

'Study of Soil Analysis in Different Places at Rudrapur, Uttarakhand'

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Abstract

The Soil samples were collected from different locations of Rudrapur areas at Fazalpur, Danpur, Fojimatkota, Chatarpur, Preetnagar and Bhamrola, Collected samples were analysed at Regional Soil Testing Laboratory Rudrapur Udam Singh Nagar, Uttarakhand. The main findings were pH, electrical conductivity (EC), Organic Carbon (OC), Nitrogen (N), Phosphorus (P), Potassium (K), Sulphur (S), Zinc (Zn), Boron (B), Manganese (Mg), Copper (Cu). The instrument techniques were pH meter, EC meter, Colorimeter, Flame Photometer, Atomic Absorption Spectrophotometer, spectrophotometer, and Titrations. The necessary recommendations are advised to farmers for use of fertilizers in different crops - wheat, rice, maize and sugarcane. To improve the nutrients and micro nutrients also have been suggested for crops wheat, rice, maize, and sugarcane.

Keywords: Soil analysis, Rudrapur, NPK, EC, pH, nutrients and micronutrients.

1. Introduction

Like air and water, soil plays an essential role in our ecosystem to preserve biodiversity. The ability of soil to produce crops or sustain agricultural development is reflected in its value. Soil provides the setting in which human enterprises there life. A volume of soil typically contain about 50 percent solid and 50 percent pore space. The Soil consist of are minerals and organic particles upto 40 to 49 percent (Miller and Gardiner, 1998). There are several elements which are essential for the fertility of soil, carbon and oxygen are supplied from carbon dioxide in air, hydrogen is derived from water. Nitrogen is measure component of soil

organic material (plant residue and animal residue). As those organic material decompose, nitrogen is released as soluble ion. As elements are solubilised from weathering minerals and several elements are held on the surfaces of clay particles by electrostatic attraction. The fertility of a soil depends upon the amount of plant nutrients, it contains the availability or solubility of these nutrients, (Subramanian, 2005). Nitrogen, Phosphorous and potassium (NPK) are commonly added to soil as fertilizers, calcium deficiency in soil is due to calcium uptake by plants, leaching by carbonic acid in acid soil and composition with high level of sodium, potassium and magnesium in alkaline soils. Calcium deficient soils are generally treated with lime to required calcium reply for plants. Magnesium is made available to plants through ion exchange organic matter or clays which holds magnesium rather strongly. Phosphorous is an essential for plants though the phosphorous content in plants is low at the soil pH, H_2PO_4^- and HPO_4^{2-} are phosphate species utilized by plants. Potassium is required at high level by growing plants. Potassium activates some enzymes and plays a key role in water balance in plants and for some carbohydrate transformations. Crop fertilizers contains nitrogen phosphorous and potassium (NPK) as major component. Fertilizers are denoted by numbers such as 6-12-18, which means 6% N, 12% P (as P_2O_5) and 8% K (as K_2O) (DE and De, 2008). The results of soil analysis of Ranikhet region of Kumaun, shows the minor changes in soil of hill were found due to climate change and different types of fertilizers used by farmers (Mehta and Belwal, 2014). The iron (Fe) and pH effects in soils were observed in Ahmad Nagar, Maharashtra, all micronutrients concentration were available in sufficient amount

for growth of plants and soil organism. Soil is fertile but also it is alkaline in nature. The restoration of alkaline should undertake by applying advance scientific applications, (Kamble et al, 2013).

Rudrapur is a city which is located in Udham Singh Nagar Uttarakhand and rich of farming land for different crops. Soil analysis report will be helpful for the improvement of quality of fertile land to farmers. The different sites were considered for this work. Nutrients and micronutrients were also analysed with the element analysis. The several recommendation are providing for farmers in different crops- wheat, rice, maize and sugarcane.

3. Material and Methods

The various samples were collected from farmland near to Rudrapur areas are :

Table.1 List of sample collection in Rudrapur areas.

