according to soil condition and organic matter status of the soil.

Key words: Organic matter, Tehsil Gujar Khan, fertility status, recommendation

Introduction

Most of the soils in Pakistan have been exhausted due to continuous crop production and meager replenishment, particularly in rainfed areas. Cook (1967) relates soil fertility to the amount of available nutrients while others meager it by the yield capacity still others, look it to be a function of organic matter or even soil texture. Balanced use of Fertilizers is a basic need for boosting crop production. The soils of Pakistan are characteristically low in organic matter <1% (Hassan, 1975; Tahir, 1980; Azam, 1988) out of 6000 samples analyzed for organic matter, 61.8% sites were deficient in Punjab (Malik *et al.,* 1975). Studies on different crops had shown large increase in yields in soils deficient in organic matter under increasing level of N and P (Khan *et al.,* 1987) and green manuring (Akram *et al.*, 1982). Farm Yard Manuard (FYM) is specially beneficial as improved the physical condition of soils and offset nutritional problems of the plants (Ghafoor *et al.,* 1990) and its continuous use resulted in lowering of soil pH, increase in organic matter, cation exchange capacity (CEC) and exchangeable cations (Lohia *et al.,* 1980). The Nitrogenous (N) fertilizers significantly depressed pH (Janzen, 1987). Bhariguvanshi (1988) observed that long term application of FYM and fertilizers did not effect soil pH, however water holding capacity (WHC) was improved by 25% in sandy loam and 35% in clay loam soils while use of fertilizers alone increased salt content (Conductivity) of soils. Soils testing program is essential to formulate site specific fertilizers recommendations, as proposed by Welch and Wiere (1977), with the following four distinct aspects:-

1. Educational
2. Irnproved soil sampling and analytical techniques
3. Research to provide correlation and calibration data
4. Consistent Monitoring, interpretation and recommendations

In addition to soil nutrients, soil data regarding pH, texture, Organic Matter, soil type/series and clay type/Mineralogy are also necessary (FAO, 1978). The fertility status of soil varies with nature crop pattern and management practices. Therefore assay of fertility status is essential for Judicious fertilization and assurance of better returns from food and fiber crops. The diagnostic technique for fertility evaluation include fertilizer trials, soil test and plant analysis out of these soil test provide most accurate information on supplies of different nutrients and changes affecting nutrient availability. In almost all the countries soil testing survey is available for making fertilizer recommendations (Chaudhary, 1980). 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 Gujar Khan tehsil fall under subhumid areas of Rawalpindi district with sandy loam to loam textured , soil. The present study was under taken to evaluate the organic matter status of Gujar Khan Tehsil.

Materials and Methods

Forty eight composite soil samples from different sites of Tehsil Gujar Khan of district Rawalpindi were collected from 0-15 and 15-30 cm depths 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. 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).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
		100%	Clay

Soil salinity and sodicity:

Status	E.0 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
	Poor	< 0.86
	Satisfactory	0.86-1.29
	Adequate	>1.29

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 pH, salinity and sodicity , texture and organic matter is given in (Table 1) and Minimum,

Table 1: Number of soil samples analyzed for texture, PH, salinity and sodicitv and oraanic matter

Site	Texture			PH		Salinity abd Sodicity				Organic matter			Total
	L	M	H	<8.5	<8.5	N	S	SS	SOD	P	S	S	
Goira-Badahana	B	-	-	8	-	8	-	-	-	8	-	-	32
Bardiana	-	1	7	8	-	8	-	-	-	8	-	-	32
Mohra-Fatima	-	8	9	8	-	8	-	-	-	8	-	-	32
Daultala	-	8	-	8	-	8	-	-	-	8	-	-	32
Bandth	-	8	-	8	-	8	-	-	-	8	-	-	32
Gulliana	4	4	-	8	-	8	-	-	-	8	-	-	32
Total	12	29	7	48	-	48	-	-	-	48	-	-	192
% age	25	60	15	100	-	100	-	-	-	100	-	-	
Mean	6	5.8	7	8	-	8	-	-	-	8	-	-	
S.D.	2	8.16	0	-	8	-	-	-	0	-	-		

192L =Light (Sandy loam) = N = Normal = P = Poor = M = Medium (Loam) = $ = Loam)SS = Saline Sodic A = Adequate = Sod =Sodic = S.D = Standard Devition

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

Site	PH			EC			Organic Matter		
	Min.	Max	Ave.	Min.	Max	Ave.	Min.	Max	Ave.
Gojra-Eladahana	7.50	7.70	7.60	0.25	0.35	0.25	0.25	0.45	0.35
Bardiana	7.50	7.70	7.60	0.31	0.40	0.35	0.35	0.80	0.57
Mohar-Fatima	7.60	7.80	7.70	0.24	0.33	0.28	0.40	0.55	0.47
Daultala	7.60	7.80	7.70	0.40	0.66	0.48	0.50	0.65	0.57
Bandth	7.30	7.90	7.60	0.34	0.43	0.38	0.35	0.60	0.47
Gulliana	7.40	7.70	7.55	0.35	0.55	0.45	0.45	0.40	0.32

Maximum and Average values of all the determinations are given (Table 2). The soil analysis data of different sites of Gujar Khan tehsil indicate that pH values of the area varied from 7.3-7.9. These soil samples were considered non saline. So, 100% soil samples were safe from the salinity hazard, thus the picture revealed by the total dissolved salts (TOS), 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 reservoirs. As regards the texture 25% samples were sandy loam, 80% loam and 15% were clay loam in all the sites of Gujar Khan tehsil. The data further revealed that 100% soil samples were deficient in organic matter because of intensive cultivation of crops and arid climate had further aggravated to the situtation. Keeping in view, the farmers were recommended to grow wheat (*Triticum aestivum* L.) and rapes and mustard (*Brassica* spp.) with chick pea (*Cicer arietinum*) alternatively in winter (Rabi) while ground nut *Arachis hypogaea*) and pulses with maize (*Zea mays*) and sorghum (*Sorghum vulgare*) in summer (Kharif) season in the same field to restore the soil fertility. The practice of rotating the guar (*Gyamoposis* spp.) and Jantar and dhancha (*Sesbania* spp.) at full maturity enhances soil fertility besides using recommended doses of chemical fertilizers to obtain full benefits. Application of FYM once in two years will promote the crops yield by improving physical, chemical, biological and nutritional properties of soil. Similarly the peasants were motivated for water testing and application of gypsum so that their soils might not be further degraded. The plants like sordan grass (*Sorghun bicolor*, *S. sudanese*) and kikar (*Acacia* spp.) for timber and fuel purposes should be grown on barren soils to avoid soil erosion and to protect the top fertile layer of soil. Given the uniqueness of an area, it is recommended to adopt site specific recommendations to conserve the soil and obtain maximum possible economic return. It is concluded that:

1. The soil of Gujar Khan tehsil were deficient in organic matter
2. The productivity of soil is declining due to imbalance use of fertilizer
3. There is no severe problem of excessive salt but needs care
4. Awareness about balanced organic fertilizer usage should be propagated among the farmers

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