

“SOIL ANALYSIS AND ITS ENVIRONMENTAL IMPACT ON NANDED CITY, MAHARASHTRA”

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Abstract

The aim of the present study was to estimate the geochemical background and normal threshold values of the surface soils in Nanded. In order to reach this goal, a simple and practical procedure was applied. The methodology followed in this research seems to be an adequate alternative for soil environmental studies.

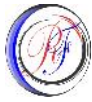
The analysis of soil was investigated over one year. The soil samples were collected from six sites of different areas surrounding Nanded city.

Keywords - Environmental impact, soil water content, soil quality, elemental analysis, black cotton soil.

Introduction

The abatement of pollution arising from various human activities has been a subject of great concern for institutions and governments worldwide. Human activities essentially lead to elevated levels of air, soil and water pollution. Air pollution and water pollution can have inimical effects on soil there by altering its elemental composition. Thus soil is the mother of the universe, and must be given a first treatment. Elemental analysis of soil particles has become important because of the effects of these particles on the environment and health. (Udo and Ogunwale, 1978) It has also been observed that elemental association with natural sources, such as soil and ocean are usually found with the coarse particulate, while elements emitted from anthropogenic sources are associated with the fine particulate. (Infante and Acosta, 1991) Toxic effects of heavy metals on microorganisms manifest in numerous ways such as decrease in litter composition and nitrogen fixation, less efficient nutrient cycling. (Baath, 1989) Impaired enzyme synthesis and activity in soil, sediments and water. The microorganisms (bacteria and fungi) are the major decomposers and are mainly responsible for the cycling of nutrients and energy in soil ecosystems. Soil organic matter has a positive effect on soil structure, tillage, and water holding capacity, aeration pH, buffering, cation exchange capacity and microbial activity (Bauer and Black, 1992).

Organic matter provides glue-like substances that act to stick individual particles together to form stable aggregates and good soil structures. (Sharma and Bali, 1998) Decomposition of organic matter is mainly controlled by soil moisture and decomposition rate increased with soil depth indicating greater microbial activity in the mineral soil than in the organic horizon due to greater soil moisture (Withington and Robert, 2007). Microorganisms in the soil are responsible for nitrogen fixation, assimilation, and



degradation of organic residues to release nutrients (Baath, 1989; Brookes, 1995). Decreasing matric potential can also change microbial community structure, but the effect on the bacteria /fungi ratio varies. Some fungi can tolerate low water potential (Harris 1980) and drought can result in a alternative increase in fungal biomass (Reichardt et al 2001, Degrood et al. 2005). Urban soils characteristics are different from agriculture or natural characteristics soils (Bretzel&Calderisi 2006). Lead and Nickel concentration associated with zinc and cadmium present the highest concentration near roadsides. However, these concentrations decreases with increasing distances from the road and with increasing depth in soil (Sutherland &Tolosa 2001).The physical properties of soil are those characteristic which can be seen with the eye or felt. They are the result of soil parent materials being acted upon by climatic factors (such as rainfall and temperature), and affected by topography (slope and direction) and life forms (kind and amount, such as forest, grass or soil animals) over a period of time. A change in anyone of these influences usually results in a difference in the type of soil formed (Tayel& El-Hady, 2005).Erosion is considered to occur when the organic carbon content of the soil falls below 2 % (Greenland et al., 1975 and Evans, 1993). Soil provides the nutrients needed for plant growth, houses microorganisms responsible for deposition of organic matter and retains and purifies water (May et al., 1993). The essential plant nutrients elements apart from carbon, hydrogen and oxygen are primarily supplied from the soil. These three, which usually make up more than 90 % of the mass of fresh plant tissue, differ in that, they come from atmospheric carbon dioxide or water.

Furthermore, the procedure used in the present work can be applied in many areas that are similar characteristic with the study area of the present work. The objective of the present work is to analysis and discusses the suitability of soil for urban development and to find its environmental impact on Nanded city.

Material and Methods

Study Area

The Nanded is located between 18°.15' and 19°.55' North latitude and 77°.7' to 78°.15' east longitudes. Nanded has a geographical area of 10528 Sq. Km. Nanded is one of the fastest growing city of Marathwada region of Maharashtra.The soil samples were collected from six sites of different area of surrounding Nanded city.

