

Analysis of Physicochemical Parameter, Heavy Metals and Micronutrients of Soil Sample of Kundal Village, Sangli District, Maharashtra

Anuradha D. Pawar

Assistant Professor, Department of Chemistry,
Krantiagrani G. D. Bapu Lad College, Kundal
Dist. Sangli .

E-mail: adpawar09@gmail.com

Abstract:

Analysis of physicochemical parameters, heavy metals and micronutrients in soil samples were collected from various farm land of Kundal area, Palus taluka Dist. Sangli, Maharashtra. Top soil samples (0-10cm) were taken from various farm lands. The soil analysis was carried out on various parameters like pH, EC, nitrogen, phosphorous, potassium and heavy metals like Cu, Fe, Mn, Zn, O.C. The result shows that on an average all the soil samples collected from various farmers of Kundal area are much varied in all parameters. This scientific information will be helpful to the farmers to solve the problems related to soil nutrients and to add optimum amount of fertilizers in soil for cultivation of highly economic crops.

Key words: soil analysis, heavy metal, physicochemical parameters.

Introduction

Soil is a vital component; medium of mineral and organic nutrients for the life of plants. Soil can develop by pedogenic processes from weathered rocks, volcanic ash deposits consisting of inorganic and organic constituents (Thakre, 2012). The chemical, physical, mineralogical and biological properties of soil having variability from depth to surface of the earth, thus forming life layer of plants. It is a natural body consisting of layers (soil horizons) of mineral constituents, which differ in their morphological, physical, chemical and biological properties from parent materials (Manimegai and Sukanya, 2014). Soil properties that are sensitive to changes can be used as indicators to improve soil quality. The testing of physical and chemical parameters of the soil is also important for the agricultural farmers in the development of specific fertilizers of land management in crop yield (Odoemelam and Ajunwa, 2008). The yield of crop depends on fertility and presence of micro-nutrients and physico-chemical constituents in the soil. These physicochemical constituents in soil influence the growth of plants (Samuel and Werner, 1975).

The fertility of the soil depends on the concentration of N, P, K, organic and inorganic materials and conductivity. The physicochemical

properties such as moisture content, Nitrogen, phosphorus and organic matter required for the growth of plant (Kanimozhi and Panneerselvam, 2011). The physicochemical properties such as moisture content, specific gravity Nitrogen as a fertilizer required for the growth of plant. Potassium is used for flowering purpose, it is also required for building of protein, photosynthesis, fruit quality and reduction of diseases and phosphate is used for growth of roots in plants. Calcium is an essential part of plant cell wall, which provides normal transport and retention of other elements (Garba et al., 2013; Kordlaghari and Sisakht, 2013). Soil sampling is perhaps the most vital step for any soil analysis. Soil analysis is extremely important to get a truly representative of soil. Soil analysis test has emerged as a key issue to increase nutrient management in agricultural productivity and production since optimal use of nutrients, can improve crop productivity and minimize wastage of these nutrients, thus minimizing impact on optimal production (Dalwadi and Bhatt, 2008 and Borah and Bhuyan, 2009). The main aim of the present investigation is to analyze the physicochemical properties and heavy metals content of soil samples collected from the various localities of Kundal areas of Sangli district, Maharashtra.

Material And Methods:

The present study deals with the analysis of soil samples from sugarcane field which were collected

in a period 2020 - 2021 from Kundal village situated in Palus taluka of Sangli district. The soil samples were collected in winter season by standard procedure in polythene bags. The soil samples were collected at surface level (0-10cm in depth) from the field. The collected samples were air dried and sieved into fine fractions. All the chemicals and reagents used for soil analysis, are A R grade from S. d. Fine and Sigma chemicals, Mumbai. For analysis of physicochemical parameters, soil samples were suspended in distilled water (1:4 w/v) and allowed to settle down the particles. The pH of the suspension was determined using glass electrode pH meter (Equiptronics, India) (Ming and Lena, 2001 and Lork, 2002). Electrical conductivity of the soil was determined from saturation extract using Conductivity meter. % Organic carbon (OC) content was determined by standard procedure of Walkley and Black method using diphenylamine indicator. The available nitrogen was estimated by alkaline permanganate method described by Subbaiah and Asija (1956). The available phosphorus and potassium in the soil were determined by volumetric method (Ifenna and Osuji, 2013). Nickel and cadmium were determined by USEPA method (3050). Available calcium can be determined by titration with standard KMnO₄ solution. Magnesium can be determined by precipitation in magnesium ammonium phosphate. Heavy metal concentrations viz. (Cu, Fe, Mn, Zn) was analyzed by Atomic Absorption GBC Avanta version 1.31 Spectrophotometer by flame Atomization (Lork, 2002).

