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## Assessment of physico-chemical properties of soils in Shravasti district an eastern part of Uttar Pradesh (India)

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### Abstract

The study was conducted centre at K.V.K. in Shravasti which is run by Acharya Narendra Deva University of Agriculture and Technology, Kumarganj (Ayodhya, U. P.) India. A total number of 50 samples were collected from 5 blocks (Sirsiya, Ekauna, Hariharpur Rani, Gilaula and Jamunaha) 10 villages and analysed for physico-chemical properties using standard method at varying depths (0-15 and 15-30) in the lab of agriculture department. The soil survey of Shravasti district (U.P.) was carried out during the year 2022. The studies on physical and chemical properties of soils were undertaken through soil sampling. The pH of surface horizon varied from whereas in the subsurface horizons it ranged from in shravasti District pH (1:2.5) 7.60-9.50, EC 0.79-1.19 dSm<sup>-1</sup>, organic carbon (0.20-.38), Available N (63.68-90.01 kg ha<sup>-1</sup>), P (13.43-22.21 kg ha<sup>-1</sup>), K (203.32-235.18 kg ha<sup>-1</sup>), S (10.25-14.62 kg ha<sup>-1</sup>), Zn (0.20-0.30 ppm), Mn (3.24-3.95ppm) Bo (0.58-0.97ppm), Mg (1.49-2.02ppm). The generally Nutrient availability in surface low in subsurface horizons in both the soils of ustic and udic moisture regime.

**Keywords:** Physico-chemical properties

### Introduction

In Shravasti district basic fertility and land use capability of soils is directly related to a few chemical properties, such as nutrient availability in soil. Soil is the most important natural resource, which is a treasure of any country but it is finite, non-renewable and is constantly degrading. Proper use of this vital natural resource influences the existence of life system and socio-economic development of any country. To achieve soil resource management in agro-ecological regions needs knowledge on physical and chemical characteristics is an essential requirement. The present investigation was therefore under taken Shravasti District U.P. Because the soil fertility status of soil affected food productivity and environmental quality, it's critical to have a fundamental understanding of these properties. Physical attributes include Bulk density, Particle density, Porosity, Water Holding Capacity. Soil Fertility status of Shravasti District pH, EC, OC, N, P, K, S, Bo, Mn, Mg, Bo and Zinc. Soil health is inextricably tied to soil microbial diversity and activity, which are important components of soil health. Healthy soils are essential for long-term development not only for increasing agricultural production as the world's population expands, but also for the long-term survival of essential ecosystem services.

### Materials and Methods

Shravasti district has a relatively subtropical climate with high variation between summer and winter temperatures. The average temperature is 30 °C-43 °C in summer and 6 °C-18 °C in winter. The average Annual Rainfall is 1196 mm. There is no meteorological observatory in Shravasti District. Soil samples from different horizons were collected crushed and passed through a 2-mm sieve. Soil samples were collected before transplanting and after harvesting of crop from 0-15 cm and 15-30 cm soil depth with the help of soil auger randomly for different places in Shravasti district. The samples were mixed to make composite sample representing the fertility of the whole field.

These samples were air dried and grind with the help of Pestle-mortar and sieve then such sample was used for different physico-chemical analysis. Soil samples were analyzed for bulk density (Core method). Techniques used to measure porosity of water absorption, field capacity and permanent wilting point (Pressure membrane apparatus), pH, EC (1:2.5 ratio of soil: water), organic carbon (wet oxidation), analyzed for chemical properties by following standard methods (Jackson, 1973) <sup>[5]</sup>. Analyzed By S method on turbidimetry method, DTPA extract method (Lindsay and Norvell, 1978) <sup>[12]</sup> and particle size distribution by Bouyoucous hydrometer method. The soils were classified according to soil taxonomy (Soil Survey Staff 1998) <sup>[13]</sup>.

## Result and Discussion

### Physical Properties of soil

Well drained clayey soils on very gently sloping land with moderate erosion associated with very shallow somewhat excessively drained Sandy Soil to loamy soils with severe erosion in Shravasti District. The texture was sandy loam, with sand content ranging from 62.56 to 83.78%, silt from 19.16 to 42.15%, and clay from 5.42 to 16.04% and similar findings were reported. Physical properties indicated that the soils are sandy to clay loam in texture, with bulk density 1.29 to 1.42 Mg m<sup>-3</sup>, Particle density (%) 2.50-2.60, Porosity (%) 47.35-50.65 and water holding capacity (%) 36.40-45.80 as per respectively (Raghuwanshi *et al.* 2011) <sup>[8]</sup>.

