



Present Status Of Physico – Chemical Properties Of Agricultural Soil Of Kanpur

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Abstract

Agriculture is playing important role in growth of economy in India. India is the biggest country for crop production and major contributor of country's economy and provide food for millions of people and animals. This research work were conducted at various agricultural sites of Kanpur Nagar , U.P. to evaluate the fertility status of agricultural soil. We aimed to study the physical and chemical status in agricultural soil. We collected 20 Soil samples from different region of agricultural soil. The soil samples were analyzed for their physico – chemical properties. Soil samples were collected from different depth at 0-10 cm, 10-25 cm and 25-40 cm. The result revealed that soil colour varied from different in dry condition and wet condition. The texture was dominantly sandy, loam, alluvial and clay soil. Chemical properties that is P^H , electrical conductivity (EC), and organic carbon. The p^H ranged is 7.5 – 8.4 and EC found range 0.60 – 0.90 ds/m, while organic carbon was ranged from 0.30- 0.75 %. The study show the physico – chemical properties of Kanpur region of U.P., India. Understanding of these properties are crucial for sustainable agriculture, preservation of ecosystem health because agriculture contributes 17-18% India GDP, and 13% of total export.

Key Words- Agriculture, economy, p^H , Electrical conductivity, Ecosystem

Introduction

Soil is important resource of the nature. It is consist properties of rock that have been altered by mechanical and chemical process that include erosion and weathering (Addis, 2014). Soil health shows biological, chemical and physical condition, having the capability to maintain the development, growth and mechanical strength of land plants (Idowu *et al.* 2019). Healthy soil drive healthy ecosystem and directly affect the food and nutritional security, human health, water quality, biodiversity and climate change (Manter *et al.* 2017). Soil provide nutrition to crop and crop growth (Khandey *et al.* 2017). Soil physio – chemical properties shows the level of content and characteristics of soil nutrient that are present in it (Meena *et al.* 2020). It has capability to hold immense importance in fecilitating a plants, ability to extract water and nutrient. The physio- chemical study is very important for management of soil fertility and it is important for sustainable agriculture (Sharma *et al.* 2017). The characteristics of soil vary with time and place due to variation in climate, microbial

activities, weather and several biotic and abiotic factor of the soil to the greater extent (Shrivastava *et al.* 2014). The study of the physio-chemical characteristics interrelationship with each other. The physical properties of soil depend upon shape, size structure and pore spaces of organic matter and mineral composition of soil (Chen *et al.* 2016). The chemical properties of soil are interaction of varied chemical constituents among soil particles and soil solution. Soil properties like p^H , Electrical conductivity (EC) and Organic Carbon, are closely related to soil quality (Chen *et al.* 2016).