Soil is one of the important and valuable resources of the earth's crust that have been altered by chemical and mechanical processes. Soil physicochemical properties influence the behavior of soil and hence, knowledge of physicochemical properties of soil area so important (Sumitra, 2013). This region is affected by the solid waste disposal as well as industrial effluents. The primarily study is focused on testing of soil quality and the analytical results were expected to be representative for the entire field. The soil samples were black gray in color and have unpleasant smell. In the present study the analysis of soil is carried out for the studies of various physical parameters like pH, Electrical conductivity (EC), organic carbon (%) and chemical parameters like phosphorus, potassium, copper, iron, manganese, zinc and boron analysis.

The analytical data of physicochemical parameters of soil samples are presented in table 1. The P^H of soil samples ranged from 7.5-8.8 indicating that soils are alkaline and thus satisfactorily used for horticulture crops. The electrical conductivity (EC) values are ranged from 0.06-0.30mmhos/cm, slightly well below the critical concentration. The calcium is in sufficient amount, so there is no need to use calcium containing fertilizers. Nitrogen (N), phosphorus (P), sodium (Na) and iron (Fe) these parameters are in medium range in this farm land area, so we can use fertilizers containing these parameters. Potassium(K), manganese (Mn), zinc (Zn), copper (Cu) and organic carbon (OC) these parameters are in high range in this farm land, so there is no need to use fertilizers containing these parameters.

Table -1: Physicochemical, heavy metals and micronutrients analytical data of soil sample collected from the Kundal area.

Sample site	P ^H	EC	N	P	K	Ca	Na	Fe	Mn	Zn	Cu	O.C
1	7.5	0.14	185	10	551	10.3	30	2.5	2.35	1.45	5.95	1.48
2	8.2	0.15	300	73	581	13.3	36	6.65	8.56	0.15	16.5	1.15
3	7.9	0.3	350	147	309	6.3	10	4	0.05	0.6	8.52	1.01
4	8.6	0.06	226	30	94	9	9	6.96	5.2	0.4	10.15	0.87
5	8.03	0.75	198	58	134	9.3	12	4.1	18.25	1.1	5.23	0.72
6	8.4	0.21	169	43	336	5.6	1.6	4.15	4.35	1.05	6.5	0.63
7	8.53	0.11	288	31	94	2.6	6	1.75	2.5	0.85	3.4	0.75
8	8.47	0.1	195	43	202	11.9	11	2.45	7.5	1.65	8.27	1.05
9	7.7	0.08	200	40	242	0.5	11	26.2	8.1	7.35	3.14	0.76
10	7.64	0.25	254	68	524	4.8	17	8.1	8.44	3.65	7.36	1.51
11	7.75	0.24	230	49	538	7.1	17	10.1	10.2	1.65	9.3	1.35
12	8.8	0.09	313	62	54	2.4	6	4.95	2.65	1	4.45	0.6

EC = mmhos /cm. O.C, Ca and Na=%, P&K=Kg/ha, Cu, Fe ,Mn, Zn = ppm



Results And Discussion:

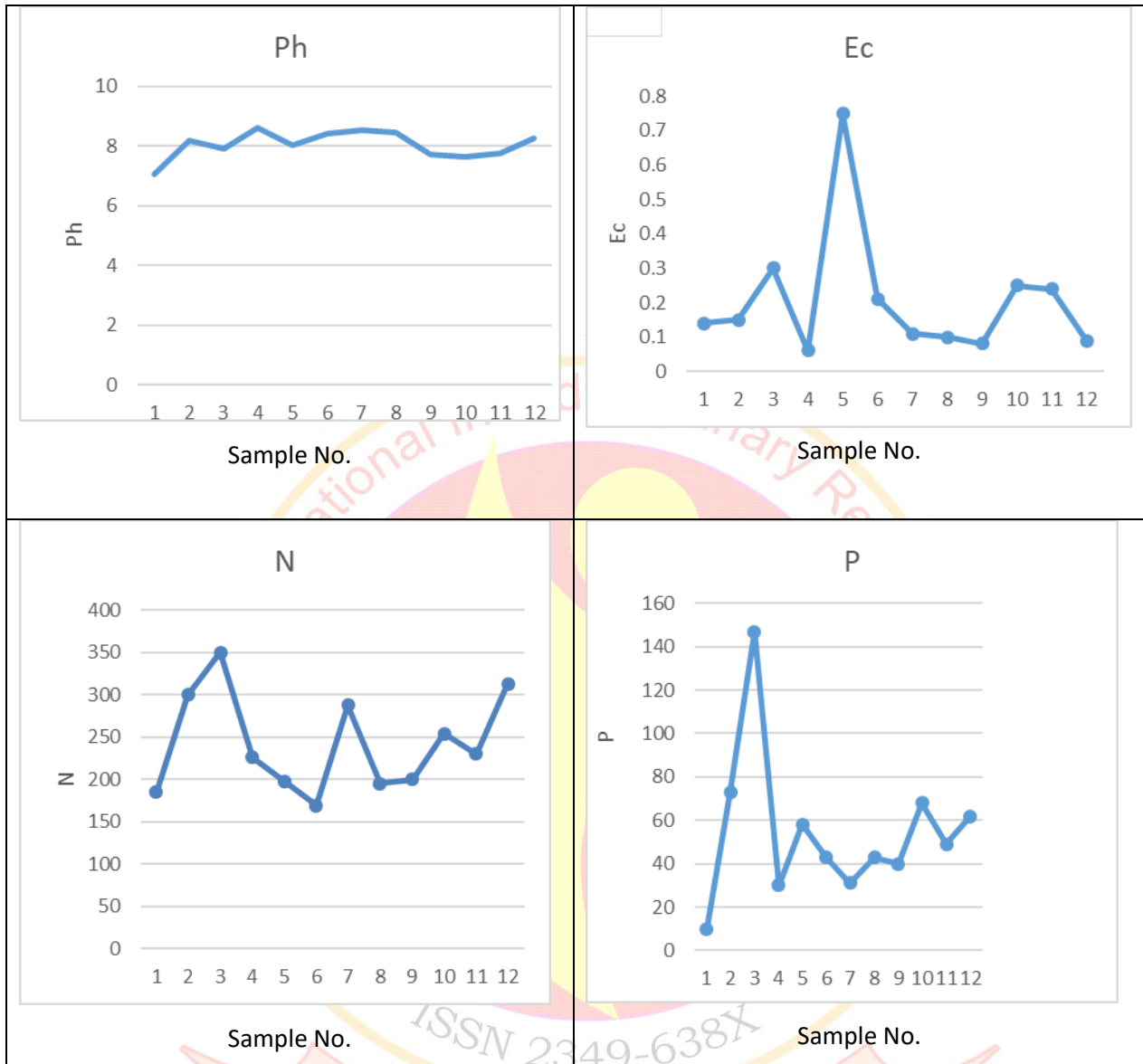