### Chemical Properties

The pH of surface horizon varied from range (pH 7.6- 9.50). Electrical conductivity indicates that the soils are non-saline

and which varied from. 79-1.19dS m<sup>-1</sup>. The organic carbon content (0.20-.38) is generally surface very low the soils of ustic and udic moisture regime. Available Nitrogen ranged from 63.50-90.00 (kg ha<sup>-1</sup>), Because Available Nitrogen is positively connected with Organic Matter concentration which reduces with depth and may be owing to greater pH at deep, Available Nitrogen decreases with depth. Available Phosphorous ranged from 13.43-22.21(kg ha<sup>-1</sup>) with increasing depth the amount of available phosphorus decreases. The presence of more accessible phosphorous in surface soil may be due to a favorable soil pH and organic matter concentration. Similar research was conducted (Wani, *et al.* 2017) <sup>[14]</sup> The Available Potassium ranged from 203.32-235.18 (kg ha<sup>-1</sup>) (Desavathu *et al.* 2018) <sup>[4]</sup>. The amount of available potassium reduces as you go deeper into the earth (Jackson *et al.* 1973). The release of available potassium from organic residues and the application of potassium fertilizers may be responsible for the high quantity of accessible potassium on the surface soil. The available sulphur ranged from 10.25-14.62 (kg ha<sup>-1</sup>) (Singh, *et al.* 2012) <sup>[9]</sup>.

Micronutrient of soil required for catalysis of different enzymes like aldolases, carbonic unhydrase. It is required for protein synthesis and auxin production. The content of Exchangeable Magnesium ranged from 1.58-2.02 (cmol kg<sup>-1</sup>) Mn ranging from 3.24-3.95 ppm complies with reference range differences in depth soil. The concentration of zinc in samples under study occurs in the range of 0.20-.30 ppm. The concentration of Boron in soil samples under study occurs in the range of. 31-.39 ppm (Lindsay *et al.* 1978) <sup>[12]</sup>. All the soil samples under study found to be zinc deficient except soil.

**Table 1:** Status of depth wise Physical properties of soil under Shravasti District.

Block	Soil Depth (cm)							
	Bulk Density (Mg m <sup>-3</sup> )		Particle Density (Mg m <sup>-3</sup> )		Porosity (%)		Water Holding Capacity (%)	
	0-15	15-30	0-15	15-30	0-15	15-30	0-15	15-30
Sirsiya	1.29	1.36	2.50	2.53	48.02	47.35	36.20	34.25
Ekauna	1.34	1.38	2.56	2.59	50.65	49.28	40.52	37.52
Jamunaha	1.30	1.33	2.53	2.55	49.80	47.39	38.21	35.25
Hariharpur Rani	1.38	1.42	2.60	2.56	50.10	48.80	45.80	39.52
Gilaula	1.35	1.36	2.56	2.52	49.25	47.58	39.20	36.40

**Table 2:** Status of depth wise Chemical properties of soil under Shravasti District.

Block	Soil Depth (cm)											
	pH		EC (dS/m)		O. C. (%)		Avail N (kg/ha)		Avail P (kg/ha)		Avail K (kg/ha)	
	0-15	15-30	0-15	15-30	0-15	15-30	0-15	15-30	0-15	15-30	0-15	15-30
Sirsiya	7.60	9.48	0.96	1.06	0.35	0.28	78.41	63.50	18.71	15.40	225.2	220.81
Ekauna	7.82	8.94	0.87	1.08	0.36	0.29	81.32	65.14	15.15	13.43	227.91	222.30
Jamunaha	7.90	9.50	1.04	1.19	0.34	0.28	76.52	63.68	20.22	15.45	208.81	203.32
Hariharpur Rani	7.63	8.82	0.79	0.94	0.38	0.32	90.01	72.01	22.21	17.41	235.18	228.15
Gilaula	7.84	9.46	0.98	1.11	0.24	0.20	65.81	63.87	19.62	16.05	228.14	226.14

**Table 3:** Status of depth wise Chemical properties of soil under Shravasti District

Block	Soil Depth (cm)									
	Avail S (kg/ha)		Mn (ppm)		Bo (ppm)		Mg (ppm)		Zn (ppm)	
	0-15	15-30	0-15	15-30	0-15	15-30	0-15	15-30	0-15	15-30
Sirsiya	12.14	10.25	3.51	3.24	0.59	0.58	1.58	1.49	0.23	0.20
Ekauna	13.25	11.05	3.88	3.72	0.87	0.85	1.72	1.70	0.25	0.23
Jamunaha	14.62	13.52	3.41	3.39	0.96	0.94	2.02	2.00	0.30	0.27
Hariharpur Rani	12.58	11.32	3.95	3.90	0.97	0.96	1.95	1.92	0.28	0.25
Gilaula	13.01	11.98	3.45	3.43	0.79	0.77	1.88	1.85	0.22	0.20

## Conclusion

In the based on observation the soils are suitable for Paddy, Bajra, Sugarcane, Pulses, wheat, Mustard, Vegetable crop and Groundnut agriculture. Farmers must keep a Soil Health Card in accordance with central, ICAR, and state government recommendations for crop production, and are advised to use appropriate management strategies and supply proper nourishment to soil health.

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