CHEMICAL ANALYSIS OF SOIL FERTILITY PARAMETERS IN SRI GANGANAGAR AND HANUMANGARH DISTRICT OF RAJASTHAN

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ABSTRACT: **The study area comprises of Sri Ganganagar and Hanumangarh district of Rajasthan is located between 28.4º to30.3º Northern latitude and 72.3º to 75.3º Est. longitude at an altitude of 75.6 m above mean sea level.This area falls under irrigated north western plain zone of Rajasthan in India. The total geographical area of the zone is 2.63 million hactares. the soil of this zone are sandy, loamy and sandy loam. the soil are deficient in nitrogen and having very low organic matter. The phosphorous content of these soil varied from low to medium in range and potassium content is medium to high. Some areas have salt affected soils due to secondary soil salinization as a result of water logging. These soil have high value of pH and EC. The soil irrigated by the underground water with EC higher than 8 $dSm^{-1}$are saline and ultimately reduced the germination of crops and plant growth.**

***Keywords*: SAR (Sodium absorption ratio), EC (Electrical conductivity) ,IGNP (Indira Gandhi Canal project)**

1. INTRODUCTION-

The Soil fertility is the capacity to receive, store and transmit energy to support plant growth. It is the component of overall soil productivity that deals with its available nutrient status, and its ability to provide nutrients out of its own reserves and through external applications for crop production. Most characteristics that contribute to the fertility of soil, such as soil pH and the susceptibility of the soil to compaction are dependent on the constituents of the original parent rock. Subsequent events, including the growth of plants and addition of fertilizer, modify the soil characteristics and alter its fertility.Continuous use of acidic or salty synthetic fertilizers, insecticides, fungicides and herbicides disrupts the delicate balance between the Physical, Chemical and Biological components of soil fertility.

2. MATERIALS AND METHODS

2.1 Collection of sample –

A set of 20 soil sample from 0-15,15-30 and 30-60 cm depth were collected from cultivator's fields irrigating with underground tube well water from each canal command area .In each soil sample approximately 500 gm soil was taken with the help of a "khurpi" and collected in polythene bag. Each soil sample was carefully labled , carrying all the relevant details and was brought to the laboratory for analysis . The soil sample were properly dried in shade pulverized passed through 2 mm sieve and stored in marked plastic bag for chemical analysis .

3.2 Analysis methods

3. RESULTS AND OBSERVATION

Table I :- Mean study of 20 soil sample from each canal command area at different depth of soil

Soil depth(cm)	P^H (1:2)		EC (dSm^{-1})		Organic Carbon (%)	
	Range	Mean	Range	Mean	Range	Mean
Indira Gandhi Canal						
0-15	7.87-9.12	8.36	0.23-5.50	1.43	0.08-0.32	0.24
15-30	7.86-9.08	8.40	0.20-5.20	1.31	0.06-0.27	0.18
30-60	7.77-9.02	8.33	0.20-5.12	1.36	0.05-0.20	0.12
Bhakra Canal						
0-15	7.84-8.82	8.38	0.26-1.52	0.78	0.12-0.36	0.26
15-30	7.64-8.86	8.40	0.26-1.57	0.71	0.10-0.25	0.17
30-60	7.52-8.94	8.40	0.26-1.52	0.65	0.06-0.15	0.10
Gang Canal						
0-15	8.10-8.85	8.50	0.20-3.10	0.62	0.05-0.36	0.17
15-30	8.20-8.90	8.50	0.10-3.08	0.57	0.03-0.20	0.10
30-60	8.08-8.94	8.51	0.12-2.06	0.52	0.02-0.13	0.07

Sr no.	Properties	Procedure	References
1.	P^H	Electrometric method with pH meter in 1:2(soil :water)	Piper (1950)[1]
2.	Conductivity	Conductivity measurement of soil: water suspension (1:2) by conductivity meter	Piper (1950)[1]
3.	Organic carbon	Walkley and black's wet digestion method	Piper (1950)[1]
4.	Available phosphorous	Extraction by 0.5 M $NaHCO_3$ Solution at P^H 8.5 (Olsen's method) estimation by colorimetric method	Olsen et al (1954)[2]
5.	Available potassium	Extraction by 1N neutral ammonium acetate and estimation by flame photometer	Metson (1968)[3]
6.	SAR	$SAR = \frac{Na^+}{\sqrt{(Ca^{+2} + Mg^{+2})/2}}$	Richards (1954)

