Assessment of Physico-Chemical Parameters of Selected Agricultural Fields, Anand, Gujarat, India

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Abstract: Soil is an important feature of ground which is very much essential for nourishment of innumerable ecosystems. Present study is based on investigation of agricultural areas in Anand, Gujarat with Rabi season crops from December 2016 to February 2017. It helps to know about expanse of effluence produced in selected zones. It gives indications of pollution in the soil which can be harmful to human health as well as the bionetwork also. It deals with study of selected physico-chemical parameters like, Electrical conductivity(mmhos/cm), pH, Temp (∘c), TDS (ppm), Bulk Density (g/cm^3), Moisture (%),WHC (g/cm^3), Chloride (mg/l), Salinity (%),Boron (mg/l), Nitrate (mg/l), Copper (mg/l), Chromium (mg/l), OC (%), In. phosphate (mg/l), Iron (mg/l), Sulfur (mg/l). Many of the parameters were inconsistent with the time and were above the acceptable edge, too.

Keywords: Agricultural soil; tobacco; banana; physico-chemical analysis; pollution level

1. Introduction

Soil is described as foundation from innumerable organic matters, liquids, gases and lots of microorganisms. It is the skin of Earth with three state system of solids, liquid and gases. Earth acquires various qualities of soil at different places accordingly there is a range of quantity and quality of crop. (Richards L.N., 1954)So, soil is playing a major role in terrestrial ecosystem for agricultural applications, cycling of nutrients etc. Nature of crop is influenced by variety of soil. Soil which has plentiful amount of organic matter, nutrients and mineral rich constituents plays a major role in quality of yield. (KjellEsser, 2002) It is similarly supportive in manufacturing of ceramics, medicines, beauty products and many more. Now days, soil gets polluted by various factors like, soil erosion, various types of degradation, prompt urbanization. Pollution of topsoil can be also menacing for human health as toxic substances from soil can easily move to food chain also reaches to drinking water supply. Likewise, unmethodical solid waste management leads to generate leachate which is a serious problem to manage globally. (B.P. Naveen*et al*., 2016).

1.1. Study area

This study has been conducted to estimate physico-chemical parameters of selected regions of Anand district. Generally, this part of Gujarat is having tropical climate during entire year with attired weather conditions which is advantageous for many seasonal crops. The study includes assortment of agricultural sites which includes random sampling in banana plantation as well as tobacco farming with $22.51°N$ & $72.88°E$ and $22.52°N$, $72.88°E$ longitude and latitude individually. As Banana and Tobacco plants are diverse with nutrient uptake, seasonal growth with different genus i.e. *Musa* and *Nicotiana* respectively. Beside all variations these two plants are common Rabi crop of this region with good source of earning.

1.2. Materials and methods

Anand, a part of Charotarpradesh is an important area by means of productive soil properties with crop yielding. An introductory examination was completed and different positions were selected to collect soil samples in polythene bags. Subsequently, in laboratory samples were oven dried. At that juncture, collected samples were ground with pestle and mortal to perform several standard methods for physico-chemical parameters. (Trevedi P.K. &Goel P.K., 1986) In this method 50 gm of soil was taken which was dissolved with distilled water and filtrate of it was used for measuring of selected parameters. Some parameters like pH, conductivity, temperature and total dissolved solids were measured by using digital meters relevant with respective devices like digital pH meter, thermometer and TDS meter. Bulk density was performed by core method. Simultaneously, moisture and water holding capacity were done with the help of gravimetricmethod. (Maiti, S. K., 2003) For chloride and salinity with titrimetric method was followed. Organic carbon was performed by rapid dichromate method. (Mahajan, S. &Billore, D., 2014) Boron, nitrate, copper, chromium, inorganic phosphate, iron, sulphur were measured with the help of spectrophotometer. (Gautam, S. P. *et al*., 2005)