S.No.	Location
1	Code 1: Fazalpur Rudrapur (FAPRUSN)
2	Code 2 : Danpur Rudrapur (DAPRUSN)
3	Code 3 : Fojimatkota Rudrapur (FMTRUSN)
4	Code 4: Chatarpur Rudrapur (CHPRUSN)
5	Code 5: Preetnagar Rudra pur (PNGRUSN)
6	Code 6 : Bhamrola Rudrapur (BMLRUSN)

All samples were collected, dried under shade and analysed at Regional Soil Testing Laboratory, Rudrapur Udham Singh Nagar, which is equipped with these instruments.

1. pH Analysis- pH meter
2. Electrical Conductivity (EC)-EC meter
3. Calorimeter (Digital Photo) - Phosphate, Boron analysis.
4. Flame Photometer- Potash Analysis
5. Atomic Absorption Spectrophotometer (AAS)- Micronutrients.
6. Spectrophotometer - Sulphur Analysis.
7. Organic Carbon- Titration Analysis.

4. Results and Discussion-

After the complete analysis the obtained results are summarised below these tables.

**Table 2 : Fazalpur- Rudrapur (FAPRUSN)
Area Approx : 2.5 Acre**

Sr. No.	Parameters	Result	Unit	Evaluation
1	pH	8		Normal
2	Electrical Conductivity (EC)	1		Low
3	Organic Carbon (OC)	0.49	%	Low
4	Nitrogen (N)	Nil	kg/hect.	NIL
5	Phosphorus (P)	4.5	kg/hect.	Low
6.	Potassium (K)	127	kg/hect.	Medium
7	Sulphur (S)	4.40	ppm	Deficient
8	Zinc (Zn)	1.336	ppm	Deficient
9	Boron (B)	0.320	ppm	Deficient
10	Iron (Fe)	32.809	ppm	Low
11	Manganese (Mg)	12.57	ppm	Low
12	Copper (Cu)	2.48	ppm	Low

**Table 3 : Danpur - Rudrapur (DAPRUSN)
Area Approx : 5.0 Acre**

Sr. No.	Parameters	Result	Unit	Evaluation
1	pH	8		Normal
2	Electrical Conductivity (EC)	1.440		Low
3	Organic Carbon (OC)	0.45	%	Low
4	Nitrogen (N)	NIL	kg./hect	Nil
5	Phosphorus (P)	4.5	kg./hect	Low
6.	Potassium (K)	164	kg./hect	Medium
7	Sulphur (S)	6.0	ppm	Deficient
8	Zinc (Zn)	0.685	ppm	Low
9	Boron (B)	0.21	ppm	Deficient
10	Iron (Fe)	20.879	ppm	Low
11	Manganese (Mg)	15.89	ppm	Low
12	Copper (Cu)	3.078	ppm	Low

Table 4 : Fojimatkota - Rudrapur (FMTRUSN)
Area Approx : 6.5 Acre

Sr. No.	Parameters	Result	Unit	Evaluation
1	pH	8		Normal
2	Electrical Conductivity (EC)	1.150		Low
3	Organic Carbon (OC)	.49	%	Low
4	Nitrogen (N)	NIL	kg./hect	Nil
5	Phosphorus (P)	9.0	kg./hect	Low
6	Potassium (K)	155	kg./hect	Medium
7	Sulphur (S)	12.01	ppm	Deficient
8	Zinc (Zn)	1.115	ppm	Low
9	Boron (B)	0.18	ppm	Deficient
10	Iron (Fe)	28.946	ppm	Low
11	Manganese (Mg)	14.70	ppm	Low
12	Copper (Cu)	2.778	ppm	Low

