Statistical variation in Soil Nutrient Characteristics near Industrial Area of Mayiladuthurai Taluk of Mayiladuthurai District in Tamilnadu, India

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Article History: Received: 10 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online:28April 2021

Abstract: Surface soil samples were collected from the 0-50 centimeter depth and assessed the soil statistical variation in physico-chemical parameters. The soil grain class of the surface layer is (0-58 centimeter) of the shape. Soil samples of the experimental field were clay loam while it was clay for the subsurface (25-100 Centimeter) layers of the profile. The soil samples were air-dried, crushed and passed through a 2 mm sieve before analyzing it for Nitrogen, Phosphorus, Potassium, Organic Carbon, Organic Matter, pH and exchangeable bases. Soil pH was measured electrometrically with a glass electrode pH meter, EC was determined are by using Conductivity meter. Alkaline permanganate method, colorimetric method and Flame Photometer method is used to determine Macronutrients like N P and K. Walkley and Black method is used to determine Organic Carbon (OC) and Organic Matter (OM). While the SAR, ESP% and Cation Exchange Capacity (CEC) were calculated. Micronutrients like Zinc(Zn), Copper(Cu), Iron(Fe) and Manganese(Mn) were determined by using Atomic Absorption Spectrophotometer (AAS). Available Soil pH ranged between 7.3 to 7.9. The available Electrical Conductivity (EC) values ranged from 0.18 to 0.5dsm-1 within the range for optimal growth of plants. The ranges of available Organic Carbon are ranged between 0.23% and 0.36%, Organic matter content ranged between 0.46 and 1.11 %. Nitrogen 39.2 kg/ha-1 and 72.8 kg/ha-1 are lower than that of the control soil. Available Phosphorus is ranged between 30.00 kg/ha-1 and 67.5 kg/ha-1 and is slightly higher than that of the control soil and potassium 169 kg/ha-1 and 370 kg/ha-1 content were high respectively. Cu is available between 0.72 – 0.92 ppm and Cu was found in 100% sufficient in study area. Zn is noticed between 0.62-0.82 ppm and Zn was found in 100% deficient in study area. Mn is available between 1.18-3.92 ppm and Mn was found in 70.0% deficient and 30.0% sufficient in study area. The available concentration of Fe ranged between 3.09-4.88 ppm and Fe was found in 100% sufficient in the study area. Where all below the recommended limits. Our aim is to support the farmers to characterize the soil based on their nutrition status for best suited crops which can be used effectively for crop production and enhanced productivity [1]. The statistical variation in soil nutrition is focused in Mayiladuthurai taluk in the present study at industrial based agriculture land area of Mayiladuthurai taluk in Mayiladuthurai district. The recommendations of fertilizer can be made for the crops to enhance the productivity. Soil test assessed and recommends the application of balanced fertilizers would go a long way in enhancing soil fertility and productivity.

Keywords: Statistics, Soil nutrients, soil characterization, Mayiladuthurai district.

1. Introduction

This present research work is designed to provide information on a variety of nutrient management issues to extension agents. Certified crop advisers, consultants, and producers soil are the basic requirement of life on earth. Soil nutrients have an important role in production of crops. Its availability and spatial distribution needs to be studied before planning for nutrient recommendation. The yields and intensive cropping is making high demands for nutrients from soil, which leads to depletion of soil nutrient reserve.

The study area Mayiladuthurai taluk one among the eight taluk of Mayiladuthurai district. This taluk located at near coastal belt of Bay of Bengal , last few years this taluk frequently affected by drought and floods. In 2004 tsunami affect the soil and water quality in coastal lands not only that sea water moves towards both ground and surface level, every year sea water intrusion increased in coastal taluk as such fresh water is contaminated by salinity, so people do not use the water for agriculture purpose at the same time surface soil is contaminated by salt water. Soil contamination developed by irrigation water from various sources .River, lake and ground water polluted by unwanted disposal chemicals, domestic and industrial waste now a days people are using ground water from deep bore wells and also oil bore wells change the ground water quality. Hence the present study to improve the soil quality parameters and enhance the farmers economical status based on the result in future uplift the environmental and farmers.

The removal of Potassium is by the intensive cropping is out of proportion to higher than the potassium added through fertilizer as apparent from the results of long term fertilizer experiments. The nutrients consign out of the farm in crop produces must be necessarily fill up to comfort soil fertility and therefore the production system for which stability of fertilizer application is the precondition and there is growing need for site specific balanced fertilizer recommendations according to the crop type, yield level and soil conditions. Balanced fertilizer programmed was developed for rice and by the applications of mathematical models and decision support systems. The soil salinity hinders the crop growth and yield. The challenge of crop nutrient treatment is to balance production and economic accretion with environmental impacts. Successful crop production dependents upon effective nutrient management that includes recognizing nutrient deficiencies and excesses.

