

'Analytical Investigation of Agricultural Soil from Different Areas of Kichha Regions in U.S.Nagar - Uttarakhand

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Abstract

Soil is earthy material which is essential for a nature and livelihood in the universe. Soil is a dynamic system in which the soil solution is the medium of physical, chemical and biological process in the environment. There is a dynamic equilibrium with minerals, organic matter, microorganism and atmosphere. The Kichha is the area in Udham Singh Nagar which basically well known for good fertility of crops - Wheat, Rice, Maize and Sugarcane. The soil monitoring was carried with the various parameters pH, electrical conductivity (EC), Organic carbon(OC), Nitrogen(N), Phosphorus (P), Potassium(K), Sulphur (S), Zinc (Zn), Boron (B), Manganese(Mg), Copper (C), and various nutrients. All parameters were analysed by the instruments Atomic Absorption Spectro Photometer, Flame Photometer, Colorimeter and Titrations. All samples taken from different sites at a Kichha.

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

1. Introduction

Soil is a store house of Minerals, a producer of Vegetative Crops, a reservoir of Water, a home of Wild life, a Conservator of Soil fertility and livestock. The Word Soil is derived from a Latin word *Solum*, which means Earthy Material in which Plant grow (Kaur,2018). It is known as the Skin of the Earth. Soil can be defined as the Weathered layer of the Earth's crust with living Organism and their products of decay intermingled. Soil is a marvelous substance, a living resource of terrestrial animals, plants and micro-organism. Therefore it can be known as an ecosystem by itself

(Pani, 2007) Soil is a dynamic system in which the soil solution is the medium of physical, chemical and biological processes in soil environments. Soil solution is in dynamic equilibrium with minerals, Organic matter, Micro-organism and soil atmosphere. Thus it is the bottle neck of transformations and transport of vital and detrimental molecules and ions in the ecosystem. Soil is the loosely arranged mineral on the earth's surface which has been subjected to show environmental factors such as factor of climate including water and temperature effects, macro and microorganism, genetic effects and parents material is being reflected over a period of time.

Kichha is located at 28.92°N 79.50°E. The town has an average elevation of 293 meters and is surrounded by a number of villages. Kichha has largely an agricultural economy. Paddy, wheat and sugarcane are major crops here. Most of the farmers are rich and affluent due to the availability of rich arable land and their sheer hard work. There are some 30+ rice mills in its vicinity. The overall study of the survey in different regions of Kichha are given below-

1. To provide an index of nutrients availability or supply in given soil.
2. To provide a basis for fertilizer recommendations for a given crop.
3. To evaluate the fertility status of soil land plan a nutrition program.
4. To compare the different regions of soil of kichha on the basis of different parameters.

2. Review of Literature

It shows the interpretation of soil test report for agriculture for accurate soil testing. It is necessary to collect soil sample from the 0-6 inches and 6-24 inches from the soil surface. Also it is necessary to collect samples from different

locations in the field. Soil samples are taken by using hand probes, hand augers, spades, shovels or vehicle-mounted hydraulic probes or auger. Hand auger is used when samples are collected at different dept. With the help of interpretation of soil parameter we can gain information of the status of fields or soil fertility. This would give us the information to adjust applicable fertilizers to optimize plant growth (Dinkins, 2013). It represents that in Soil Science the key area of research are formation and classification of soil. There are many descriptive studies and quantitative approaches for the purpose. The book soil genesis and classification is given by America soil scientists Stan buol and Francis hole. The literature of soil science is rich and diverse. It consists of half a million article's published in peer reviewed journals and thousands of books, monographs and reports. Some chapters of sixth edition of soil genesis are introduction, morphology and composition of soils, soil-forming factors: Soil as a component of ecosystems, soil material and weathering, soil- forming processes, modern soil classification systems, U.S. soil taxonomy, Alfisols: high base status forest soils with finer-textured subsoil horizons, andisols: soils with andic soil properties, entisols: recently formed soils, Gelisols: very cold soils etc. (Hartemink, 2013). Physico-Chemical characterization of farmland soil used in some villages of Lunawada Taluka. Dist: Mahisagar (Gujrat) India, this studied were based on parameters like pH, EC, total organic carbon, available nitrogen, available phosphorous and available potassium. This studies have given the nutrients quality of soil. Soil sampling is the first step for this purpose. To identify the soil problems this testing is done for recommendation of fertilizers (Jain et al 2014).

