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Physicochemical and Micronutrient Assessment of Some Soil Samples Collected from Kalamb Tahsil, District Yavatmal

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Abstracts:-

The soil fertility plays great role in agricultural productivity and it is essential to maintain proper soil health. The soil health can be properly maintained by regular soil testing and analysis as per requirement and agricultural practices. In the present study attempts were made to assess the physicochemical parameter and micronutrients such as pH, electrical conductivity, N, P, K, Cu, Fe, Mn and DO this study will help farmers for proper application of fertilizers and deciding crop pattern in this region.

Keywords:- fertility, agricultural, soil health, pH, electrical conductivity, N, P, K, Cu, Fe, Mn and DO

Introduction:-

Kalamb tehsil of Yavatmal district of Maharashtra state is located at the lower reaches of Wardha and Penganga riverbeds. The major soil type is the deep black. This region comes under the less rain fall, highly drought prone and most of the agriculture from this region depends on monsoon rain.d irrigation is very less. In Summer the region is characterized by a hot and average temperature since last ten year is about 40-45^{0}C. The average normal annual rainfall varies from about 800-812.69mm[1]. Soil is the important medium on which plants and animals depends for their nutrients, water and mineral supply it is derived from the transformation and weathering of rock[2].Due to industrialization and anthropogenic activities the soil of the some parts get polluted[3] therefore the proper testing and analysis of soil is necessary. Waste disposal from various industries causes the major problem of soil pollution.[4] The pollutants directly affects the physicochemical and biological properties of soil. New chemical compounds developed by some constructive forces such as mineral and organic compounds leads to new distribution or association characteristics, structural properties as well as chemical compositions. Such factor affects the growth[5] of various plants in the soil. Human health can also affected by soil pollution due to the administration of potentially toxic substance through the food chain or by ground water used for drinking purposes[6-7]and other domestic applications.

To maintain the proper growth and economic development of production of crop yield the study of soils of farmers is essential. Such study also helps about the suggestion to farmer for the proper supply of nutrients to crops and to increase productivity to maintain their economy. Considering all above facts the present study has been undertaken which could be helpful in assessing the present status of the soils in the study area.

Material and Methods

The study area covers the kalamb at a radius of around 15 km. depending on the nature of Analysis of soil selection and collection of site and sample collection changes Composition sampling is the best method for soil analysis[8] Nutrition study requires sample at the depth of 10 cm. Borer samples are used for this purpose. Soil samples were collected from local reservoirs and sealed in tight cloth bag at the depth of 10 cm and 20 cm valley. Ten soil samples were collected from Danoda, mavalani,Borimahal, Katri, Malkapur, and adjoining areas

Soil water content described in terms of the mass of water in unit mass of soil or as volume of water in unit volume of soil. Placed the container with soil contents in the thermostat controlled oven and dried to constant weight between 105 °C and 110 °C for about 2 hours and then placed the whole in the desiccators to cool. The process was repeated for constant weight. By knowing the soil water content became easy to assess the extent availability of soil water to plants and water storage capacity of soils. It helps to evaluate regional soil water balance[9]. Density of soil is defined as mass per unit volume. Average density of soil is 2.65 gm/ml. It varies with degree of weathering. The densities of soil were determined by pycnometer method. Porosity were determined from the observed values of particle density and bulk density. pH values were determined by using digital pH meter in this 20g of soil sample was mixed with 50 ml distilled water. Suspension obtained by mixing was stirred intermittently for 30-40 minutes with magnetic stirrer and allowed to stand for one hour. The pH values were recorded by inserting combine electrode into the supernatant. pH value of the soil samples provide information about whether soil is acidic or basic.Total ions present in the soil sample represents the electrical conductivity (EC) which also determine the current carrying capacity of the soil giving a clear idea of the soluble salts present in the soil.The electrical conductivity values of a soil samples were determined by using digital Equiptronics conductivity meter for this 20g of soil sample was mixed with 50ml distilled water. Suspension obtained by mixing was stirred intermittently for 30-40 minutes with magnetic stirrer and allowed to stand for one hour.
The soil was allowed to settle down and then conductivity cell was inserted in solution to take the reading to record the conductance of soil samples.