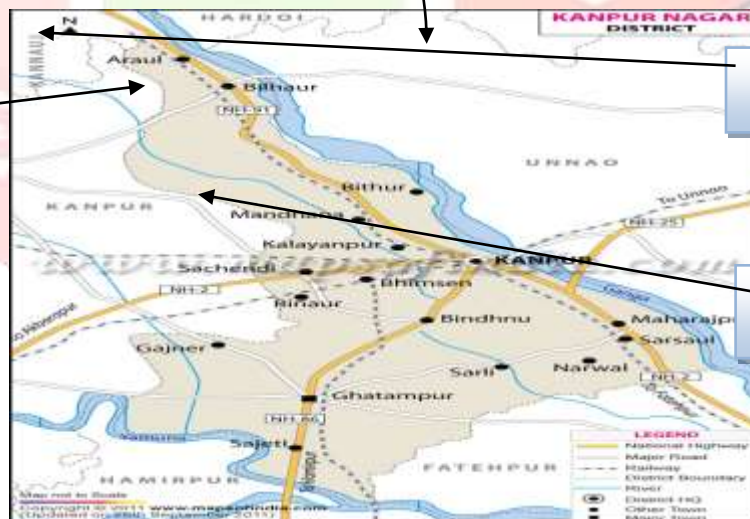
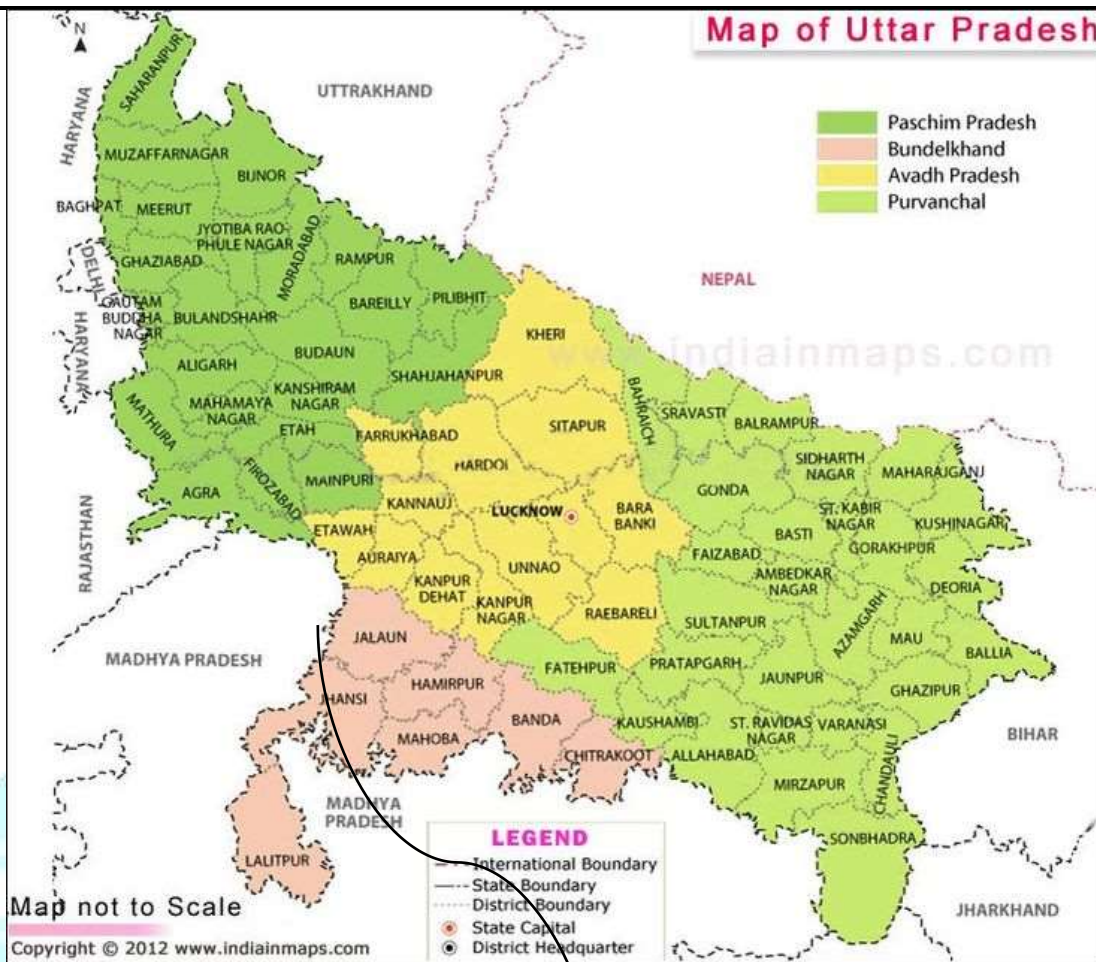
We aimed to study the Physico- chemical properties of soil sample were collected from various location of Kanpur. Optimizing and understanding these properties are crucial for sustainable agriculture, preservation of insoluble resources and ecosystem health.

Materials and Methods

Kanpur is located at 26.44° N latitude 80.33° E in the central- western part of U.P. The study area was divided into three different blocks from the district under study. Total twenty soil sample collected at different depths of 0-10 cm, 10-25 cm and 25-40 cm at different sites. The collected soil samples were processes and analyzed the physio- chemical properties of soil by the diffetent methods such as atomic absorption spectrometer and spectrophotometry.

The research was conducted in different blocks of Kanpur Nagar such as Shivrajpur, Bilhaur and Kakwan. Kanpur is major agricultural district of U.P., the western state of India. This town is situated the western site of Utter Pradesh. The present investigation soil sample collected from two different district and various lands for study the physico- chemical properties of soil, and analyzed by standard analytical method. The data was recorded during the research of analyzed were subjected to statistical analysis by (ANOVA) “Analysis of Variance technique (Fischer *et al.* 1927, Yadav *et al.* 2024).

Seived soil samples were determined for physical properties like soil colour, soil texture and water holding (Bouyoucos, 1927., Munsell, 1954., and Muthuvel *et al.*, 1992). For analyzed the chemical properties of soil such as pH, EC (Electrical Conductivity) and O.C. (Organic carbon). pH was measured by digital pH meter in which 1:2 ratio soil and water are present, while EC measured by EC meter (Wilcos, 1950), OC determined by wet oxidation method (Walkley, 1947).



Bilhaur

Kakwan

Shivrajpur

Result and Discussion

Physical Properties

The result showed that most of the soil of Kanpur Nagar, reflected yellowish brown, brownish, reddish brown and grayish colour. Soil texture of soil sample was sandy, loamy and alluvial soil. Result of this study are mentioned below (Table 1).

