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SOIL HEAVY METAL STATUS AROUND MAHAD MIDC AREA DISTRICT RAIGAD MAHARASHTRA

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ABSTRACT :

Maharashtra is one of the agriculturally most developed state of India and people are mainly in the occupation of agriculture. The investigation focused the analysis of soil metals concentration from Mahad MIDC industrial territory which was used for cultivating paddy and still surrounding people are in the same business.The investigation was completed around Mahad MIDC, District Raigad of state Maharashtra, India. The Industrial zone is known for its different Chemical and Pharmaceutical industries. Industrial effluent are more responsible for the increase in the concentration of poisonous metals into the soil. The examination discovers contamination state of soil. The heavy metals(Iron, Copper, Zinc, Manganese, Nickel, Chromium, Cobalt, and Lead) were studied from fifteen selected stations of Mahad MIDC zone. The remarkable variation in the metals concentration was observed during study period. The outcomes clearly demonstrate that the industrial effluents are affecting adversely on the quality of soil.

KEYWORDS : *Heavy Metals, Soil, Pollution, Mahad MIDC area.*

INTRODUCTION

Soil is one of the indispensable assets on the planet Earth. In last few year, extensive focus has been paid to waste of industries, which is generally release ashore or into the different water sources. The soil physico-chemical properties affects the soil behavior and therefore the learning of soil property is essential (Rajbala et. al., 2012). Soil is an imperative creation of earthbound environment, and direct release of industrial waste particularly that without treatment may have profoundly impact on natural properties of soil identified in relation to soil productivity (Kumar et. al., 2012).Heavy metal tainting of soil because of different anthropogenic activities has turned into a serious reason for worry all through the world. The expansion in pollution of heavy metals, for example, Cr, Cu, Co, Cd and Pb in cultivable soils because of utilization of agrochemicals and polluted water system, water prompted decay of soil quality (Rayment et. al., 2002; Kaur et al., 2014).Various metals like Cd, Cu, and Zn are accounted as transporting with industrial discharges, bedrock, and lake silt in acidic conditions (Steinnen E., Schindler D.).Heavy metals have more holding power in soil any longer than in different parts of the biosphere. Also, the rehashed utilization of water for water system may prompt the accumulation of toxic metals in agrarian soils and plants (Odoh,2011).The harmful impacts of heavy metals may rely on the dimensions and oxidation states and kinds of sources(Duruibe, J.O., and F.A. Nicholson), they can influence the nature of agrarian soils, including phytotoxicity. Obviously, soil is considered as the predominant mode for the heavy metals transportations to

human body through harvest or vegetables as a food (F.A. Nicholson).Many scientists (Lasat, M.M., Mireles F, Wei B., Gülten Yaylalı-Abanuz) affirmed that heavy metal contamination of surface soils is because of concentrated and mass industrialization and urbanization that has turned into a genuine worry in many developing nations since soil contamination is the beginning stage of transportation of the poisonous substances to all living things and in to the surrounding atmosphere. The sufficient insurance and rebuilding of soil biological systems polluted by poisonous metals require their analysis and remediation. Contemporary enactment regarding ecological security and general wellbeing, at both national and universal level, depend on information that gives details about physico-chemical properties of natural phenomenon, particularly those related to our food chain (A. Kabata-Pendias). While soil study would give an understanding into toxic metal speciation and bioavailability, efforts for remediation of polluted soils would give insight of origin of pollution, soil chemistry, and impacts of these toxic metals. Evaluation of toxic metals status in soil is a best logical way which help authority to control pollution and saving soil and biological systems on the earth (Q. Zhao).

MATERIAL AND METHODS

Study Area

This study was carried out around the Mahad MIDC area. The study sites covers the area from different agricultural fields.

Material Required

Soil sample, Plastic bag, Shovel, 2 mm sieve, Beakers, Electronic balance, Hot plate, Measuring cylinder, Funnel, 100 ml air tight bottle, Whatman filter paper No. 42, Distilled water, Double distilled water.