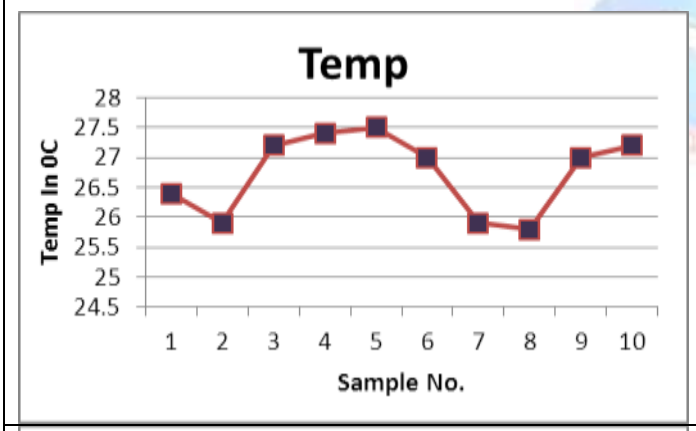
The micronutrient from the soil samples were determined by Lindsay and Novell[10] method. In this method DTPA (Diethyl Triamine Penta Acetic Acid) used for separating soils into deficient and non-deficient categories for Zn, Cu, Mn, and Fe by using atomic absorption spectrophotometer.Nitrogen of soil mainly present in organic form together with small quantities of ammonium and nitrate forms. The nitrogen supplying ability of the soil was determined by distilling soil with alkaline potassium permagnate solution. During the distillation easily utilizable and amino- N hydrolyzed nitrogen liberated as ammonia is measured. This serves as an index of nitrogen status of soil. Alkaline potassium permagnate method[11] was followed to estimate available N of soil samples.Soil available phosphorus found as orthophosphate in several forms and combinations, but only a small fraction of it may be available to plants.

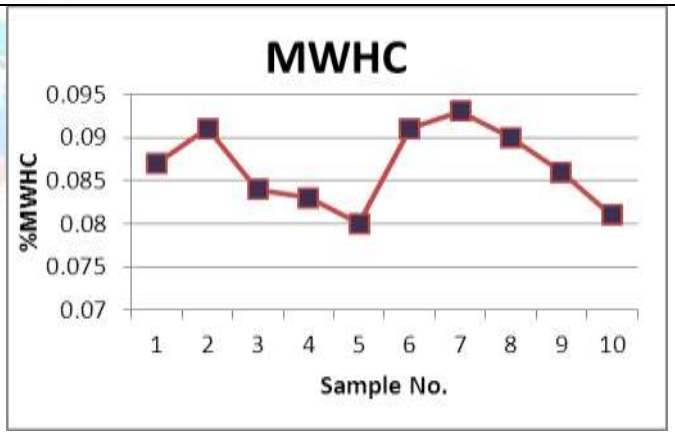
Available phosphorus was estimated by Olsen's method[12]modified by Watanbe(1965).Only small fraction of total K is held in exchangeable form, while the rest remains in fixed or non-exchangeable form. When the crop exhausts the supply of exchangeable K, more K is released from the fixed reserve. Exchangeable K, is therefore, also referred to as 'available K'.The flame photometric method[13] was employed to estimate available K of samples.

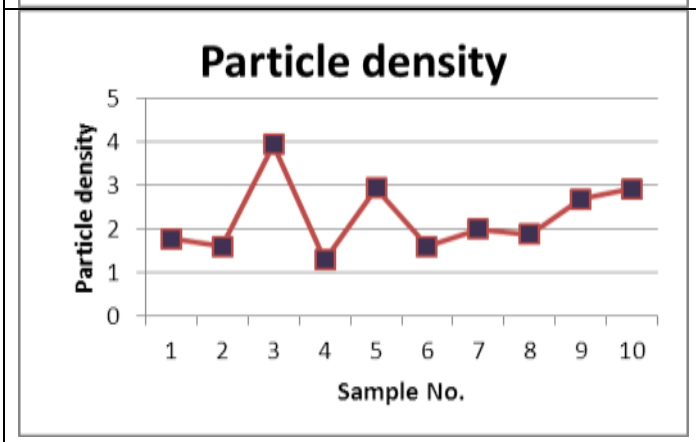
Table: 1 Showing the variation of physical parameter of soil samples

