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Fertility Status of Cultivated Land in Azad Kashmir

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Abstract: The research study was carried out in the four districts of Azad Kashmir (Muzaffarabad, Mirpur, Bagh and Rawalakot). Soil samples were collected randomly through out the study area depending upon the cultivated land in each district. The samples were analysed for texture, pH, organic matter, available phosphours and available potassium. The results were classified according to the prescribed standards for crop growth to check the fertility status of the soils. It was found that majority of the samples of each district were having adequate levels of organic matter, available phosphorus and potassium except for district Mirpur where most of the samples were found deficient in available phosphorus. The pH level of maximum samples was under the ideal range of 6.5 to 7.5. The textural class of most of soils was clay loam. This study will serve as a pre-requisite guide for studying in detail the fertility status of the state.

Key words: Texture, pH, organic matter, phosphorus, potassium

Introduction

Soil is an indispensable basic natural resource for crop production. Whereas fertility of a soil refers to the ability of a soil to supply the nutrients essential for plant growth. Fertility is only one of a number of factor that determine the magnitude of crop yield. Low soil fertility is one of the major constraints to optimum crop growth and yield. According to Rashid (1996) the fertility of the soil can be managed by fertilization, but the farmer must be aware of the nature and severity of the nutrient problem (s) in his field in order to arrive at a decision regarding the kind and dose of fertilizers to be applied.

The problems like deforestation, overgrazing and poor input delivery system is degrading the non-renewable soil resource of the state. In addition to this soil fertility depletion is occurring due to continuous cultivation of the soil. In fact soil erosion and fertility degradation go hand-in hand. Factor responsible for soil fertility depletion in Azad Kashmir includes continues nutrient mining by intensive cropping, use of low qualities of fresh farm yard manure, very little or no use of chemical fertilizers and non-exploration of biological nitrogen fixation in the cropping system (Rashid, 1998). The study was conducted in the four districts namely Muzaffarabad, Mirpur, Bagh and Rawlakot to check the fertility status of the cultivated land in the state.

Materials and Methods

To study the fertility status of the soils, samples were collected randomly from the research area depending upon the cultivated land in each district. A total of 957 samples were collected from the farmer's fields including 629 samples from district Muzaffarabad, 178 samples from district Rawalakot, 100 samples from district Mirpur and 50 samples from district Bagh. The largest cultivated area being in district Muzaffarabad and smallest being in district Bagh.

The samples were air-dried, sieved in 2 mm sieve and were analysed for texture, pH, organic matter, available phosphorus and available potassium. Soil texture was determined by hydrometer method (Bouyoucos, 1962) and was classified into three main textural classes. The pH was measured by Mclean (1982) procedure and data was classified into three levels. Organic matter was analysed by Walkely and Black Method (1934) and was classified according to FAO (1980) standards Available phosphorus was analysed by Sodium Bicarbonate Extractable Method (Olsen *et al.*, 1954) and data was classified into three categories according to Wehab (1985). The results of chemical analysis were subjected to statistical analysis and the differences among the levels were tested by Duncon's Multiple Range Test.

Results and Discussion

The soil texture of the four districts is shown in Fig. 1. It shows that in district Mirpur 91 % of the soils were loam as compared to Rawalakot (72.5 %), Muzaffarabad (72 %) and Bagh (48.9%) respectively. Clay loam soils were almost same except for district Mirpur. Whereas sandy loam soils were found more in district Bagh followed by Rawalakot (14.4 %), Muzaffarabad (13.5 %) and Mirpur (8 %) respectively. These results show that loamy soil, which is a good medium of growth for all common agricultural crops, is abundant through out the state. This type of soil does not have any problem of aeration as its water holding capacity and porosity is batter as compared to other classes.

The results showed (Fig. 2) that the best range of soil pH exists in district Rawalakot (86.8%) followed by Mirpur (77%), Bagh (70%) and lowest in Muzaffarabad (55.8 %) respectively. At this range of soil pH all the plant nutrients are available to the plant. Whereas at an acidic level district Muzaffarabad had about 37.8 % samples followed by district Mirpur (22%), Bagh (20 %) and lowest in district Rawalakot (11.8). Whereas in the alkaline range 10 % samples from district Bagh were recorded and the other districts had only 7 % samples in this range. These results showed that there is no problem of alkalinity in the state. The pH of all the soils was in suitable range, where the availability of nutrients is not affected.