Site and Field Selection

The environmental contaminated sites located at Nanded (Maharashtra) have been selected for sampling the soil fortheir physic-chemical and microbialcharacterization.

Sampling Methods

For the present investigation the soil samples were collected from different sites of Nanded city by using random sampling methods.Sampling was done three times in the year at morning in 2009-10.Samples were collected in sterilized sealed pack polythene bagsby using a corer and were brought to the laboratorywhich is properly labeled. Processed soil samples were analyzed for nutrient availability by following standard analytical techniques.The

physical, chemical and biological parameters were analyzed as per Standard Methods (R. K. Trivedy and APHA) were composed to standards.

Results and Discussion

The present research study has been carried out in the Nanded city. The number of physico-chemical parameters like pH, EC, organic matter, alkalinity, carbonate, chloride, calcium, magnesium, specific gravity, and moisture content was determined. Biological properties like standard plate count and identification of Actinomycetes, Bacteria, and Fungi were performed. In the present study the data revealed that there were considerable variations in the quality with respect to their physicochemical characteristics. The average value of various soil parameters had been mentioned in Table 1 and represented in graphs.

Soil pH greatly influences the solubility, available and toxicity of metal elements in soil Baath and Arnebrant (1994). Nwuche et al (2008) observed pH range 7.23 from Oshodi in the South-West of Nigeria. According to Moleele et al. (2002) animal grazing and trampling as well as movement of people have been known to cause trampling which results in bare soil patches. The soil moisture commonly ranges from 5 % to 35 %. Generally it depends on void ratio, particle size, clay minerals, organic matter and ground water conditions. (Martin, 1994) Tripathi et al (2009) observed soil organic matter 1.33-4.49 % from agroforestry systems of Meghalaya, Northeast India. The physical chemical & biological characteristics of a particular soil, as well as growing plants influence the number and activities of its various microbial components (Germida 1993, Uckan & Okur, 2004).

Table 1: The physico-chemical and biological properties of soil samples.

Parameters	S ₁	S ₂	S ₃	S ₄	S ₅	S ₆	Mean	S. D.
pH	6.98	6.54	7.39	7.08	7.02	7.66	7.11	0.382
EC (uS/cm)	654	101	324	92	363	190	287.3	211.5
Organic Matter (%)	0.102	0.102	0.128	0.064	0.056	0.057	0.08	0.029
Alkalinity (meq/100g)	115	55	65	55	50	80	70	24.49
Carbonate (%)	138	66	78	66	60	96	84	29.39
Chloride (%)	5.25	1.24	2.84	2.55	13.06	3.12	4.70	4.278
Calcium (mg/gm.)	38.42	44.08	43.28	25.69	40.88	24.04	36.07	8.961
Magnesium (mg/gm.)	39.55	46.15	55.38	9.2	2.63	23.73	29.44	21.04
Specific Gravity	4.3	4.1	4.1	4.5	4.1	4.0	4.18	0.183
Soil Moisture (%)	5.48	7.26	7.58	4.10	3.78	12.90	6.85	3.059
SPC (cells/gm.)	4.5X10 ⁴	3.9X10 ⁴	3.4X10 ⁴	3.5X10 ⁴	5.5X10 ⁴	5.8X10 ⁴	4.43X10 ⁴	0.9X10 ⁴

According to Islam and Weil (2000), soil degradation can occur as a result of the macro-aggregate disruptions and loss of labile organic matter due to amongst other factors, tillage. This could have happened in the cultivated soil. Factors that affect soil penetration resistance include water content, bulk density, soil compressibility, soil strength parameters and soil structure (Bradford, 1986). Oseni et al (2007) observed moisture content, pH, organic matter and bacteria 13.81-26.27 %, 6.67-7.02, 1.03-4.71 % and 0.59-2.60 (cfu/g) X 10⁵ from rain forest and plantation in Ondo state, Nigeria. We find results like black cotton soil, which is rich in calcium and magnesium. The soil is mainly alluvial in nature. Similar results are also found to Shaikhet al. (2012) This soil type is not suitable for urban development of Nanded

city. In centre part of Nanded city soil depth (80-100 feet) more. Because of it more houses are find cracks in these areas even they are newlyconstructed too. So main reason to find cracks to houses in this area is soil depth, after certain period of time houses are get settled in this black cotton soils.