Sampling and soil testing provides an opportunity to check soil nutrients and critical for developing a nutrient management plan. Nutrient requirements and nutrient removal by a crop is important of knowing for achieving a balance of nutrient inputs and crop removal outputs. The Geographic Information System (GIS) is an effective tool in the estimation of the spatial distribution in which interpolation can be undertaken utilizing simple mathematical models or more complex models. The review of relative studies of incorporate methods applied to soil properties which demonstrate that the selection of method can significantly influence the map accuracy. The present study was conducted with the main objective of providing balanced nutrition through soil-test based fertilizer recommendation in industrial area at Mayiladuthurai district.

2. Study area

The Mayiladuthurai district situated on the east coast to the south of Cuddalore district and another part of the Mayiladuthurai district lies to the south of Karaikkal and Tiruvarur districts. Mayiladuthurai district flank it on the East and bordered by the Bay of Bengal. The study area is pinpoint at 11° 6' 6.6240" N latitude and 79° 39' 7.9992" E longitude. Heat and humid climate is influenced by the East Coast of Bay of Bengal. Summer is hot from April to July and of rainfall happens from September to December. The annual mean temperature is 35°C (95°F) while mean value ranges from 30°C (86°F) in January to 40°C (104°F) in July. The highest recorded temperature is 42°C (108°F) (May, 2017), and the lowest is 18°C (64°F) (In mid 1990s). However average of annual rainfall observed is 250 mm (10 in).

3. Materials and methods

Soil samples were collected from 10 revenue villages of the study area. Five samples from each village, therefore a total of 50 samples were collected and analysed for soil quality parameters. The location map of the Mayiladuthurai Taluk is given in Fig.1.

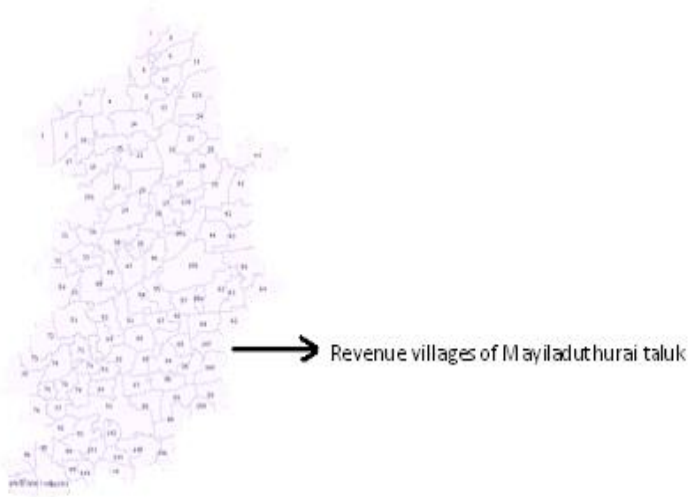

Figure.1. Location Map
Mayiladuthurai Taluk in Mayiladuthurai District

4. Soil Survey

Soil survey was carried out in industrial based agriculture land area of Mayiladuthurai taluk in Mayiladuthurai district. Samples were collected and analyzed. Fifty Surface soil samples were collected at 200 m grid spacing. These samples were subjected to analysis and the nutrition data were generated. The soil profile study was located and profiles were dug up to 50-100 cm depth which was shallower, and studied for their morphological characteristics as per Soil Survey manual[2][3].

4.1 Soil sample Analysis

Soil samples were collected and analyzed for soil reaction, salinity, organic carbon, Macro nutrients and Micro nutrients at laboratory using standard methods. Soil nutrient-balance exercises based on static modeling systems and linear up scaling are devoid of the dynamics and the interacting processes involved. Methodological evaluations are distraught with problems such as limited data availability at spatial scales, scale-specific spatial variation of nutrient-balance input data, non-linearity in up scaling, and lack of reliable up scaling techniques. Of further relevance is their emergence as a reliable tool for devising time-scale soil fertility interventions based on a sound policy framework [4][5].

5. Results and Discussion

The Physico-chemical characteristics and average mean value of nutrient given in table-1.

5.1 Soil pH

pH is another element in addition to organic matter, soil phosphorous and calcium carbonate that impacts the transformation and availability of micronutrients to plants. The low pH values could be due to low level of organic matter and leaching of some of the nutrient elements pH values of the soil samples from two areas of Halkurke require area were 7.07 and 7.54 with an average of 7.3. The pH values of the soil samples in the revenue village of Mayiladuthurai taluk were 7.3 and 7.9 with an average value of 7.6. pH value of V. Mallenahalli tank command area was 7.52. [6] The soil samples were slightly alkaline but pH of all the samples was within 6.5 to 8.5 range and was optimum for crops.

