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Estimation of chemical properties of soil of Sri Ganganagar district of Rajasthan, India

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Abstract

An estimation of chemical properties of soil of block Raisinghnagar and Sri Vijaynagar of Sri Ganganagar district was carried out in 2016-17. The experiment was conducted in three stages soil survey and mapping, collection of samples and their analysis for chemical properties of soil for the analysis for 8 sampling point of 2 block of 1 district were selected. Soil samples were collected at a depth of 0-15cm, 15-30cm and 30-45cm and the study revealed that soil pH ranges from 7.26-7.50, soil EC ranges from. 37-0.57 (dSm⁻¹), organic carbon 0.24-0.38 (%), available nitrogen 180.35-275.63 (Kg ha⁻¹), available phosphorus 9.10-16.13 (Kg ha⁻¹) and available potassium 270.39-340.40 (Kg ha⁻¹). It clearly indicate that soil has good chemical properties and sufficient nutrients are available for crops. The soil is suitable for almost all tropical and sub-tropical crops and oil seeds.

Keywords: Soil, chemical properties Ganganagar district

Introduction

“Nutrients” may be defined as the chemical compounds required by an organism. The plant nutrients may be divided into macro-nutrients (primary and secondary nutrients) and micro-nutrients. Macro-nutrients are found and needed in plants in relatively higher amounts than micro-nutrients (Das, 2004) [4].

Changes in land use and soil management can have a marked effect on the soil organic matter (OM) content. Several studies in the past have shown that deforestation and cultivation of virgin soils often lead to depletion of macro-nutrients (N, P, S) present as part of complex organic polymers. Changes in the land use scenario and greediness of getting high return through intensive cultivation by the resource-rich farmers have resulted in changes in soil quality and leading to declined soil fertility (Singh and Singh 2005) [8].

Soil is a complex natural medium and intensive soil physico-chemical testing is required to understand the behaviour of each soil type. Physiochemical characteristics of different soils vary in space and time due to variations in topography, climate, physical weathering processes, vegetation cover, microbial activities, and several other biotic and abiotic variables (Paudel and Sah, 2003).

Soil is the biologically active, structured porous medium that has developed below the continental land surface on our planet. Soils represent one of the most complex and dynamic natural systems studied by scientists. Knowledge of their chemical, physical and biological properties is a prerequisite both for sustaining the productivity of the land. The communication of soil knowledge is therefore no easy task. India is a country where more than 60% of the population's livelihood depends on agriculture, and soil is the major factor which affects the crop growth. wheat is the staple food of our country. The major crop of Rajasthan is wheat. Rajasthan is situated in the western part of India. The capital of Rajasthan is Jaipur. Rajasthan is situated between 23.03-30.12 N latitude and 69.30-78.17 E longitude in western part of India with more than 74.79 million populations

Materials and Methods

Sri Ganganagar is a Northern most district of Rajasthan state in Western India. The town of Sri Ganganagar is the district headquarters. Sri Ganganagar district is located between latitude 28.8 to 30.6° N and longitudes 72.2 to 75.3° E. Sri Ganganagar is situated at the point where the Sutlej waters enter Rajasthan. The region irrigated by the Gang canal and the Bhakhra canal tributaries. Surface soil of the farmer's field from different village of Raisinghnagar

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block and Sri Vijaynagar of Sri Ganganagar district, were sampled randomly to a depth of 0-15 cm, 15-30 cm 30-45 cm. Total 24 soil samples were collected from two tehsil of Sri Ganganagar from 4 villages of Raisinghnagar block and 4 village of Sri Vijaynagar block was presented. four soil samples were collected from each village. The samples are named as V₁,V₂,V₃ V₄,V₅ V₆ V₇ and V₈. Air dried soil samples were crushed with the help of wooden roller and sieved through 2 mm sieve. Finally dried soil samples were kept in a polythene bag for further chemical analysis the PG laboratory of Dept. of Soil Science, SHUATS.

Result and Discussion

Of the following soils, pH, EC (dSm⁻¹), Organic carbon (%), available nitrogen (Kg ha⁻¹), available phosphorus (Kg ha⁻¹) and available potassium (Kg ha⁻¹) is given in table 1 to 7. The highest value of soil pH is found in (V₃) 7.48 and lowest value was found in (V₆) 7.28. The low pH values could be due to low level of organic matter and leaching of some of the nutrient elements. EC of various farmers field and depths which was found to significant. The EC ranges from 0.37 to 0.57. The highest mean value is recorded 0.55 in (V₂) and (V₄) and the lowest mean value is recorded 0.39 in (V₁). Accumulation on organic carbon of various farmers field and depths which was found to be significant. The OC ranges from 0.24 to 0.38. The highest mean value is recorded 0.34 in (V₁) and the lowest mean value 0.26 in (V₄) Similar results were reported by (Kumar *et al.*, 2009) [8]. Accumulation on nitrogen (kg ha⁻¹) of various farmers field and depths which

was found to be significant. The N ranges from 180.35 to 275.63. The highest mean value is recorded 232.57 in (V₃) and the lowest mean value 209.47 in (V₈) accumulation on available phosphorus(kg ha⁻¹) of various farmers field and depths which was found to be significant. The P ranges from 9.10 to 16.13. The highest mean value is recorded 13.79 in (V₃) and the lowest mean value 10.46 in (V₁). Accumulation on potassium (kg ha⁻¹) of various farmers field and depths which was found to significant. The K ranges from 270.39 to 340.40 The highest mean value is recorded 329.03 in (V₇) and the lowest mean value 303.70 in (V₂). Similar results were reported by (Raman *et al.*, 2015).