The organic matter in the state soil is more than adequate. The results of the analysis of organic matter are shown in Table 1. It shows that around 70% of Azad Kashmir soils have organic matter greater than 1.3 %. Few soils of district Muzaffarabad had organic matter less than 0.85 % . The organic matter of these soils can be improved by the use of well rotten farm yard manure or by green manuring which will not only increase the fertility of the soil but will also result in high yield of the crop. Organic matter acts as a complete fertilizer for all the available nutrients required by the crop but its availability is slow as compared to the chemical fertilizers,

The results of available phosphorus are shown in Table 2. It was found that available phosphorus was greater than 15. Kg^{-1} in more than 40% soils of all districts except in the soils of district Mirpur where only 24% of soils have available

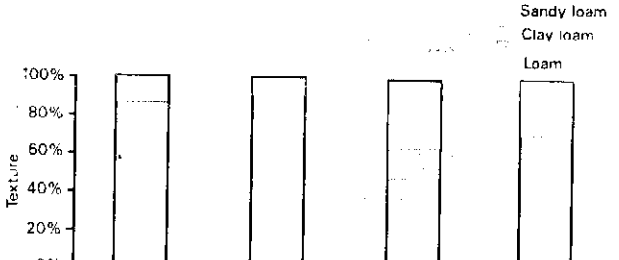

Fig. 1: Soil texture of Azad Kashmir Soils

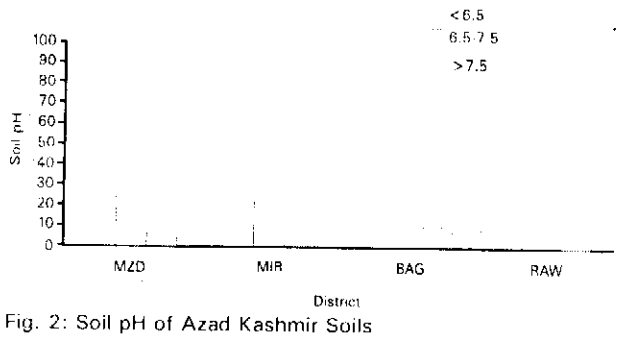

Fig. 2: Soil pH of Azad Kashmir Soils

Table 1: Organic Matter in Azad Kashmir Soils %

Level	Muzaffarabad	Mirpur	Bagh	Rawalakot
<0.85%	21.4 b	6.2 B	0.0	13.0 b
0.85-1.3%	4.8 c	7.8 b	5.2 b	17.4 b
>1.3 %	73.8 a	86.0 a	94.8 a	69.6 a

Means in a column followed by different letter are significantly different at 1 % level of probability

Table 2: Available phosphorus in Azad Kashmir Soils (%)

Level	Muzaffarabad	Mirpur	Bagh	Rawalakot
<10 mg. Kg $^{-1}$	24.5 b	46 a	24 b	11.2 c
10-15mg. Kg $^{-1}$	26.3 b	29 b	36 a	35.9 b
>15 mg. Kg $^{-1}$	42.2 a	24 b	40 a	52.9 a

Means in a column followed by different letter are significantly different at 1 % level of probability

Table 3: Available potassium in Azad Kashmir Soil (%)

Level	Muzaffarabad	Mirpur	Bagh	Rawalakot
<50 mg. Kg $^{-1}$	6.6 c	14 b	12 c	7.4 c
50-125mg. Kg $^{-1}$	27.8 b	18 b	40 b	26.3 b
>125 mg. Kg $^{-1}$	65.6 a	68 a	48 a	66.3 a

Mean in a column followed by different letter are significantly different at 1 % level of probability

Phosphorus in this range. 46%of soils in district Mirpur were deficient in available phosphorus. Whereas 24.5 % soils of district Muzaffarabad, 24 % soils of district Bagh and only 11.2 % soils of district Rawalakot were found deficient in available phosphorus.

As phosphorus plays an important role in the growth and root development of a plant, therefore its sufficient quantity is necessary for a good growth of a crop. According to Soltanpour and Schwab (1977) phosphorus concentration between 8 to 11 mg. Kg $^{-1}$ is an adequate for normal growt of agricultural crops. Rapid and early growth of a crop allow for quicker closing of the crop canopy, which serves as a umbrella to protect soil from erosion, which is a main proble of hilly areas.

The results of available potassium (Table 3) show that almos all soils of the state had an adequate amount of available potassium. About 50 to 66 % of the soils in each district had greater than 125 mg. kg $^{-1}$ Whereas an average of 28 % soils of the state had available potassium in the range of 50 to 125 mg. kg $^{-1}$ and only 10 % soils of the state had available potassium below 50 mg. kg $^{-1}$. Hamid (1986) also found tha the concentration of ammonium acetate extractable potassium in Muzaffarabad soils ranged from 15 to 82 mg. kg $^{-1}$.

On the basis of these results it can be stated that there is almost no problem of potassium deficiency in the state soils. The farmers can have a bumper crop even without the application of potassium fertilizers if they use farmyard manure with nitrogen and phosphate fertilizers in their fields.

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