Table II :- Mean study of 20 soil sample from each canal command area at different depth of soil

Soil depth(cm)	Available phosphorus (ppm)		Available potassium (ppm)		SAR($meqL^{-1}$)$^{1/2}$	
	Range	Mean	Range	Mean	Range	Mean
Indira Gandhi Canal						
0-15	11.3-28.3	18.45	130-715	260.85	2.10-5.93	3.66
15-30	10.5-21.5	15.62	125-545	244.30	2.07-7.30	3.58
30-60	9.8-17.7	12.16	95-420	231.35	2.0-7.18	3.46
Bhakra Canal						
0-15	2.4-39.6	19.87	115-415	237.65	2.12-16.0	7.61
15-30	9.0-38.3	17.62	80-140	223.75	2.10-12.16	7.38
30-60	8.1-30.2	15.48	75-402	202.20	2.0-12.28	7.36
Gang Canal						
0-15	9.5-24.0	14.93	45-190	97.75	1.09-3.20	2.55
15-30	8.7-23.7	13.47	30-185	88.95	1.06-3.20	2.45
30-60	7.5-22.0	12.76	25-180	56.30	1.0-3.10	2.29

4. DISCUSSION-

The mean value of soil fraction Viz. Sand ,silt and clay were 80.64,10.34 and 9.03 ; 80.47,10.51 and 9.01; 78.85,11.07 and 10.08 percent in IGNP ,Bhakra and Gang canal command area respectively. Soil texture was determined with the help of Soil texture diagram given by (Kanwar and Chopra)[5].The following factors concerns for soil fertility status .

P^H - Soil of study area were relatively alkaline with P^H ranging 7.77 to I9.12 ; 7.52 to 8.94 ; and 8.10 to 8.51 of the layer depth 0 - 60 cm in IGNP, Bhakra and Gang canal command area respectively.

EC – The mean EC of 0 – 15, 15 – 30 and 30 – 60 cm soil layer of IGNP, Bhakra and Gang canal command area were found 1.43,1.31 and 1.36 ; 0.78 ,0.71 and 0.65 ; 0.62 ,0.57 and 0.52 dSm^{-1} respectively .It has a declining trends from upper layer to lower layer of soil.

Organic carbon- The mean organic carbon content of upper 0 – 15cm soil layer contain 0.24,0.25 and 0.17 percent in IGNP, Bhakra and Gang canal command area respectively. It has a declining trends from upper layer to lower layer of soil. The source of organic carbon is plant debris and root system of the crops. Some farmer also used FYM in the soil .

Available Phosphorus – phosphorus in the soil was in low and medium range (<25 and 25 – 50Kg P_2O_5/Ha) in all three canal command area . Root exudates of the crop plants convert the non-available phosphorus to available form. So deficiency symptoms were not found. Similar study were carried out by (Sharma and Singh)[7].

Available potassium – Amount of potassium in the soil surface layer 0 – 15 cm ranged 130 – 715, 115 – 415 and 45 – 190 K_2O/Ha in the soil of IGNP, Bhakra and Gang canal command area respectively. It is clear from the data that K_2O is found in medium to high range in IGNP and Bhakra command area.Where as the soil of Gang canal command area contain potassium in low to medium range .This may be attributed to the action of plant roots of the growing crops in transporting potassium from deeper layer to surface of the soil and also due to the present material of the soil.

SAR – The SAR value in 20 soil sample from each canal command area found to 95,none,none and none ; 75 , 20, 5 and none percent and 100,none,none and none percent soil showed the SAR range of <10,10 – 15,15 – 20 and >20 in IGNP, Bhakra and Gang canal command area respectively . The soluble inorganic salts that occurs in soils consist mostly of various proportion of the cations Na+,Ca+2 and Mg+2 which affect the soil fertility and productivity. Gupta et al[9] gave the four group of good, moderate , high and very high SAR value while working on quality of water and soil .

5. *CONCLUSION* –

The texture of soil in all three canals command area were ranged between loamy sand to sandy loam. The soil were categorized as low in organic carbon and low to medium in available P2O5 and medium to high in available K2O in IGNP command area. The soil were low in organic carbon and low to medium in available P2O5 and low to high in available K2O in Bhakra canal command area. The soil were categorized low in organic carbon and P2O5/Ha and medium in available K2O in Gang canal command area.

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