2. Results and Discussion

Table 1 illustrates various results for certain parameters which shows EC was not much varying from one month to other with average value of 0.75 mmhos/cm in tobacco and 0.87 mmhos/cm in banana plantation. Identically pH, temperature and total dissolved solids were giving mean values 6.7, 25.3°C, 541.6 ppm for tobacco plant and 6.8, 24°C, 673.6 ppm in banana field sequentially. Data shows that bulk density, moisture content and water holding capacity of selected areas were moderately changing throughout the season. Moreover, chloride, salinity and organic carbon also exhibit increasing order in plants. Boron (figure 1) was steadily increasing in tobacco plantation and decreasing in banana farm which expresses that boron is not significantly affecting the organic carbon content of soil. (Sharma, S. K.*et al*., 2016)On other hand, nitrate (figure 2) shows continuous reducing values in tobacco site and increasing values in banana site which is self-explaining, decreasing level of nitrate cancause problems in growth of plants. (Chen, B. M.*et al*., 2004)Amount of copper (figure 3) and chromium (figure 4) in selected areas were not changing much but high amount of both expresses very destructive effect on plant progress.(Maksymiec, W.,1998) Inorganic phosphate (figure 5) and Iron (figure 6) were increased in both the floras which can give an indicationof iron plays a significant role in the reactivity of ion. (Achat, D. L.*et al*., 2016)Sulfur (figure 7) content was augmented in each sample which indicates photosynthetic problems in selected species (Jiang, Y.*et al*., 2017).

Table 1: Soil Analysis of selected locations during December 2016 to February 2017