Effect of forest management on soil C and N storage are important to study because they are master components to determining the soil fertility. This presents the metal analysis in the form of result. This shows that forest harvesting had little effect on soil C and N. the fire in forests are affected the management of C and N. fertilizers and N-fixers both add substantially to soil C and N pools. In the case of fertilization, there is normal increase in primary productivity in nutrient-poor sites. Fertilization would not necessarily be expected to produce any increase in soil C in sites where the nutrients added are not growth limiting unless the fertilizer itself facilitates chemical reactions which tend to cause increase in soil organic matter. The positive effect of sawlog harvesting appeared to be restricted to coniferous species. No overall effects of fire on C and N were found. Meta analysis indicates a fire treatment effect (Johnson, 2001)

Analysis of some physico chemical parameters of soil from a protected forest ecosystem of Askot wild life sanctuary is done in district Pithoragarh (Uttarakhand). Climate and soil are non-living components and plants, animals and other life forms are the living components of the forest. Soil organic matter is the most important factors of soil quality and fertility and maintaining quality and quantity to ensuring land sustainability. A level of organic carbon greater than 0.75% shows the good fertility. Tropical rain forest soil contains less organic matter than temperate forests. Most of available nutrients are found in living plants and animal materials. Soil is an important segment of our ecosystem because it serves as source of nutrients for plants. Among all studies the result is that soil of Askot wild life sanctuary is having high organic matter which makes it fertile for the growth of vegetables in that area. (Joshi et al, 2013). Soil consist of weathered or eroded rocks, nutrients, living organisms, organic matter, water and air. There are four components in an ideal proportion, 45% solid material, 5% organic matter, 25% air and 25% water. The proportion of these four components impact soil texture, porosity and pore space (Kalev, 2017)

3. Material and Methods

The samples were collected from different sites of farmland, taking Kichha as a reference centers. All four villages were considered as a sample in different directions.

Table 1: Selection of Sites

Sr. No.	Direction	Name of site	Longitude	Latitude
1	South	Dopahria village	28°53'28.734 N	79°30'44.187 89 E
2	East	Nayi basti, dhada village	28°53'57.292 5 N	79°32'19.963 68 E
3	North	Kishanpur village	28°55'29.383 68 N	79°30'32.185 08 E
4	West	Chukti devaria	28°55'46.485 84 N	79°28'39.057 96 E

All samples were collected and dried under shade and analysed at Regional Soil Testing Rudrapur with these instruments.

- 1- pH Meter- pH determination.
- 2- Electrical Conductivity Meter- EC determination.
- 3- Colorimeter- Phosphate, Boron determination.

- 4- Flame Photometer- Potash determination.
- 5- Atomic Absorption Spectrophotometer (AAS)- Micronutrient determination.
- 6- Spectrophotometer- Sulphur determination
- 7- Organic Carbon - Titration methods.

4. Result and Discussion

After the complete analysis of the soil from different sites, the obtained results are summarized below these tables.