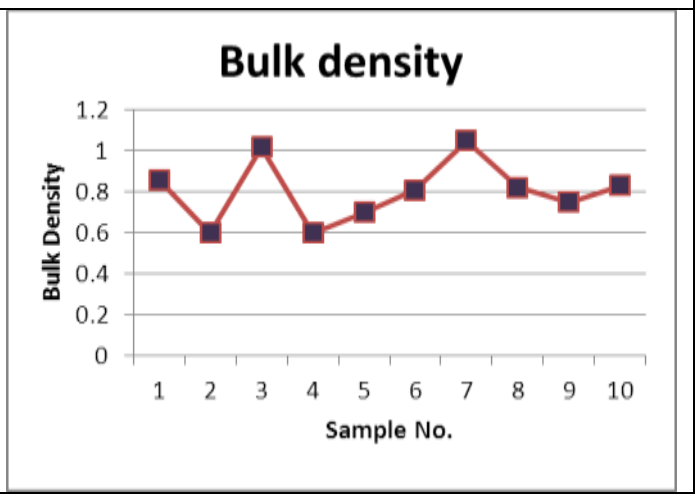
Sr. No.	Temp	MWHC	Particle density	Bulk density	Porosity	pH	Cond	Salinity	DO
1	26.4	0.087	1.785	0.86	46.80	10.27	0.37	0.02	330
2	25.9	0.091	1.612	0.60	35.60	7.19	0.26	0.01	245
3	27.2	0.084	3.941	1.02	21.96	8.5	0.21	0.01	285
4	27.4	0.083	1.298	0.60	53.77	9.73	0.24	0.01	350
5	27.5	0.080	2.94	0.70	20.00	7.75	0.24	0.01	280
6	27.0	0.091	1.61	0.81	80.00	7.46	0.22	0.01	290
7	25.9	0.093	2.00	1.05	16.11	9.71	0.24	0.01	312
8	25.8	0.090	1.88	0.82	41.73	10.96	0.24	0.01	290
9	27.0	0.086	2.7	0.75	25.07	7.49	0.30	0.02	340
10	27.2	0.081	2.93	0.83	24.32	7.32	0.39	0.01	321

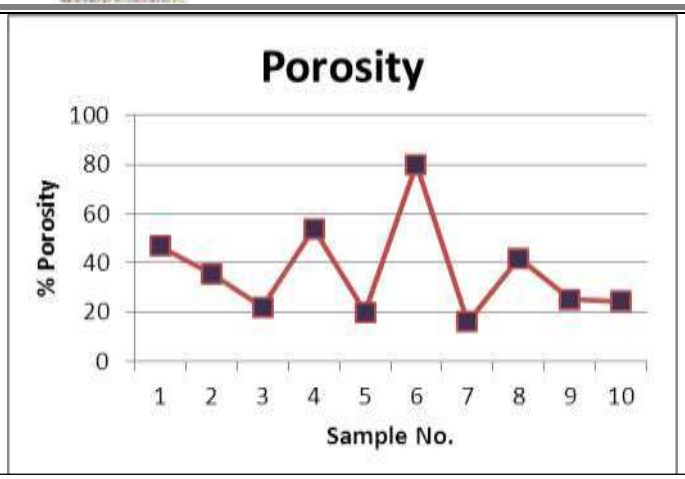
Temp:^{0}C, MWHC=Maximum Water Holding Capacity,Porosity:% Cond,:ms/Cm, salinity:dS/m,DO=Dissolved Oxygen:ppm











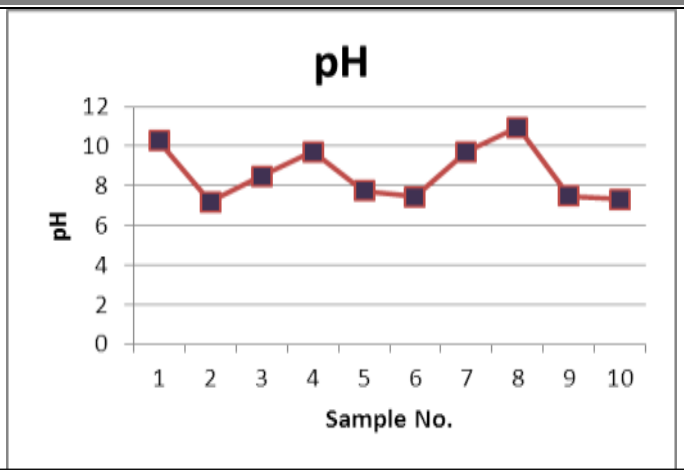
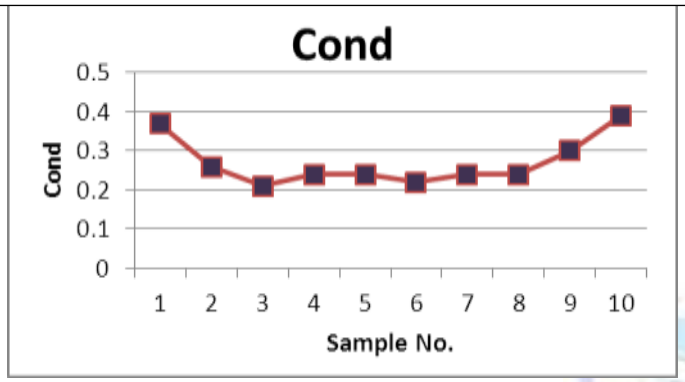
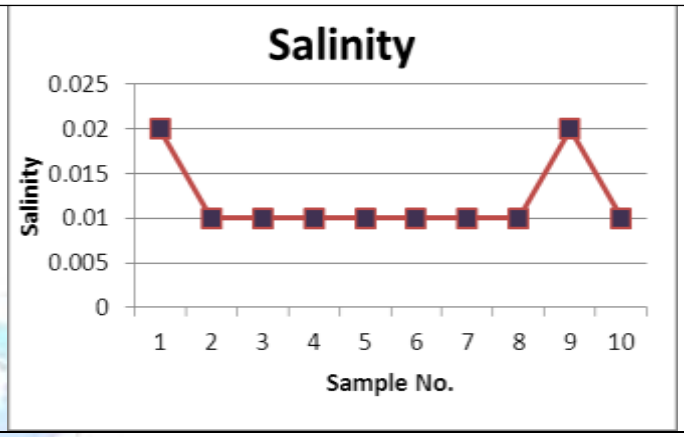