5.2 Electrical Conductivity (EC)

Electrical conductivity is a quantify measure of soil salt content or salinity level. [6]Electrical conductivity of Halkurke soil samples were 0.26 dsm^{-1} and 0.33 dsm^{-1} at the two sampled areas and the soils were of low salinity class as EC was 0.265dsm^{-1}. EC values of all the soil samples were within 0.8dSm-1 specifying the normal nature of soils and belong to low salinity class. The electrical conductivity of 4 dsm^{-1} at 25°C has been taken, in general, as the limit for classifying soils as beyond this level, the yield of most of the common field crops is lowered [7]. Plant response due to salinity effect is negligible when EC value of the saturation extract is 0-2 (ds m^{-1}). The EC values of the study area in Mayiladuthurai is ranged from 0.18 (ds m^{-1}) to 0.5 (ds m^{-1}) and the average mean value is 0.299 (ds m^{-1}).

5.3 Organic Carbon (OC)

Organic carbon is another powerful factor which increases the availability of iron and boron but decreases the availability of manganese, zinc and copper to the plants. [6] In Halkurke soil samples organic carbon was 0.67% and 0.57% and the soil was of medium quality class. Organic carbon contents of Eachanur soil samples were 0.63% and 0.67% progressively and OC of V. All the soil samples concern to medium Organic carbon ranged from 0.5 to 0.75% range. The low OC can be attributed to continuous cultivation, removal of crops residues without return, effects of water and wind erosion which privileged remove the soil colloids including the humidified organic fractions [8]. Organic carbon in the study area of Mayiladuthurai taluk of 0.23% and 0.56% and the average was 0.375% respectively.

5.4 Organic Matter (OM)

The percentage (%) of Organic matter values are above the average level of 3% for tropical soil as of Food and Agriculture Organization (FAO) standard. Organic matter plays an important role in supplying nutrients, water and provides good physical conditions to the plants [9] reported soil OM content of < 2.0 % as low 0.46- 1.11 % as medium and >3.1% as high. Following this classification the agricultural soil possesses low Organic matter. The higher levels of Organic matter present could be attributed to the application of animal manure.

5.5 Available Macronutrients and Micronutrients

In Halkurke soil samples was 62.445 kg/ha and 54.825 kg/ha progressively which indicate that the soil was poor in nitrogen and was of low grade soil. Assessed nitrogen in Eachanur soil samples which was 77.92 kg/ha and 77.92 kg/ha where as it was 85.72 kg/ha in V. Mallenahalli soil sample which are also below par in nitrogen [6]. The available nitrogen contents of Mayiladuthurai taluk soil samples were 39.2 kg/ha and 72.8 kg/ha and average mean value of nitrogen 54.12 kg/ha respectively.

In Halkurke soil samples were 5.33 kg/ha and 9.86 kg/ha and the soil samples were below par in phosphorous. In Eachanur soil samples phosphorous content was 5.60 kg/ha and 10.79 kg/ha respectively where as in V. Mallenahalli soil sample it was 6.26 kg/ha, which disclose that all soils were of low quality as per the definition. When deficiency occurs, it causes undersized growth and minimize the size of leaves and delays maturity. The low phosphorous content can be as a result of low clay content and high sand particles, which lead to loss of soluble available phosphorous besides by rain or acidification effect of phosphorous fixation by the soil flora and other soil micro organisms [8]. The assessed phosphorus content varied from 12.5 to 47.5 kg ha^{-1} with a mean value of 25.0 kg ha^{-1}. The scale is considerably large which might be due to variation in soil properties viz., pH, organic matter content, texture and various soil management and agronomic practices, on the basis of the limits recommended [9]. The accessible phosphorous contents of Mayiladuthurai taluk soil samples were 30 kg/ha and 67.5 kg/ha and average mean value of phosphorous is 44.95 kg/ha respectively. The obtainable phosphorous content increases with pH value and decreases with organic carbon. The increase in phosphorous due to increase in pH may be due to lowering of activities of Fe^{3+} and Al^{3+} which increases the solubility of strangle and variscite and increases electronegativity of colloidal complex with a consequent decrease in sorption of phosphorous [10].