TABLE:2 Site -1 Dopahria Village

S. No.	Parameters	Result	Unit	Evaluation
1	Ph	8.1		Normal
2	Electrical Conductor (EC)	0.52		Normal
3	Organic Carbon (OC)	0.45	%	Low
4	Phosphorous	85.50	Kg/h	High
5	Potassium	69.00	Kg/h	Low
6	Sulphur	34.08	ppm	Normal
7	Zinc	0.385	ppm	Low
8	Boron	0.13	ppm	Low
9	Iron	0.855	ppm	Low
10	Manganese	2.638	ppm	Normal
11	Copper	0.687	ppm	Normal

TABLE :3 Site -2 Nai Basti, Dhada Village

S. No.	Parameters	Result	Unit	Evaluation
1	Ph	8.2		Normal
2	Electrical Conductor (EC)	0.25		Normal
3	Organic Carbon (OC)	0.29	%	Low
4	Phosphorous	58.5	Kg/h	High
5	Potassium	100	Kg/h	Low
6	Sulphur	26.92	ppm	Normal
7	Zinc	0.306	ppm	Low
8	Boron	0.11	ppm	Low
9	Iron	2.682	ppm	Low
10	Manganese	2.101	ppm	Normal
11	Copper	0.687	ppm	Normal

TABLE :4 Site -3 Kishanpur Village

S. No.	Parameters	Result	Unit	Evaluation
1	Ph	8.1		Normal
2	Electrical Conductor (EC)	0.16		Normal
3	Organic Carbon (OC)	0.24	%	Low
4	Phosphorous	63.0	Kg/h	High
5	Potassium	80.0	Kg/h	Low
6	Sulphur	24.48	ppm	Normal
7	Zinc	0.341	ppm	Low
8	Boron	0.09	ppm	Low
9	Iron	1.743	ppm	Low
10	Manganese	3.492	ppm	Normal
11	Copper	0.621	ppm	Normal

TABLE :5 Site -4 Chukti Devaria Village

S. No.	Parameters	Result	Unit	Evaluation
1	Ph	8.2		Normal
2	Electrical Conductor (EC)	0.34		Normal
3	Organic Carbon (OC)	0.61	%	Medium
4	Phosphorous	85.5	Kg/h	High
5	Potassium	138	Kg/h	Medium
6	Sulphur	23.52	ppm	Normal
7	Zinc	1.049	ppm	Normal
8	Boron	0.20	ppm	Low
9	Iron	1.978	ppm	Low
10	Manganese	6.420	ppm	Normal
11	Copper	1.039	ppm	Normal

5. Conclusion

Based on the report from regional laboratory of soil testing, rudrapur the results of soil analysis are given. Soil pH, electrical conductivity, sulfur and copper are normal in all sites while variation of observe in elemental analysis Zinc, Boron, Iron, Manganese, Copper in all samples with respect to each other. The soil quality can be improved by considering the recommendations for fertilizers from Regional Soil Testing Laboratory Rudrapur. According to low and high parameters the recommendation for all sites are given below-

TABLE :6 Recommendation of Fertilizer

Site	Diammonium Phosphate (DAP)	Urea	Mutrate of Potash (MoP)	Zinc Sulphate (ZnSO ₄)	Borax	Ferrous Sulphate (FeSO ₄)	Compost
Site 1	32 kg/hect.	143 kg/hect.	34.8 kg/hect.	8 kg/hect.	8 kg/hect.	15 kg/hect.	20 qtl./hect.
Site 2	32 kg/hect.	143 kg/hect.	34.8 kg/hect.	8 kg/hect.	8 kg/hect.	15 kg/hect.	20 qtl./hect.
Site 3	32 kg/hect.	143 kg/hect.	34.8 kg/hect.	8 kg/hect.	8 kg/hect.	15 kg/hect.	20 qtl./hect.
Site 4	32 kg/hect.	104 kg/hect.	26.7 kg/hect.	26.7 kg/hect.	8 kg/hect.	15 kg/hect.	20 qtl./hect.

6. Acknowledgement

The author is very thankful to Dr. Mohd. Tahir Assistant Director and Sri. Harish Chandra Sati Agriculture Officer of Regional Soil Testing Laboratory Rudrapur for providing the Lab facility.

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