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Physico Chemical Analysis of Soil of Digod Tehsil, Kota and Their Statistical Interpretation

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Abstract: ***Throughout human history, our relationship with the soil has affected our ability to cultivate crops. This relationship between humans, the earth and food sources affirm soil as the foundation of agriculture. The environmental quality is greatly focused on water and soil because of their importance in maintaining the human health and the ecosystem.The organic matter, particular minerals N, P, K and soil microbial biomass and their stocks over the soil profile are known to be indicator of soil. The present study was conducted to study the nutrients and their relationship with soil of Digod tehsil of Kota district.***

Keywords: Nutrients, Physico Chemical analysis, Soil fertility, Digod

1. Introduction

Kota is the third largest city of Rajasthan with an area of 5217 km^2. It is bounded in the north by Bundi, in the east by Baran, in the south by Jhalawar and in the west by Chittorgarh district. Kota is education city of Rajasthan. It is famous for preparation of IIT-JEE as well as medical exams. Chambal Fertilizers is a well-known name for manufacturing fine grade fertilizers which aid in enhancing the agricultural turnover of the state. Soil quality and fertility is largely influenced by controlling factors like climate, soil topography whereas soil erosion is a serious problem for productive agricultural land[1, 2].Through awareness we can maintain proper yield and economy of the production. For this region the present study has been undertaken which could be helpful in assessing the quality of the soil of the area.

2. Material and Methods

In the present work for Physico-chemical analysis of the samples of soilwere collected from Digod tehsil of Kota district. Samples were collected from various villages which are

1) Digod
2) Nimoda
3) Sultanpur
4) Notara

5) Mandawara
6) Budhadeet
7) Baroa
8) Seemalya

For analysis of Physicochemical properties all parameters such as % OC, pH, EC, N, P, K, Zn, Fe, Cu and Mnwere analysed at Ummedganj Research Centre which comes under Kota Agriculture University.

3. Experimental Data of Digod Tehsil, Kota

Property / Samples	KD1	KD2	KD3	KD4	KD5	KD6	KD7	KD8
Physical Properties								
OC (%)	0.54	0.75	0.68	0.44	0.78	0.51	0.85	0.78
pH	7.93	7.94	8.10	7.34	8.24	7.92	7.43	7.85
temp (^{0}C)	34	36	37	39	40	43	44	45
EC (dS/m)	0.47	0.68	0.54	0.42	0.68	0.59	0.70	0.63
Micronutrients								
Cu (ppm)	66.56	84.16	78.35	71.58	68.95	86.55	76.75	82.37
Fe (ppm)	33.54	54.12	48.18	43.14	47.12	42.14	52.12	45.19
Zn (ppm)	0.72	0.54	0.74	0.68	0.58	0.85	0.68	0.67
Mn (ppm)	15.75	15.91	15.77	17.11	15.33	14.52	16.47	15.14
Macronutrients								
N (%)	0.74	0.78	0.65	0.71	0.58	0.65	0.61	0.81
P (Kg/ha)	30.70	42.90	45.76	37.33	42.45	39.54	35.41	45.41
K (Kg/ha)	207.31	241.25	245.98	258.89	238.45	215.14	227.53	251.72

*KD – Kota Digod

4. Statistical Interpretation of Data of Digod Tehsil, Kota

1) MEAN ($\bar{X}$)

$$\bar{X} = \frac{\sum f_i x_i}{\sum f_i}$$

Where,
f_i = frequency of regarding class
x_i= intermediate of class
$f_i x_i$ = multiplication of frequency and class intermediate
$\sum$ = symbol of summation

2) MODE

$$\text{Mode} = L + \frac{(f_m - f_1) \times h}{(2f_m - f_1 - f_2)}$$

Where,
L = Lower limit of modal class
f_m = Frequency Point of modal class
f_1 = Frequency Point of class preceding the modal class
f_2 = Frequency Point of class succeeding the modal class
h = Size of class interval

Properties	Mean Values	Mode Values
Organic Carbon (%)	0.66	0.75
pH	7.81	7.95
Electrical Conductivity (dS/m)	0.56	0.70
Copper (ppm)	76.88	80.00
Iron (ppm)	45.00	43.75
Zinc (ppm)	0.68	0.66
Manganese (ppm)	15.75	15.67
Nitrogen (%)	0.68	0.66
Phosphorus (Kg/ha)	40.62	38.33
Potassium (Kg/ha)	235	250

5. Result and Conclusion

1) **Organic carbon:-**Organic matter contributes to nutrients turnover and cation exchange capacity, soil structure, moisture retention and availability, degradation of pollutants, greenhouse gas emission and soil buffering[3,4]. In Digod tehsil the range of % OC is 0.51 to 0.85 %.
2) **pH:-**It specially affect plant nutrients availability by controlling the chemical forms of the different nutrients and in flouncing the chemical reactions they undergo.[5] In Digod tehsil the range of pH is 7.34 to 8.24.
3) **Electrical Conductivity:-**Soil electrical conductivity is a measurement that correlates with soil properties that effect crop productivity including soil texture, cation exchange capacity (CEC), drainage conditions, organic matter level, salinity and subsoil characteristics[6]. In Digod tehsil the range of EC is 0.42 to 0.70 dS/m.
4) **Copper:-**Copper is an important compound of proteins found in the enzymes that regulates the rate of many biochemical reactions in the plants. Copper promotes seed production and chlorophyll formation. In Digod tehsil the range of Cu is 66.56 to 86.55 ppm.
5) **Iron:-**Iron deficiency can develop if the soil is too water logged or has been over fertilised. Elements like Ca, Zn, Cu, Mn, and P cantie up iron if they are present in high amount. Iron is needed to produce chlorophyll hence its deficiency causes chlorosis. In Digod the range of iron is 33.54 to 54.12 ppm.
6) **Zinc:-**Zinc is an essential micro nutrient for plant life. In Minnesota while some soils are capable of supplying adequate amount for crop production, addition of Zn fertilizers is needed for others. In Digod the range of Zn is 0.54 to 0.85 ppm.
7) **Manganese:-**Mn isfulfils a number of roles and is used in photosynthesis, synthesis of chlorophyll and nitrogen absorption as well as the synthesis of Riboflavin, Ascorbic acid and Carotene. In Digod the range of Mn is 14.52 to 17.11 ppm.
8) **Nitrogen:-**Nitrogen mineralization in soil when absorbed by plants, Ammonium and Nitrate are incorporated in to plant cells as organic or living forms of nitrogen, Nitrogen is essential element of all Amino acids. Amino acids are the building blocks of proteins[7]. In Digod the range of nitrogen 0.58 to 0.81 %.
9) **Phosphorus:-**Phosphorus is an essential element. It is generally added to soils in fertilizers. One of the main roles of P in living organism is in the transfer energy[8].Its range in Digod is 30.70 to 45.76 Kg/ha.
10) **Potassium:-**Potassium has many different roles in plants. In photosynthesis, potassium regulates the opening and closing of stomata and therefore regulates CO_2 uptake. Potassium triggers activation for production of Adenosine Triphosphate (ATP)[9]. In Digod the range of K is 207.31 to 258.89 Kg/ha.

In the present study we found that majority of soil samples do not require additional or external nutrition and they are nutrient sufficient.

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