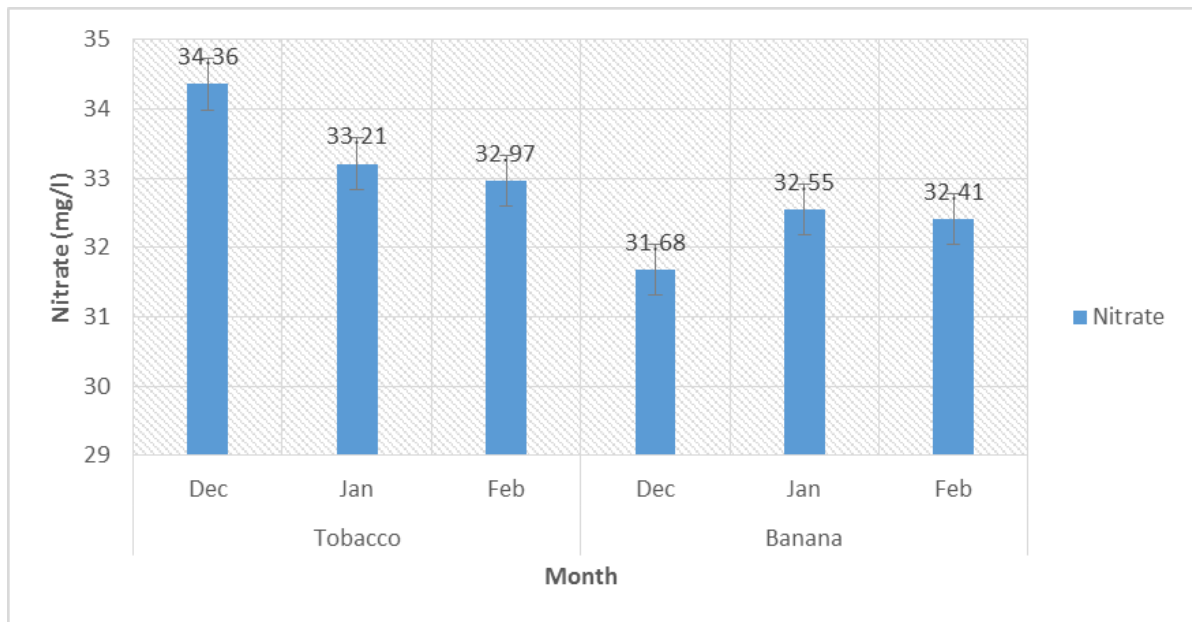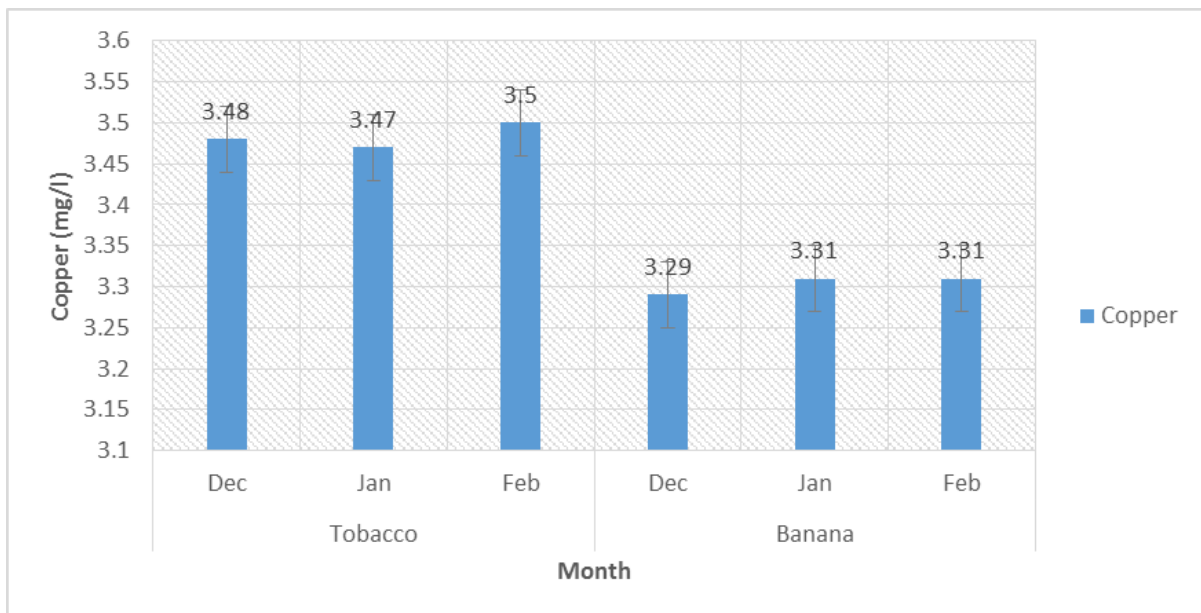| Sr. No	Physico-Chemical parameter	TAF			BAF		
		Dec	Jan	Feb	Dec	Jan	Feb
1	Electrical Conductivity(mmhos/cm)	0.76	0.7	0.8	0.9	0.93	0.78
2	pH	6.9	6.7	6.6	6.8	7.1	6.7
3	Temperature (∘c)	23	25	28	25	23	24
4	Total Dissolved Solids (ppm)	522	546	557	698	652	671