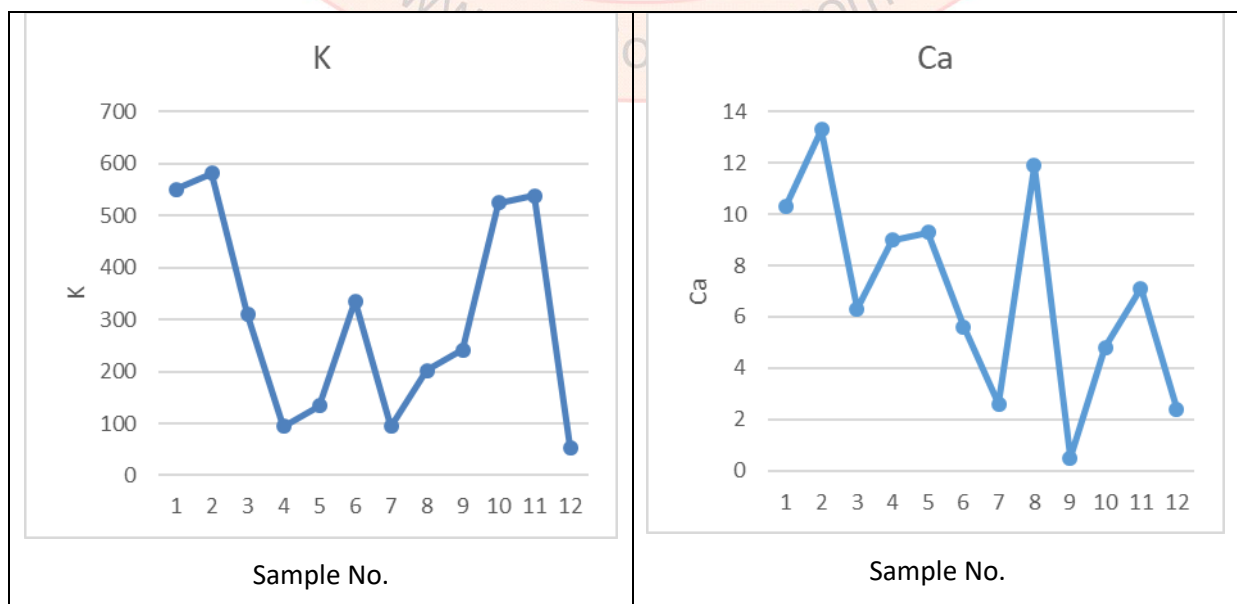