Table 2: The biological properties of soil samples.

Sr. No.	Sampling Area	Actinomycetes	Bacteria	Fungi
1	CIDCO	Absent	Present	Present
2	Kautha	Absent	Present	Present
3	Vishnupuri	Present	Present	Present
4	Workshop	Present	Present	Present
5	Chaityanagar	Present	Present	Present
6	Shardanagar	Absent	Present	Present

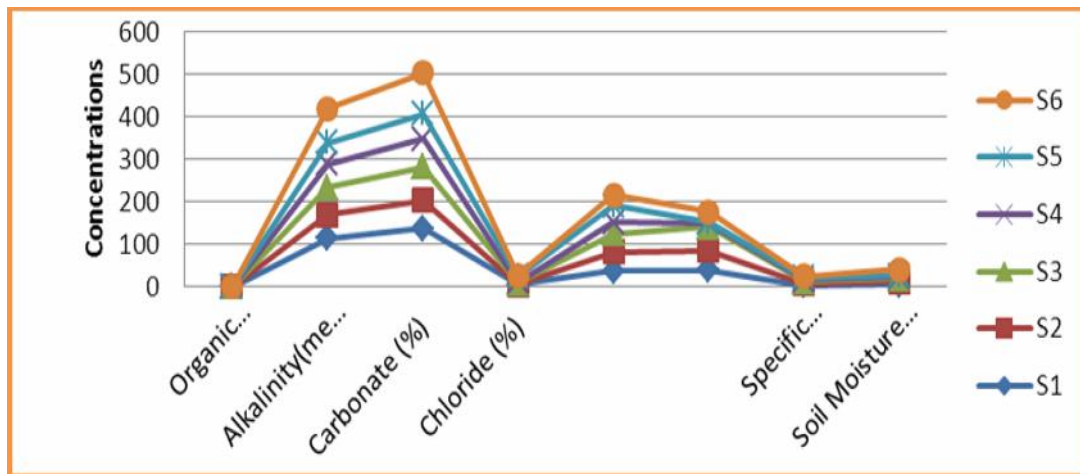


Fig.2:Shows the physicochemical properties of observed parameters of soil samples

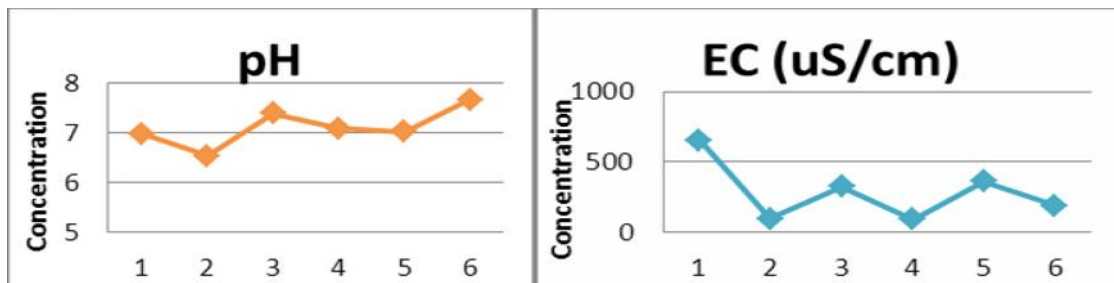
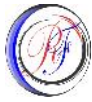


Fig.3: Observed pH of soil samples **Fig.4:** Observed EC of soil samples

Conclusion

From this study, it was concluded that the Nanded has black cotton soil, which is rich in calcium and magnesium. The soil is mainly alluvial in nature. The soil present in this region is black cotton soil. It covers maximum study area of Nanded city and which is useful in cotton crops and other crops also. The water holding capacity of this soil was good as compare to other soils. On the basis of above discussion it is concluded that the soil type is not suitable for urban development of Nanded city. In this area construction of houses are risky at



the time of earthquake. Alternate method you can also apply to this region you can build earthquake resistance houses for safety of you and your family.

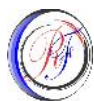
Further studies are required to address other possible environmental impacts of this soil type on study area.

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