The part of this element in plants is to impart fitness and growth, making plant more tolerant to drought, cold, insects and diseases, increasing the availability of nitrogen and phosphorous and increasing the size of root and tuber. Potassium deficiency is reveal by marginal leaves turning brown and drying and stunted growth. [6]. In Halkurke soil samples was 434.38 kg/ha and 213.35 kg/ha which belong to high and medium rating progressively. Mallenahalli soil sample it was 169.98 kg/ha and these soil samples be affiliated to medium. Status of assessed potassium (K_2O) in the soils ranged from 300.22 to 418.30 kg ha^{-1} with an average of 355.05 kg ha^{-1}. According to limits suggested 100% samples were high (>300 K_2O kg ha^{-1}) in potassium content. [11] The available Potassium contents in the study area of Mayiladuthurai taluk soil samples were 169 kg/ha and 370 kg/ha and

Potassium soil sample average was 299.1kg/ha accordingly. The higher available potassium content may be attributed to the prevalence of potassium rich mineral in these soils.

Paddy Growing Coastal Land Area of Mayiladuthurai District in Tamil Nadu, India. The micronutrient contents of Zn, Fe, Cu and Mn disserted from 0.60 to 1.70, 3.50 to 22.40, 1.05 to 2.60 and 1.90 to 3.30 mg kg-1 with mean values of 1.31, 13.05, 1.72 and 2.76 in succession. On the basis of critical limits suggested [12] (<0.6 mg kg^{-1} for deficient, 0.6 to 1.2 mg kg^{-1} for marginal and > 1.2 mg kg^{-1} for sufficient) 41% samples were marginal and 59% samples were sufficient in available Zn[13]. Considering the critical limits (4.5 mg kg^{-1}) proposed [13]. Level of Fe is sufficient of collected the soil samples. All the soil samples were sufficient in available Cu and Mn considering 1.2 mg kg^{-1} for Cu and 2.0 mg kg^{-1} for Mn as critical limits suggested [14].

The average mean value of Micronutrients (Zn, Fe, Cu and Mn) of Mayiladuthurai taluk of Mayiladuthurai district found to be the following range 0.62 to 0.86, 3.09 to 4.88, 0.72 to 0.97 and 1.18 to 3.92 mg kg-1 with mean values of 0.719, 4.141, 0.809 and 2.122 respectively. There are seventeen elements are essential for plant growth, this elements needs to meet the various criteria such as plant life cycle, metabolism, reproduction and survive.

The Fifty surface soil samples were collected from industrial based agriculture land area of Mayiladuthurai taluk in Mayiladuthurai district based and analyzed soil quality parameters such as pH, EC, N, P, K, Cu, Fe, Mn, Zn, OC, and OM by standard methods. The macronutrients, micronutrients and pH were employed viz., acidic (pH<5.5), slightly acidic (5.5-6.5), neutral (6.5-7.5), slightly alkaline (7.5-8.5) and alkaline (>8.5). The soil properties with high variability in terms of coefficient of variation in available phosphorus are (C.V.= 92.471%) and potassium (C.V. = 2098.673%), nitrogen (C.V.=46.36), EC (C.V.= 0.0036336), OC (C.V.= 0.00573%), SAR and ESP were all quite variable (C.V. = 0.0036336–0.00573%) while pH had variability (C.V. = 0.0231%) according to the recommendation provided for the variability of soil properties. These variations in chemical properties are mostly related to the different soil management practices carried out in the study area parent material on which the soil is formed, The nutrition status bar diagarm were generated and the nutrients status of Nitrogen, 39.2- 72.8kg/ha^{-1}, Phosphorus 30-67.5kg/$ha^{-1}$and Potassium varied from 169 to 370 kg/ha^{-1}

Table 1: Physico Chemical parameters and soil nutrients statistical status of industrial based agriculture land area at Mayiladuthurai District.