Table 1: Evaluation of pH of different depths (0-15, 15-30 and 30-45 cm) of different villages of Sri Ganganagar district of Rajasthan

Treatments	0-15	15-30	30-45	Mean
V ₁	7.42	7.41	7.39	7.41
V ₂	7.43	7.42	7.38	7.41
V ₃	7.50	7.48	7.45	7.48
V ₄	7.41	7.39	7.37	7.39
V ₅	7.35	7.32	7.29	7.32
V ₆	7.30	7.28	7.26	7.28
V ₇	7.35	7.33	7.30	7.33
V ₈	7.49	7.47	7.46	7.47
Mean	7.41	7.39	7.36	7.39
	Result	S. Ed. (±)	C.D. at 5%	
Due to depths	S	0.006	0.012	
Due to village	S	0.004	0.007	

Table 2: Evaluation of EC dS m⁻¹ of different depths (0-15, 15-30 and 30-45 cm) of different villages of Sri Ganganagar district of Rajasthan

Treatments	0-15	15-30	30-45	Mean
V ₁	0.41	0.38	0.37	0.39
V ₂	0.57	0.54	0.54	0.55
V ₃	0.54	0.52	0.51	0.52
V ₄	0.57	0.55	0.54	0.55
V ₅	0.50	0.48	0.48	0.49
V ₆	0.56	0.54	0.53	0.54
V ₇	0.55	0.54	0.54	0.54
V ₈	0.55	0.53	0.53	0.54
Mean	0.53	0.51	0.51	0.52
	Result	S. Ed. (±)	C.D. at 5%	
Due to depths	S	0.0041	0.0085	
Due to village	S	0.0025	0.0052	

Table 3: Evaluation of organic carbon % of different depths (0-15, 15-30 and 30-45 cm) of different villages of Sri Ganganagar district of Rajasthan

Treatments	0-15	15-30	30-45	Mean
V ₁	0.36	0.34	0.33	0.34
V ₂	0.38	0.30	0.28	0.32
V ₃	0.35	0.30	0.29	0.31
V ₄	0.28	0.26	0.24	0.26
V ₅	0.31	0.27	0.25	0.28
V ₆	0.32	0.28	0.26	0.29
V ₇	0.29	0.25	0.24	0.26
V ₈	0.35	0.30	0.28	0.31
Mean	0.33	0.29	0.27	0.30
	Result	S. Ed. (±)	C.D. at 5%	
Due to depths	S	0.010	0.020	
Due to village	S	0.006	0.012	

Table 4: Evaluation of available nitrogen (kg ha⁻¹) of different depths (0-15, 15-30 and 30-45 cm) of different villages of Sri Ganganagar district of Rajasthan

Treatments	0-15	15-30	30-45	Mean
V ₁	260.40	213.74	185.40	219.85
V ₂	275.63	251.49	210.39	245.84
V ₃	252.48	205.18	180.39	212.68
V ₄	263.06	233.15	195.40	230.54
V ₅	250.45	212.14	193.35	218.65
V ₆	238.90	203.17	186.34	209.47
V ₇	274.40	220.14	180.35	224.96
V ₈	271.30	230.10	196.30	232.57
Mean	260.83	221.14	190.99	224.32
	Result	S. Ed. (±)	C.D. at 5%	
Due to Depths	S	6.21	12.82	
Due to village	S	3.80	7.85	

Table 5: Evaluation of available phosphorous (kg ha⁻¹) of different depths (0-15, 15-30 and 30-45 cm) of different villages of Sri Ganganagar district of Rajasthan

Treatments	0-15	15-30	30-45	Mean
V ₁	12.14	10.15	9.10	10.46
V ₂	14.14	12.16	10.15	12.15
V ₃	16.13	14.13	11.12	13.79
V ₄	15.30	13.40	12.10	13.60
V ₅	11.40	10.39	9.87	10.55
V ₆	13.40	12.10	10.08	11.86
V ₇	13.15	11.10	9.12	11.12
V ₈	14.15	12.30	10.35	12.27
Mean	13.73	11.97	10.24	11.98
	Result	S. Ed. (±)	C.D. at 5%	
Due to depths	S	0.44	0.91	
Due to village	S	0.27	0.56	

Table 6: Evaluation of available potassium (kg ha⁻¹) of different depths (0-15, 15-30 and 30-45 cm) of different villages of Sri Ganganagar district of Rajasthan

Treatments	0-15	15-30	30-45	Mean
V ₁	310.40	290.39	270.39	290.39
V ₂	320.39	300.40	290.30	303.70
V ₃	340.40	325.39	315.30	327.03
V ₄	335.39	320.40	310.00	321.93
V ₅	332.14	323.15	314.16	323.15
V ₆	335.34	321.30	310.30	322.31
V ₇	340.39	328.39	320.15	329.64
V ₈	320.40	304.39	290.15	304.98
Mean	329.36	314.23	302.59	315.39
	Result	S. Ed. (±)	C.D. at 5%	
Due to depths	S	12.56	25.92	
Due to village	S	7.69	15.87	

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