Figure: b) Variations of parameters like K, Ca, Na and Fe in soil samples



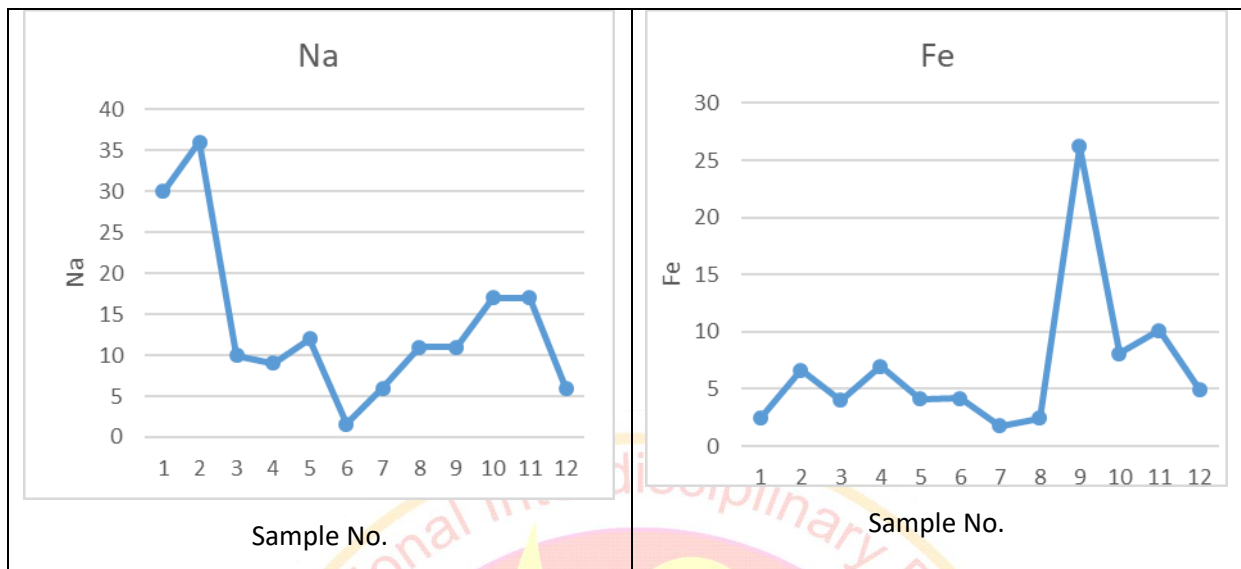
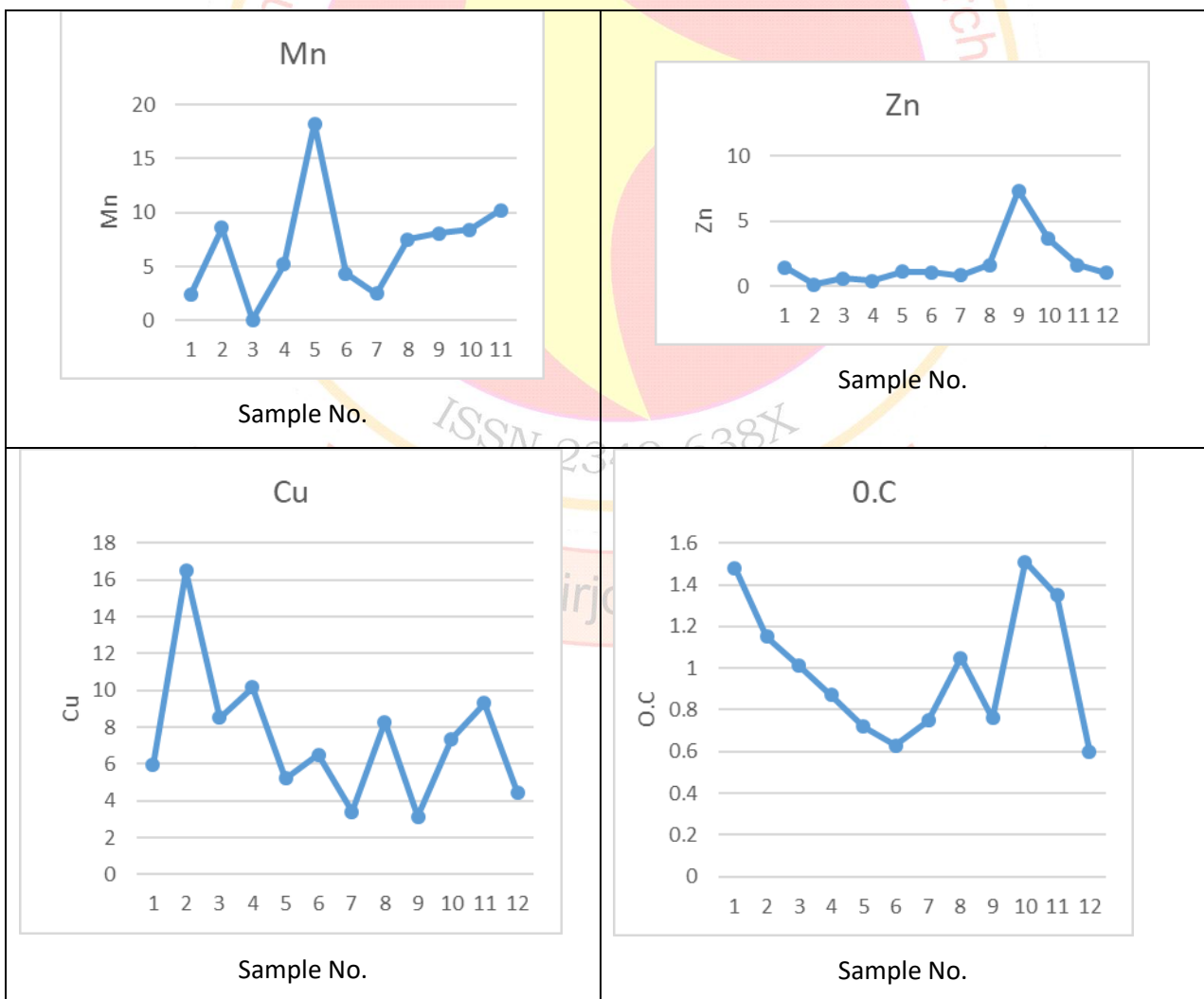