Village Name	pH	EC	N	P	K	Cu	Fe	Mn	Zn	OC	OM
Radhanallur	7.5	0.24	49.0	35.0	279	0.77	4.09	1.92	0.78	0.42	0.83
Radhanallur	7.3	0.31	56.0	42.5	350	0.75	4.01	1.94	0.78	0.35	0.69
Radhanallur	7.6	0.39	61.6	47.5	361	0.76	3.98	1.85	0.78	0.35	0.69
Radhanallur	7.6	0.33	49.0	55.0	319	0.74	4.12	1.91	0.78	0.35	0.69
Radhanallur	7.5	0.33	56.0	60.0	325	0.77	4.01	1.83	0.77	0.45	0.89
Mean Value	**7.5**	**0.32**	**54.32**	**48**	**326.8**	**0.758**	**4.042**	**1.89**	**0.778**	**0.384**	**0.76032**
Arkkadu	7.6	0.27	58.8	35.0	360	0.79	4.02	1.86	0.81	0.35	0.69
Arkkadu	7.4	0.35	51.8	42.5	366	0.79	4.16	1.89	0.76	0.50	0.99
Arkkadu	7.6	0.31	57.4	30.0	273	0.74	3.97	1.86	0.75	0.38	0.75
Arkkadu	7.4	0.29	56.0	35.0	275	0.77	4.09	1.85	0.75	0.39	0.77
Arkkadu	7.8	0.32	63.0	47.5	280	0.76	3.09	1.82	0.77	0.34	0.67
Mean Value	**7.56**	**0.31**	**57.4**	**38.0**	**310.8**	**0.77**	**3.87**	**1.86**	**0.77**	**0.39**	**0.78**
Komal	7.3	0.35	58.8	42.5	355	0.76	4.40	1.81	0.63	0.45	0.89
Komal	7.6	0.28	56.0	35.0	292	0.73	4.20	1.84	0.65	0.46	0.91
Komal	7.7	0.30	46.2	30.0	287	0.74	4.33	1.79	0.65	0.28	0.55
Komal	7.9	0.19	50.4	60.0	310	0.73	4.40	1.66	0.65	0.26	0.51
Komal	7.8	0.18	57.4	42.5	290	0.72	4.41	1.78	0.65	0.35	0.69
Mean Value	**7.66**	**0.26**	**53.8**	**42.0**	**306.8**	**0.736**	**4.35**	**1.78**	**0.646**	**0.36**	**0.71**
Panithalamedu	7.6	0.28	57.4	42.5	274	0.73	4.40	1.81	0.63	0.36	0.71
Panithalamedu	7.7	0.25	44.8	35.0	293	0.74	4.40	1.79	0.64	0.45	0.89
Panithalamedu	7.6	0.24	56.0	47.5	317	0.73	4.42	1.73	0.66	0.29	0.57
Panithalamedu	7.7	0.26	50.4	55.0	340	0.75	4.37	1.78	0.65	0.28	0.55
Panithalamedu	7.8	0.28	46.2	60.0	361	0.77	4.34	1.78	0.64	0.45	0.89
Mean Value	**7.68**	**0.26**	**51.0**	**48.0**	**317**	**0.744**	**4.39**	**1.78**	**0.644**	**0.37**	**0.72**
Kizhamaruthathanallur	7.5	0.33	49.0	47.5	290	0.73	4.36	1.77	0.63	0.24	0.48
Kizhamaruthathanallur	7.6	0.30	53.2	42.5	288	0.75	4.47	1.77	0.64	0.26	0.51
Kizhamaruthathanallur	7.7	0.31	54.6	47.5	317	0.74	4.44	1.73	0.62	0.35	0.69
Kizhamaruthathanallur	7.8	0.33	51.8	55.0	337	0.73	4.29	1.73	0.63	0.46	0.91
Kizhamaruthathanallur	7.7	0.28	39.2	47.5	328	0.75	4.38	1.72	0.64	0.35	0.69
Mean Value	**7.66**	**0.31**	**49.6**	**48.0**	**312**	**0.74**	**4.39**	**1.74**	**0.632**	**0.33**	**0.66**
Anathadavapuram	7.4	0.18	56.0	35.0	300	0.73	4.06	1.75	0.63	0.45	0.89

