

Soil Characterization in Areas near River Bhavani Basin, Tamilnadu



C.Nivetha, R.Divahar, T.Mohana Kavitha, Divaker D, Manoj Kumar P

Abstract: The fertility of soil near Kalingarayan Canal is assessed in this study. Samples were collected from 9 locations namely Panjalingapuram (north), Kolathupalayam I (South), Kolathupalayam II (north), Unjalur I (north east), UnjalurII (hospital), Perumparai, Vadakupudupalayam I (north), Vadakupudupalayam II (south) and Sallikadu. Among these soils of nine sampling stations, the soil of Panjalingapuram (north) had average nutrient status. The nutrient status of all soil samples are in poor condition which affects the yield of the crops. This induces the more usage of synthetic fertilizers. The soil sample collected from sampling station Vadakupudupalayam I (north) has worst quality. This may further induce to elevate the use of artificial fertilizers for sufficient crop yield and reduce there by the fertile nature of the soil.

Keywords : Kalingarayan canal, Soil Fertility, nutrients, physico-chemical.

I. INTRODUCTION

Bhavani Sagar dam feeds Kalingarayan canal of Erode district for a length of 140kms. Erode district which is popular for textile industries gives pathway to the kalingarayan canal. Nearly 150 textiles and 20 tanneries are being operated along the catchment area and could discharge the effluent directly or indirectly into the drain. Soil standard and production of crops will be affected when irrigated with the canal water. Such changes of soil character because of the release of wastewater were assessed in this work. Wastewater without proper remediation from industries are discharged into the canal^[1]. Such effluents which are released into the canal, spoils the water quality of the canal which in turn brings down the soil fertility and thus reduces the productivity of farming land. The application of synthetic fertilizers and improper waste management leads to the worsening of ground water quality.

Thus, this study helps in evaluating the soil fertility and yield of crops near Kalingarayan canal.

II. METHODOLOGY

A. Study Area

The area for conducting this study is the irrigated soils along the Kalingarayan canal bank. Study location selected are Panjalingapuram (north), Kolathupalayam I (South), Kolathupalayam II (north), Unjalur I (north east), UnjalurII (hospital), Perumparai, Vadakupudupalayam I (north), Vadakupudupalayam II (south) and Sallikadu. Samples were named as SS1 to SS9 (Soil Samples). The downstream side sites were selected around a portion of the Kalingarayan canal having a canal length. Latitude, Longitude and distance from the canal for all the 9 locations is provided in table 1.

B. Sampling Methodology

Soil sampling was done as per the Compendium of Indian Standards of Soil Engineering, 1987. As per the guidelines of US Department of Agriculture, Grid sampling was employed in collecting the samples, where 100 m² of land was divided into 10 numbers of grids equally of size 10 m². Soil specimens were collected from the horizontally running grid of the canal bank. Steel auger fabricated in the form of Dutch auger is used for collecting the soil. Soil was collected at 20cm depth from the surface using polythene bags. The polythene bags were tightly closed to prevent oxidation and evaporation loss. The sample collection was done before the addition of manure, fertilizers and lime. Sampling was done between last week of May and first week of June. The reason for choosing this duration is, it is the time period when the irrigation activities and rainfall will not bring out dilution and leaching effects on some parameters.

Table- I: Details of soil sampling points around Kalingarayan canal

| Sample Code | Location | Latitude | Longitude | Distance From the Canal (m) |
|-------------|--------------------------|---------------|---------------|-----------------------------|
| SS1 | Panjalingapuram (north) | 11°26'26.30"N | 77°40'34.56"E | 53 |
| SS2 | Kolathupalayam I (South) | 11°23'12.46"N | 77°41'43.80"E | 45 |

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| | | | | |
|-----|------------------------------|-------------------|-------------------|-----|
| SS3 | Kolathupalayam II (north) | 11°23'14.3 9"N | 77°41'45.1 1"E | 30 |
| SS4 | Unjalur I (north east) | 11°21'50.5 7"N | 77°42'46.9 2"E | 102 |
| SS5 | UnjalurII (hospital) | 11°21'51.7 7"N | 77°42'48.9 1"E | 142 |
| SS6 | Perumparai | 11°21'48.8 0"N | 77°43'21.2 4"E | 194 |
| SS7 | Vadakupudupalayam I (north) | 11°21'33.1 6"N | 77°44'13.9 2"E | 148 |
| SS8 | Vadakupudupalayam II (south) | 11°21'33.5 6"N | 77°44'16.9 3"E | 200 |
| SS9 | Sallikadu | 11°19'42.7 1"N | 77°45'8.58" E | 155 |

III. RESULTS & DISCUSSION

Nitrogen, Phosphorous and potassium (primary nutrients) are the major nutrients needed for plant growth. Along with this calcium, magnesium and sulphur (secondary nutrients) are also needed for growth of the plant. The combination of primary and secondary nutrients is known as macro nutrients. Manganese, chloride, boron, copper, zinc, molybdenum and iron are micro nutrients. The water used for irrigation affects the existence of nutrients which brings down the soil fertility. The samples were determined for pH of soil, Organic carbon content (OC), Electrical Conductivity of soil (EC), calcium, magnesium, nitrogen, potassium, Sulphur and Potassium. The results are shown in below table.