5	Bulk Density (g/cm^3)	1.39	1.22	1.18	0.97	1.26	1.14
6	Moisture (%)	22	25	27	36	31	34
7	WHC (g/cm^3)	1.88	1.95	2.07	2.58	2.14	2.33
8	Chloride (mg/l)	98	110	118	59	62	67
9	Salinity (%)	0.17	0.19	0.21	0.10	0.11	0.12
10	Organic Carbon (%)	0.5	0.6	0.7	0.8	0.7	0.9
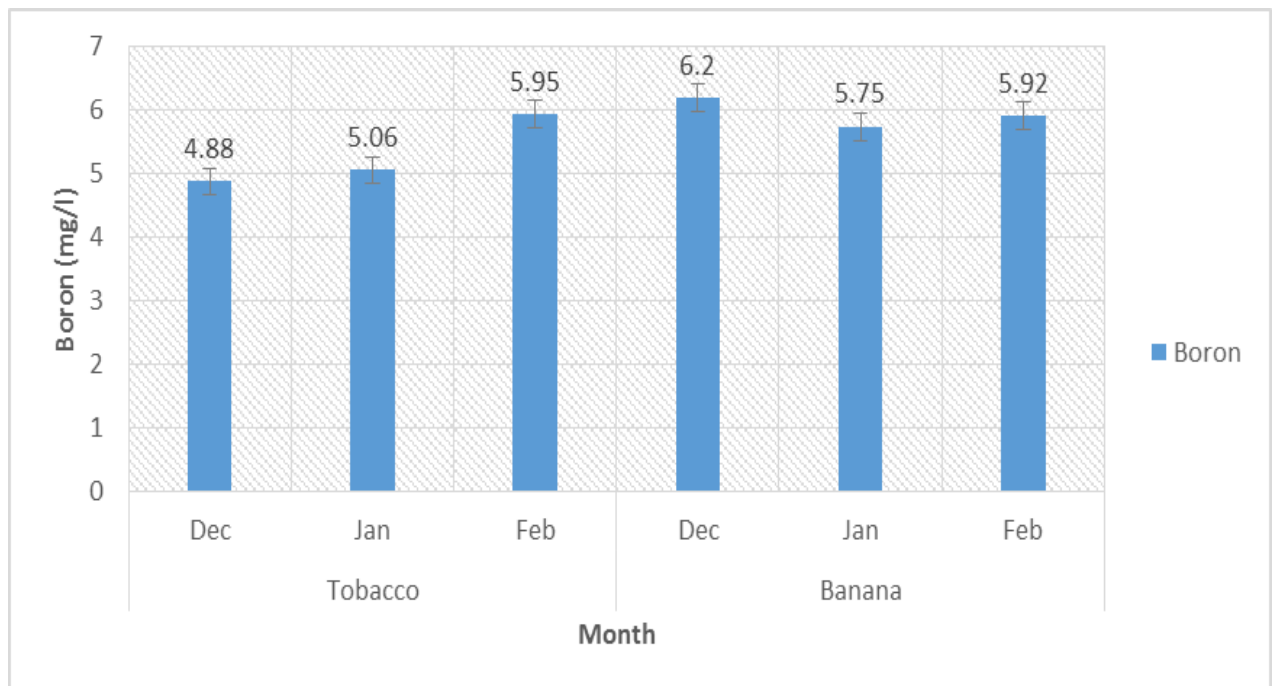
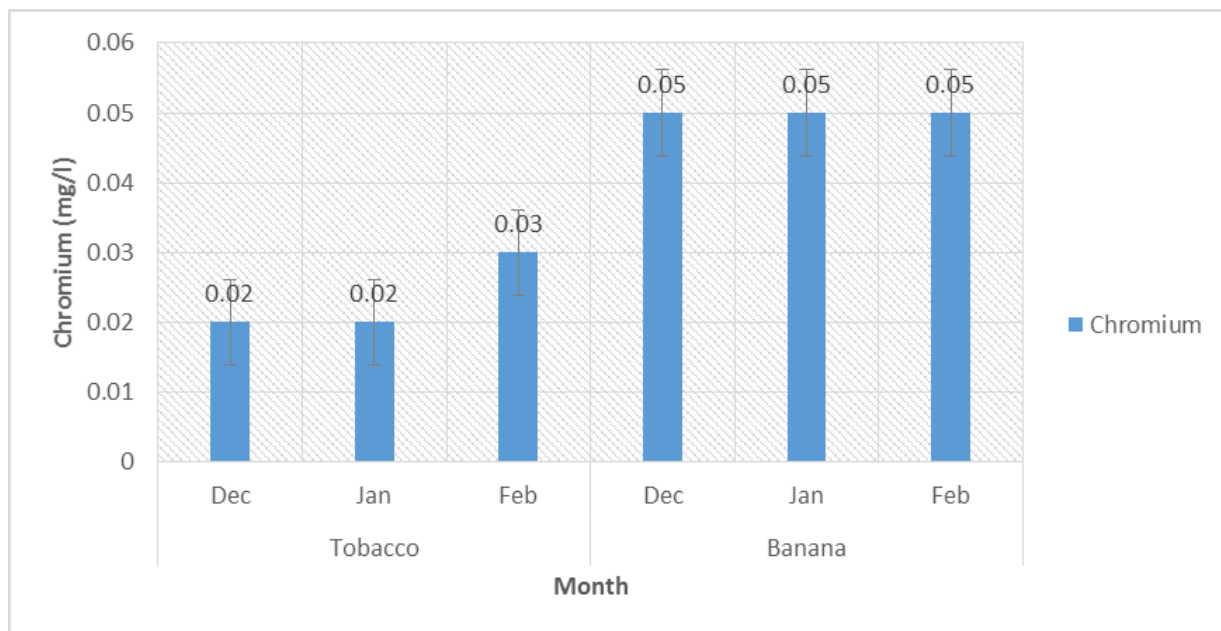*Figure 1: Boron*