Anathadavapuram	7.6	0.30	58.8	30.0	277	0.75	3.98	1.70	0.63	0.35	0.69
Anathadavapuram	7.5	0.24	49.0	42.5	370	0.74	4.03	1.72	0.62	0.45	0.89
Anathadavapuram	7.6	0.26	47.6	35.0	319	0.73	4.08	1.75	0.62	0.35	0.69
Anathadavapuram	7.5	0.28	40.6	47.5	329	0.97	3.96	1.77	0.64	0.50	0.99
Mean Value	**7.52**	**0.25**	**50.4**	**38.0**	**319**	**0.784**	**4.02**	**1.74**	**0.628**	**0.42**	**0.83**
Muvallur	7.6	0.30	46.2	55.0	345	0.95	3.96	1.71	0.64	0.39	0.77
Muvallur	7.4	0.19	58.8	60.0	335	0.92	3.91	1.72	0.66	0.38	0.75
Muvallur	7.8	0.27	56.0	42.5	270	0.92	3.96	1.68	0.66	0.35	0.69
Muvallur	7.7	0.25	50.4	47.5	255	0.87	3.90	1.18	0.64	0.25	0.50
Muvallur	7.6	0.26	51.8	60.0	280	0.94	4.55	2.53	0.65	0.36	0.71
Mean Value	**7.62**	**0.25**	**52.6**	**53.0**	**297**	**0.92**	**4.06**	**1.76**	**0.65**	**0.35**	**0.69**
Vanathirajapuram	7.8	0.29	40.6	42.5	298	0.91	4.68	2.31	0.85	0.23	0.46
Vanathirajapuram	7.4	0.30	58.8	55.0	353	0.91	4.74	2.47	0.86	0.35	0.69
Vanathirajapuram	7.5	0.32	56.0	42.5	335	0.91	4.79	2.43	0.86	0.34	0.67
Vanathirajapuram	7.8	0.31	61.6	47.5	345	0.86	4.64	2.22	0.85	0.42	0.83
Vanathirajapuram	7.6	0.28	44.8	35.0	318	0.9	4.88	2.32	0.83	0.39	0.77
Mean Value	**7.62**	**0.30**	**52.4**	**44.5**	**329.8**	**0.898**	**4.75**	**2.35**	**0.85**	**0.35**	**0.69**
Thirumanacherry	7.8	0.29	56.0	47.5	223	0.86	3.94	3.04	0.83	0.50	0.99
Thirumanacherry	7.7	0.33	51.8	35.0	260	0.88	3.73	3.07	0.83	0.39	0.77
Thirumanacherry	7.6	0.39	54.6	30.0	282	0.89	3.88	3.06	0.83	0.38	0.75
Thirumanacherry	7.4	0.32	58.8	42.5	235	0.88	3.93	3.01	0.80	0.35	0.69
Thirumanacherry	7.8	0.30	64.4	47.5	262	0.90	3.85	3.03	0.78	0.25	0.50
Mean Value	**7.66**	**0.33**	**57.1**	**40.5**	**252.4**	**0.88**	**3.866**	**3.04**	**0.81**	**0.37**	**0.74**
Mudikondanallur	7.7	0.29	53.2	30.0	275	0.86	3.74	3.92	0.79	0.48	0.95
Mudikondanallur	7.8	0.36	58.8	60.0	169	0.87	3.72	3.15	0.78	0.35	0.69
Mudikondanallur	7.9	0.41	60.2	42.5	193	0.88	3.69	3.11	0.79	0.56	1.11
Mudikondanallur	7.6	0.43	68.6	47.5	250	0.86	3.62	3.17	0.78	0.42	0.83
Mudikondanallur	7.5	0.5	72.8	67.5	212	0.86	3.70	3.09	0.78	0.35	0.69
Mean Value	**7.7**	**0.398**	**62.72**	**49.5**	**219.8**	**0.866**	**3.694**	**3.288**	**0.784**	**0.432**	**0.85536**

Table 2. Descriptive statistic of variables in soil quality parameters

Variable Parameters	Mean	Median	Minimum	Maximum	CV(%)	SD	Skew	Kurtosis
pH(−log [H+])	7.618	7.6	7.3	7.9	0.0231	0.1521	-0.1722	-0.636
EC(ds/m)	0.299	0.3	0.18	0.5	0.0036336	0.06027	0.6633	2.028793
N(kg/ha-1)	54.12	56	39.2	72.8	46.368	6.809	0.0582	0.487816
P(kg/ha-1)	44.95	42.5	30	67.5	92.471	9.6162	0.2736	-0.613
K(kg/ha-1)	299.1	295.5	169	370	2089.673	45.7129	-0.6423	0.354655
Cu(ppm)	0.809	0.77	0.72	0.97	0.006014	0.07755	0.4704	-1.36954
Fe(ppm)	4.141	4.085	3.09	4.88	0.118257	0.3438	-0.1844	0.64542
Mn(ppm)	2.122	1.835	1.18	3.92	0.341227	0.58414	1.2509	0.67517
Zn(ppm)	0.719	0.705	0.62	0.86	0.00707	0.08408	0.2212	-1.63457
OC(%)	0.375	0.355	0.23	0.56	0.00573	0.07576	0.10410	-0.27563
OM(%)	0.741	0.7	0.46	1.11	0.02253	0.1501	0.1417	-0.29779

Table 3. Deficiency and percentage of Micronutrients status in Mayiladuthurai Taluk

Name of the Villages	**No. on Map**	**No. of Samples**	**Soil distribution (%)**	**Agriculture land area of deficiency of Micronutrients (%)**			
				Zn	**Cu**	**Fe**	**Mn**
Arkkadu	5	,Adn 50,Pdg50	100	-	-	100	Arkkadu
Radhanallur	5	Klt 50,pdg50	100	-	-	100	Radhanallur
Komal	5	Klt 50,pdg50	100	-	-	100	Komal
Panithalamedu	5	Klt 50,pdg50	100	-	-	100	Panithalamedu
Kizhamaruthanthanallur	5	Klt 50,pdg50	100	-	-	100	Kizhamaruthanthanallur
Anathadavapuram	5	,Adn 50,Pdg50	100	-	-	100	Anathadavapuram
Muvallur	5	Adn 85,Pdg15	100	-	-	20	Muvallur