Figure:1 Showing the variation of Temperature,MWHC,Bulk density,Porosity and pH In the various soil samples





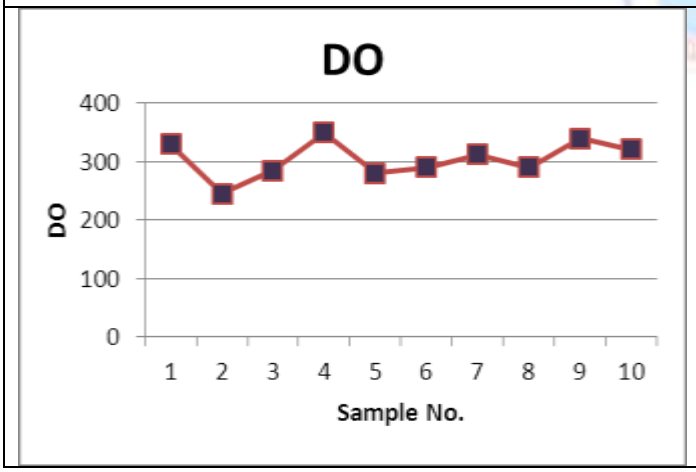


Figure:2 Showing the variation of Electrical conductance, salinity and dissolved oxygen In the various soil samples

Table: 1 showing the variation of several essential elements of soil samples

Sr. No.	N	P	K	Cu	Fe	Mn	Zn
1	190	12.22	408	1.58	1.60	4.12	1.50
2	151	9.23	380	1.16	0.47	8.62	1.41
3	123	8.00	390	0.97	0.97	7.94	0.83
4	146	10.41	265	0.47	0.47	1.70	1.18
5	137	9.65	311	0.69	1.71	5.56	1.32
6	141	11.32	301	0.62	0.69	4.65	1.96
7	126	7.15	269	1.24	0.85	5.63	0.79
8	132	8.13	195	1.64	0.69	5.68	0.97
9	170	11.89	324	0.91	0.73	3.35	1.85

10	143	12.36	392	1.87	0.89	8.47	1.42

Cu, Fe, Mn, Zn, are in ppm and N,P and K are in Kg/hectre,.