Figure: c) Variations of parameters like Mn, Zn, Cu and O.C in soil samples



Conclusion

Kundal is one of the important villages in Palus taluka in Sangli district, Maharashtra because of highly commercial agricultural farming and situated on the bank of Krishna River. The main crops cultivated in this area are Grapes, Sugarcane, Lime, Wheat, Bajara, Guava, Onion, Ginger, Garlic etc. The soil type is a major factor in determining what types of plants will grow in area. Soil testing is the only way to determine the available nutrient and minerals constituents in soil and useful tools to develop specific fertilizer/ nutrient recommendations.

Monitoring of micronutrient parameters is necessary in the soil which provides efficient way for agricultural chemists to assess the qualitative and quantitative values. These physicochemical information about nature of soil, present nutrient in soil is provides valuable information for the farmers to arrange the amount of which fertilizers and nutrients needed to soil for increase the percentage yield of commercial crops.

Acknowledgement

Author is thankful to the management and Principal of Krantiagrani G. D. Bapu Lad College, Kundal for providing necessary facilities and useful suggestions.



References:

1. B. S. Lork, R. K. Mahajan and Tps (2002). Indian J. Environ. Health, 44(2), 164-167.
2. B. V. Subbaiah, and G. L. Asija, (1956). A Rapid Procedure for Determination of Available Nitrogen in Soil, Current Science 25, 259-260.
3. Dalwadi M.R., Bhatt V.R. (2008). soil and water testing Anand, Gujarat India
4. I.Ifenna; LC.Osuji; (2013). Archives of Applied Science Research, 184-192.
5. KP Kordlaghari; SN Sisakht; A. Saleh; (2013). Annals of Biological Research, 105-108.
6. KK Borah;, B.Bhuyan; HP Sharma; (2009). Archives of Applied Science Research, 1 (2), 159-164.
7. NN Garba; A.Isma'lla; UK Asma; ZN Garba; B.I Tijini,(2013). *European Journal of Applied Engineering and Scientific Research*, 2 (2), 23-27.
8. S.A. ODOEMELAM* and O. AJUNWA. (2008). Heavy metal status and physicochemical properties of agricultural soil amended by short term applicaton of animal manure. *Current World Enviroment*, 3 (1), 21-26.
9. L Jaishree; Somwanshi; SK Akuskarint (2998). Int.J.chem.Sci., 6(1), 255-261.
10. K Kanimozhi; A Panneerselvam (2011). *Archives of Applied Science Research*, 3 (2), 525-536.
11. Ming Chen and Ma, Q. Lena (2001). Soil Sci. Socamj., 65, 491-499
12. L Jaishree; Somwanshi; SK Akuskarint (2008). Int.J.chem.Sci. 6(1), 255-261.
13. K Kanimozhi; A Panneerselvam (2011). *Archives of Applied Science Research*, 3 (2), 525-536.
14. Manimegalai, K. and Sukanya, S. (2014). Assessment of physicochemical parameters of soil of Muthannan Kulam wet land, Coimbatore, Tamilnadu, India. *International Journal of Applied Sciences & Biotechnology* 2(3):302-04.
15. Sumithra, S., Ankalaiah, C., Janardhana, R.D. and Yamuna, R.T. (2013). A case study on physicochemical characteristics of soil around industrial and agricultural area of Kadapa district, A.P, India. *International Journal of Geology, Earth and Environmental Sciences* 3(2): 28–34.
16. Thakre YG, Choudhary MD, Raut RD (2012) Physicochemical Characterization of Red and Black Soils of Wardha Region. *Int J Chem and Phys Sci* 1(2): 60-66.