Vanathirajapuram	5	Adn100	100	-	-	-	Vanathirajapuram
Thirumanacherry	5	Kvr 100	100	-	-	-	Thirumanacherry
Mudikondanallur	5	Adn100	100	-	-	-	Mudikondanallur
Deficiency of Micronutrients (%)			**100.00%**	-	-	**70.00%**	-
Total number of villages Deficient			**10**	-	-	**7**	-
Total number of villages Sufficient			-	**10**	**10**	**3**	**10**

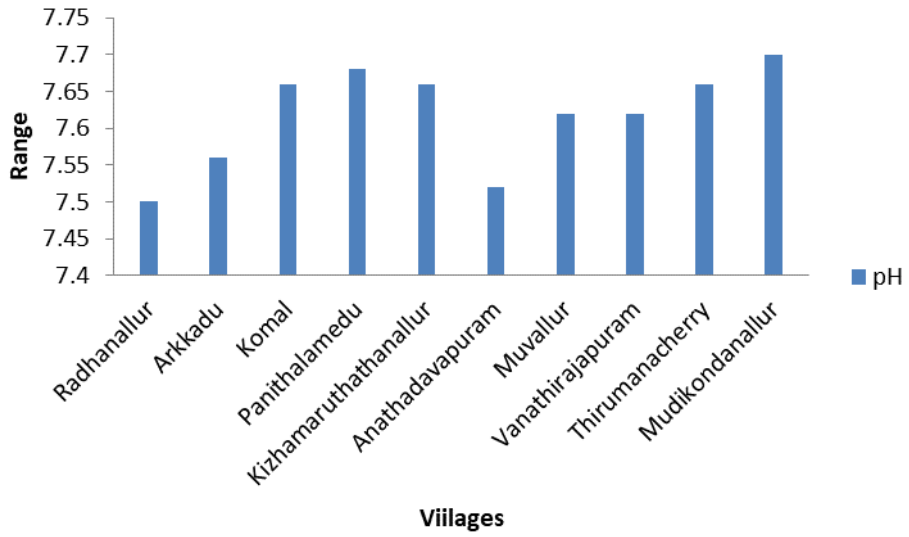

Figure 2: Soil pH in Mayiladuthurai taluk

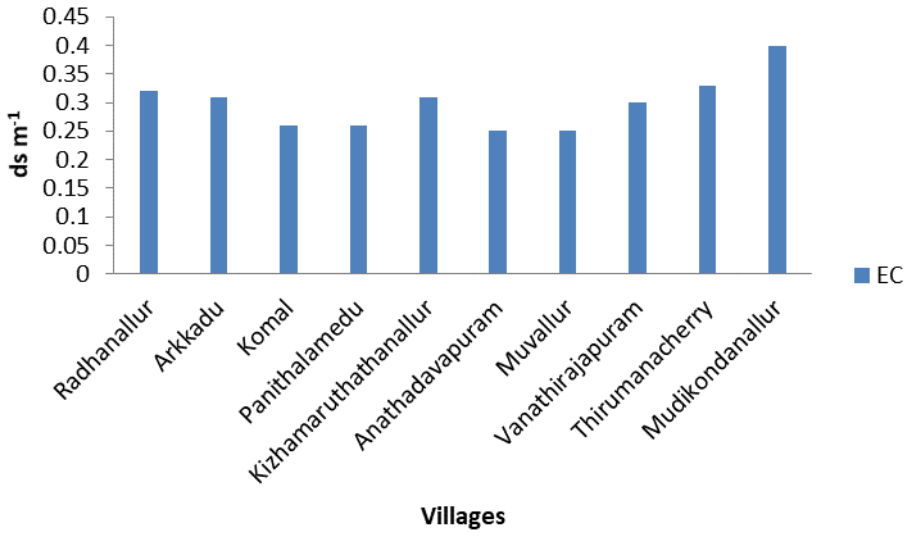

Figure 3: Average mean value of Soil Electrical conductivity in Mayiladuthurai taluk