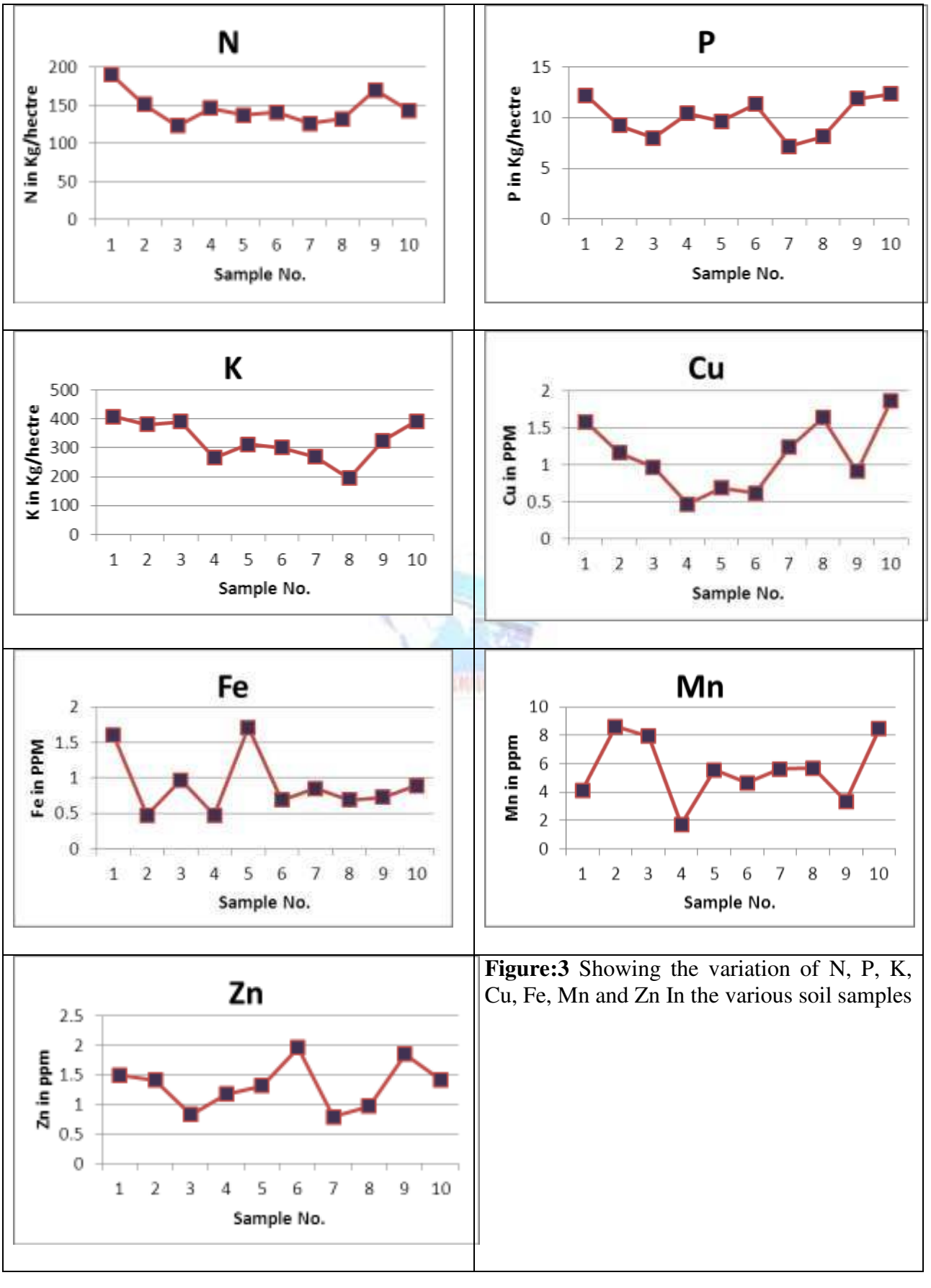


Figure:3 Showing the variation of N, P, K, Cu, Fe, Mn and Zn In the various soil samples

Results and Discussion:-

Temperature of soil samples varies from 25.8^{0}C to 27.2^{0}C.the water holding capacity of sample was found to be highest in case of sample no.7 this indicates the extent availability of soil water to plants and water storage capacity of soils whereas it is least in case of sample no 5. Particle density, bulk density and porosity were found to be maximum in case of sample no 3,7 and 6 respectively. The pH of soil samples no. 1 and 8 were found to be greater as compared to other this indicates high alkaline nature of soil this is due to the excess addition of chemical fertilizers. Electrical conductivity provides the information regarding the ion present in the soil and current carrying capacity. The electrical conductivity were found to be high in case of sample no.1 and 10 respectively, this is due to saturation of ion of the salt because of less rain fall. Soil salinity is the measure of total salts present in the soil samples it was observed that salinity of soil from this region is in normal range. The dissolved oxygen is nothing but the total oxygen dissolved in the irrigated water and measure in parts per million, the sample no.4 has the highest DO. N, P, K are important to maintain the physical characteristics of plants. The sample no. 1 and 10 were found to be the highest content of N, P and K. From the table 2 it is observe that the value of copper varies from 0.62 to 1.87 ppm it is sufficient than the normal range required by soil. Similarly the value of Fe ranges from 0.47 to 1.71 ppm, Manganese from 1.70 to 8.62 ppm and zinc value ranges between 0.79 to 1.96 ppm.

Conclusions:-

Cotton is the main crop of this region to increase the yield of crop the farmer externally added the excess of fertilizer without any proper analysis of their soil. Due to excess addition of chemical fertilizers there is accumulation of pollutant and it decreases the fertility of soil. This adversely effects on the yield of crop and soil gets polluted in this region. So without identifying the lack or deficiency in soil avoid the excess addition of chemical fertilizer. This study will help farmers for proper application of fertilizers and deciding crop pattern in this region.

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