Table 5 : Chatarpur - Rudrapur (CHPRUSN)
Area Approx : 5.0 Acre

Sr. No.	Parameters	Result	Unit	Evaluation
1	pH	8.2		Normal
2	Electrical Conductivity (EC)	1.589		Low
3	Organic Carbon (OC)	0.53	%	Medium
4	Nitrogen (N)	NIL	kg./hect	Nil
5	Phosphorus (P)	13.5	kg./hect	Medium
6	Potassium (K)	183	kg./hect	Medium
7	Sulphur (S)	4.80	ppm	Deficient
8	Zinc (Zn)	1.071	ppm	Low
9	Boron (B)	0.36	ppm	Deficient
10	Iron (Fe)	28.30	ppm	Low
11	Manganese (Mg)	11.43	ppm	Low
12	Copper (Cu)	3.028	ppm	Low

4. Conclusion

The results of soil samples from Fazalpur, Danpr, Fojimatkota, Chatarpur, Preetnagar and Bhamrolab at Rudrapur Udham Singh Nagar was very informative and useful for agriculture farmers. The pH, electrical conductivity (EC), organic carbon

Table 6 : Preetnagar - Rudrapur (PNGRUSN)
Area Approx : 2.0 Acre

Sr. No.	Parameters	Result	Unit	Evaluation
1	pH	8.1		Normal
2	Electrical Conductivity (EC)	1.286		Low
3	Organic Carbon (OC)	0.49	%	Low
4	Nitrogen (N)	NIL	kg./hect	Nil
5	Phosphorus (P)	9.0	kg./hect	Low
6	Potassium (K)	248	kg./hect	Medium
7	Sulphur (S)	7.21	Ppm	Deficient
8	Zinc (Zn)	0.554	ppm	Deficient
9	Boron (B)	0.21	ppm	Deficient
10	Iron (Fe)	25.01	ppm	Low
11	Manganese (Mg)	12.33	ppm	Low
12	Copper (Cu)	2.189	ppm	Low

Table 7 : Bhamrolo - Rudrapur (BMLRUSN)
Area Approx : 5.0 Acre

Sr. No.	Parameters	Result	Unit	Evaluation
1	pH	8.2		Normal
2	Electrical Conductivity (EC)	0.800		Low
3	Organic Carbon (OC)	0.67	%	Medium
4	Nitrogen (N)	NIL	kg./hect	Nil
5	Phosphorus (P)	4.5	kg./hect	Low
6	Potassium (K)	200	kg./hect	Medium
7	Sulphur (S)	10.01	ppm	Low
8	Zinc (Zn)	0.358	ppm	Deficient
9	Boron (B)	0.28	ppm	Deficient
10	Iron (Fe)	29.15	ppm	Low
11	Manganese (Mg)	15.38	Ppm	Low
12	Copper (Cu)	2.428	ppm	Low

(OC) in all samples were almost same while variation were observed in elemental analysis of Zinc (Zn), Boron (B), Iron (Fe) Manganese (Mn), Copper (Cu) in all samples with respect to each other. The major variation was observed in Nitrogen (N), Phosphorous (P) and Potassium (C), which is also known as NPK value. It was found

LLM (Low, Low, Medium), MMM (Medium, Medium, Medium) and MLM (Medium, Low, Medium) from the obtained results. The soil quality can be improved by using fertilizers and some nutritional compounds. The soil testing laboratory advised to use the fertilizers- Urea, Diammonium

Phosphate (DAP), Mtrate of Potash (MOP), Ventronite Sulphur (VS), Zinc Sulphate (ZS), Borax, Single Super Phosphate (SSP) and Bio compost in average quantity in approx for different crops- wheat, rice, maize and sugarcane in all six sample sites in this table.

Table 8 : Quantity of Fertilizers

Sr. No.	Name of Crops	Urea kg/acre	DAP kg/acre	MOP kg/acre	VS kg/acre	ZS kg/acre	Borax kg/acre	SSP kg/acre	BC kunt/acre
1	Wheat	143	65	30	08-Oct	05-Jul	224	45-52	40-50
2	Rice	110	57	25	08-Oct	05-Jul	224	45-52	40-50
3	Maize	80	50	26	08-Oct	05-Jul	224	45-52	40-50
4	Sugarcane	100	69	33	08-Oct	05-Jul	224	45-52	40-50

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