Figure2: Nitrate
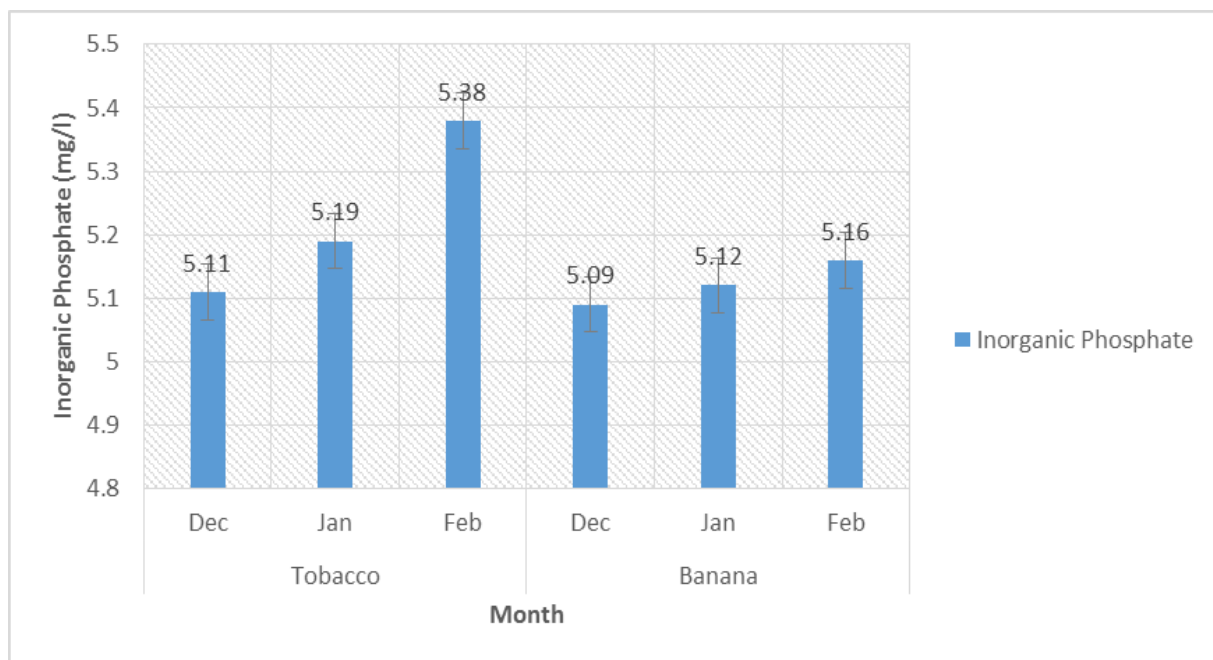

Figure3: Copper

Figure4: Chromium

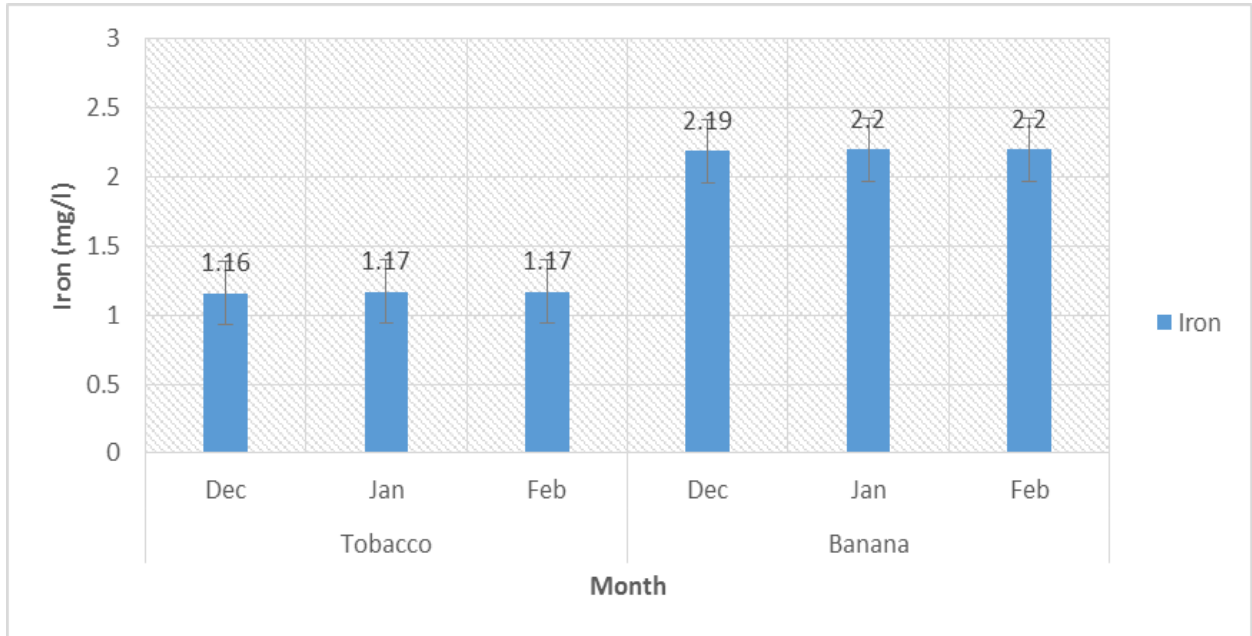

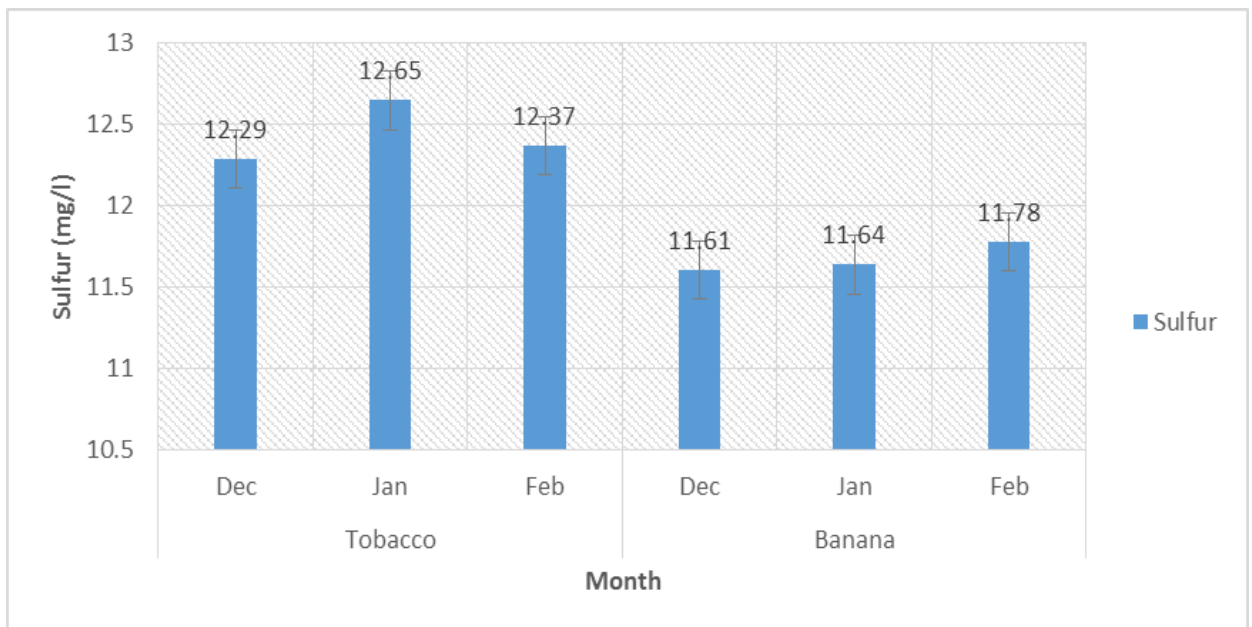*Figure5: Inorganic phosphate*

Figure6: Iron

Figure7: Sulfur

3. Conclusion

This work was carried out to distinguish physico-chemical properties of soil to know effects of parameters on growth of plant. Moreover, results also show high level of contamination in the selected areas which clarifies the problems behind reduced crop yielding. As well, high amount of impairment to soil represents that quality of soil is degrading with the time due to level of parameters ebb and flows with time. Hence, suggestions are like to cure the issue formulate less amount of anthropogenic pressure on soil to generate good quality of crop.

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A Brief Author Biography

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