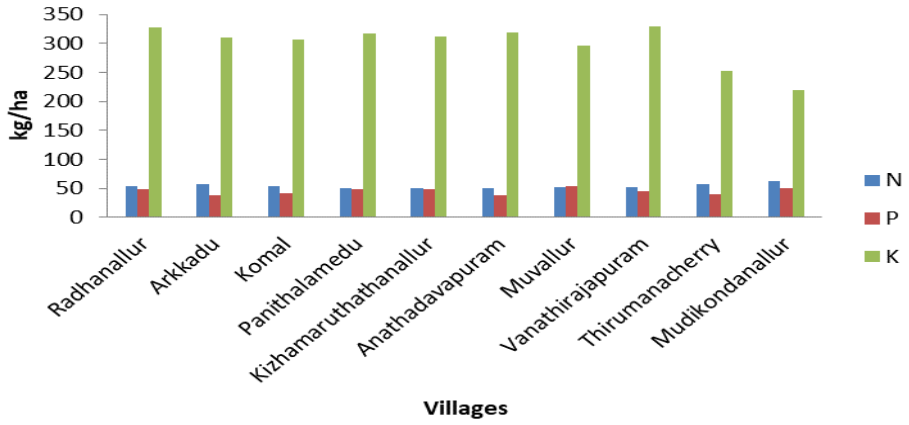

Figure 4: Average mean value of Macronutrients status in Mayiladuthurai taluk

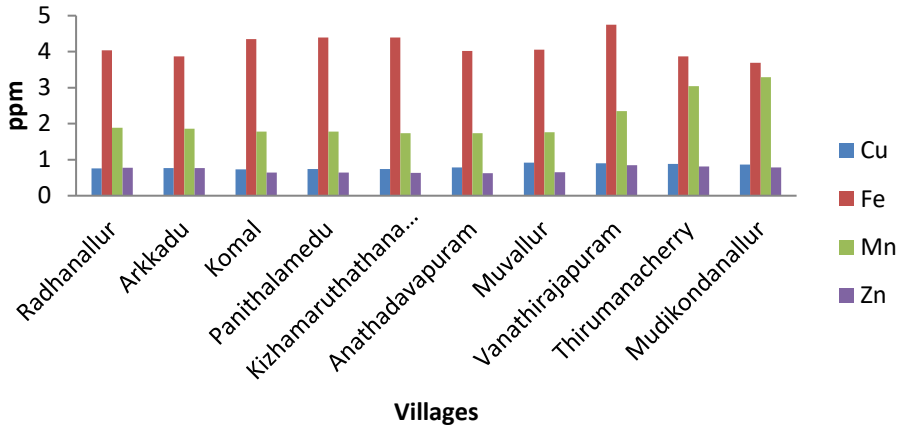

Figure 5: Average mean value Micronutrients status in Mayiladuthurai taluk

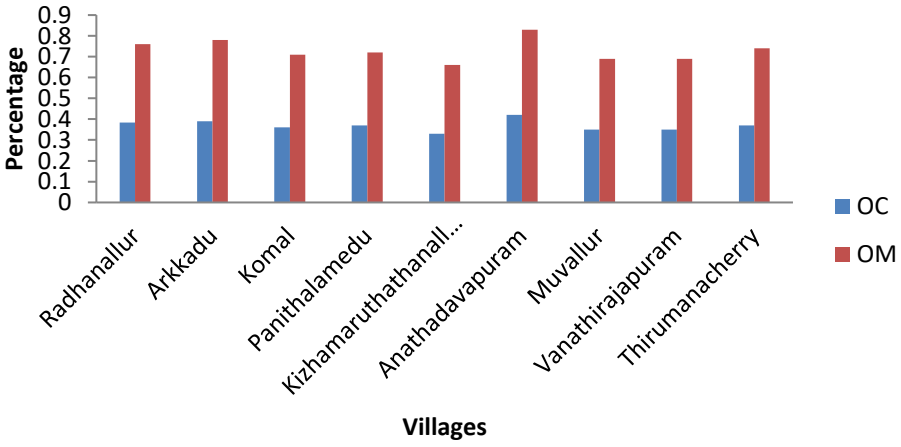

Figure 6. Average mean value organic carbon and organic mineral in Mayiladuthurai taluk

6.Conclusion

The pH of the soils in this tested villages ranged from slightly over Alkaline to neutral where 95.0 % of area (10 villages of 50 samples) is slightly alkaline and is appropriate for the Rice growth for the next few years. In view of the judgmental limit of macronutrients, the recorded macronutrients are 100.0% low in nitrogen, 100% high in P_2O_5 and 100.0% medium in potassium. Assessed Micronutrients like Fe and Cu sufficient level in all the villages. All the villages affected by zinc deficiency and the 70% of villages possess Mn deficiency. The studied soils though contained adequate amounts of available micronutrients deficiencies also recorded. The results indicated that the soil properties of pH, EC OC and OM as the main characteristics playing major role in controlling the availability of micronutrients. These features could be utilized in order to combat any present or future deficiencies of micronutrients in these soils. These results can be used to make suggestions of best management practices within the locality and also to improve the livelihood of smallholder farmers.

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