The increased in the particle density is due to soil depth, water quality and pores interaction. The water holding capacity (%) of soil varied from 40% to 85.67%, these variance due to mixture of silt, clay and organic carbon content. Sandy soil have low water holding capacity compare to other soil, Loamy soil have high water holding capacity. These holding capacity depends on presence of pore space, where these spore dense and increase in depth of soil. Chaudhary *et al.* (2020) also analyzed the capacitances of water holding.

Table 1. Soil colour and soil texture of different sites of Kanpur

S.No.	Block	Soil Texture	Soil Colour		
			0-10 cm	10-25 cm	25-40 cm
1.	Shivrajpur	Sandy soil	Brown	Dark brown	Grey
		Loam soil	Yellow	Reddish	Brownish
		Sandy loam soil	Reddish brown	Black brownish	Dark grey
2.	Bilhour	Sandy soil	Yellowish brown	Dark Yellow	Brownish
		Alluvial soil	Light grey	Dark yellow	Dark brown
		Loam soil	Yellowish	Yellow	Brown
3.	Kakwan	Loam soil	Light yellow	Reddish yellow	Brown
		Sandy soil	Yellowish	Light Reddish	Yellowish brown
		Loam soil	Light Reddish	Brown	Dark Brown

Table 2. Water holding capacity in different soil

S.No.	Block	Water holding capacity (%)		
		0-10 cm	10-25 cm	25-40 cm
1.	Shivrajpur	55.35	52.20	55.98
		50.20	45.85	52.35
		52.25	49.48	54.65
2.	Bilhour	70.12	75.32	74.32
		65.18	66.52	65.78
		67.88	65.35	85.65

3.	Kakwan	48.35	50.27	3.15
		75.32	69.65	82.34
		55.31	50.55	80.31

Chemical properties

The data for soil pH, EC and OC, that maximum pH 8.4 recorded with depth of 25-40 cm where the land use for production of rice, wheat and maize, minimum pH 7.5 was found with the depth of 0-10 cm where the land is also used for vegetables such as potato and pea. The maximum OC (.75%) was recorded from the depth of 0-10 cm and the land is pulses whereas, minimum OC (0.30%) was found at the depth of 25-40 cm , where land is barren. As the EC is concerned the maximum EC (0.90% ds/m) was recorded at 25-40 cm where the land is vegetable and minimum EC (0.60% ds/m) was found at the depth of 0-10 cm.

The pH value range of the various land use system (7.5-8.4), EC (0.60-0.90 ds/m) and OC (0.30%-0.75%). The higher OC in soil which is used for pulses. The EC is less at upper surface than lower surface due to leaching of salt and deposition of salt in lower surface. The pH increases to rising of soil depth under all lands. Similar finding was reported by (Kumal *et al.* 2023, Sahu *et al.* 2016). Result of this study are mentioned below (Table 3).

Table 3. pH, Electrical Conductivity And Organic Carbon Values Of Various Land In Kanpur

S.No.	Land	Soil Depth Cm	pH	Electrial conductivity (EC) ds/m	Organic Carbon (OC) %
1.	Agricultural Land	0-10	7.8	0.61	0.45
		10-25	7.9	0.82	0.42
		25-40	8.4	0.75	0.63
		Mean	8.0	0.72	0.5
2.	Grass land	0-10	7.9	0.64	0.52
		10-25	7.5	0.80	0.49
		25-40	7.7	0.75	0.71
		Mean	7.7	0.73	0.57
3.	Vegetable land	0-10	7.5	0.68	0.74
		10-25	7.7	0.84	0.42
		25-40	8.2	0.90	0.63
		Mean	7.8	0.80	0.59
4.	Barren land	0-10	7.6	0.60	0.45
		10-25	7.9	0.80	0.52
		25-40	7.8	0.77	0.30
		Mean	7.7	0.72	0.42
5.	Pulse land	0-10	7.6	0.77	0.75
		10-25	7.9	0.80	0.59
		25-40	7.0	0.75	0.64
		Mean	7.7	0.77	0.66
		Total Mean	7.78	0.74	0.54
		Standard Deviation	0.1304	0.357	29.2836

Conclusion

This research shows different agricultural soil sites of Kanpur Nagar at various parameters. These result help to improve the soil health for farmer's crop production. Soil texture showed alluvial, sandy and loam soil qualities. Soil has pH natural to alkaline in nature. EC is medium in soil, its also included that agriculture soil (wheat, rice and maize) and vegetable soil need the addition of organic carbon. Some organic carbon and inorganic carbon used as fertilizers which help in maintain of soil health and productivity in the region of field.

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