Table- II: Physico-chemical parameters of the soil

| Sample Code | pH | EC | OC | N | P | K | Ca | Mg | S |
|-------------|------|------|------|-------|-------|-------|-------|-------|-------|
| | | dS/m | % | kg/ha | kg/ha | kg/ha | kg/ha | kg/ha | kg/ha |
| SS1 | 5.6 | 0.58 | 4.15 | 229.5 | 21.8 | 389.5 | 10.32 | 3.1 | 1.92 |
| SS2 | 5.92 | 0.56 | 2.8 | 402.5 | 19.3 | 148.5 | 12.5 | 4.4 | 3.3 |
| SS3 | 5.11 | 0.68 | 3.1 | 318 | 12.2 | 125.4 | 10.16 | 4.6 | 3.42 |
| SS4 | 5.13 | 0.74 | 3.85 | 48 | 7.5 | 189.2 | 12.5 | 3.05 | 2.15 |
| SS5 | 5.19 | 0.58 | 3.95 | 362 | 18.8 | 384.2 | 25.3 | 3.25 | 1.26 |
| SS6 | 5.09 | 0.52 | 3.84 | 284 | 11.7 | 152 | 12.84 | 5.24 | 1.31 |
| SS7 | 5.06 | 0.97 | 4.9 | 45 | 7.1 | 98 | 13.5 | 4.1 | 2.1 |
| SS8 | 5.14 | 0.35 | 5 | 54 | 9 | 105.8 | 14.68 | 2.2 | 3.14 |
| SS9 | 5.26 | 0.65 | 4.75 | 180 | 18.7 | 124 | 24.5 | 2.8 | 1.25 |

A. Soil pH

The relative amount of [H⁺] ion in soil is its pH value. It is linked with the existence of nutrients of plants. The range of soil pH in 9 different samples was between 5.06 and 5.92 dS/m. Hence the soil is acidic in nature.

B. Electrical Conductivity & Organic matter

The values of EC were in the range of 0.52 to 0.97. Accumulation of salts and agricultural runoff is the cause of increase in Electrical conductivity. Organic matter ranged in between 2.8 to 5%. The organic content may become higher because of the putrefaction of plants in the soil.

C. Nutrients

Soil Sample 7(SS7) Vadakupudupalayam I (north) had a poor nitrogen, phosphorous and potassium content. The range of nutrients in each sampling location varied which indicates that the nutrient management practices followed by the farmers were different. The minimum primary nutrient values were found in sample 7 in the range of 45, 7.1 and 98kg/ha nitrogen, phosphorous and potassium respectively. The highest value of Ca, Mg and S in the samples was found to be 25.3, 5.24 and 3.42 respectively. Ladwani Kiran et al. 2012 classified the soil as poor, medium and fertile on the basis of nutrient concentration of soil samples. Major nutrient content range in soil is presented in the table below.

Table- III: Range of major nutrients in soil

| Nutrient status | Nitrogen | Phosphorous | Potassium |
|-----------------------|----------|-------------|-----------|
| | (kg/ha) | | |
| Level in poor soil | < 280 | < 23 | < 133 |
| Level in medium soil | 280- 560 | 23 -57 | 133 -337 |
| Level in fertile soil | > 560 | > 57 | > 337 |

Out of the 9 different samples, no sample fell in the fertile level. Most of the samples were observed to have low nutrient content and fell under poor soil level. The shortfall of these nutrients(N,P & K) will affect the crop yield at those sampling points and tends to usage of more chemical fertilizers which will spoil the groundwater quality. All soil samples had a poor nutrient status which will affect the crop yield.

IV. CONCLUSION

From the study, it could be culminated that Soil Sample at location 1 (Panjalingsapuram (north)) had an average nutrient content whereas remaining samples were poor in its fertility. Soil Sample at location 7 (Vadakupudupalayam I (north)) was worst in quality. This will tend to the furthermore usage of synthetic fertilizers for good yield of crops.

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