Sample Collection

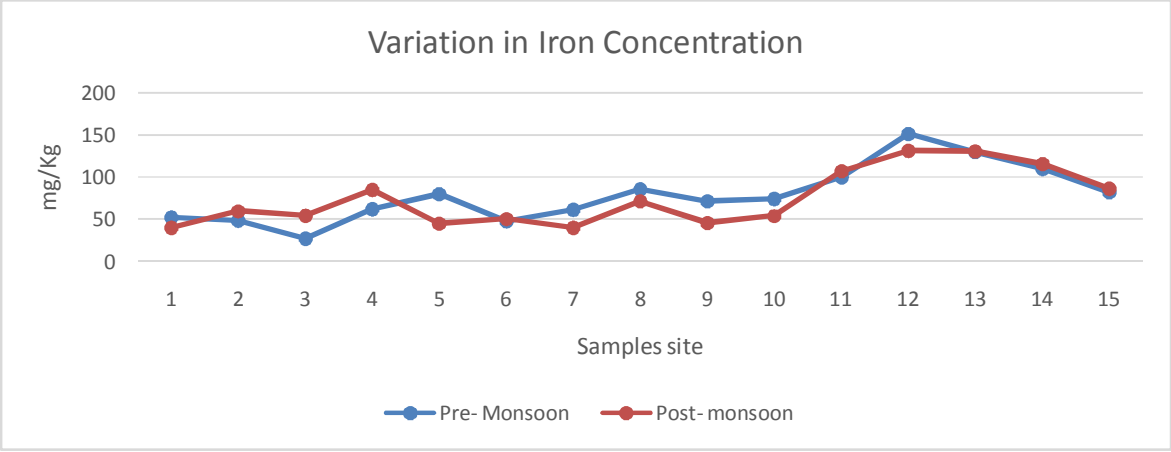
Soil samples were collected using cleaned shovel at 15cm depth and stored inpolythene bags. The samples were mix, gently homogenized and sieved through 2-mm-mesh sieve. Air drier was used for the drying of soil samples and placed in electric oven at a temperature of 40 °C approximately for thirty minutes. For further process obtained powder was kept at room temperature.

Instrument Required

Atomic Absorption Spectrophotometer.

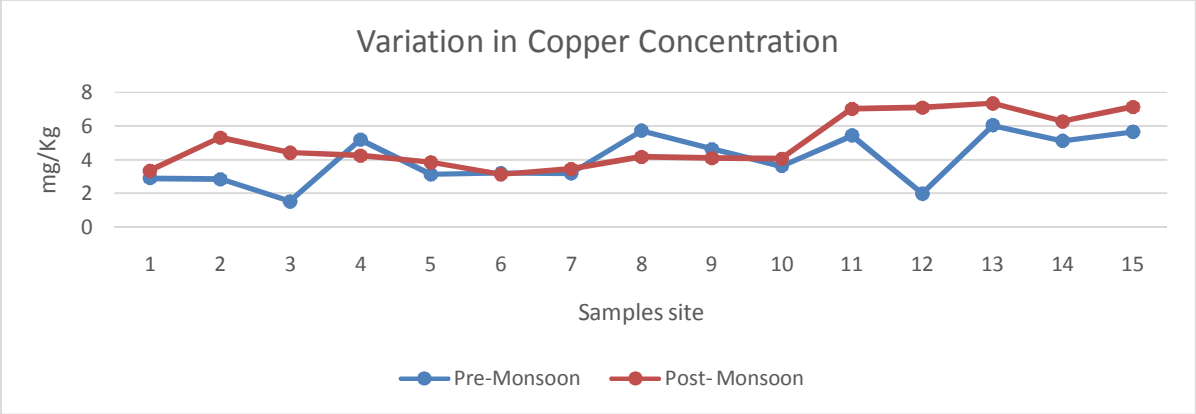
Result and discussion

Iron



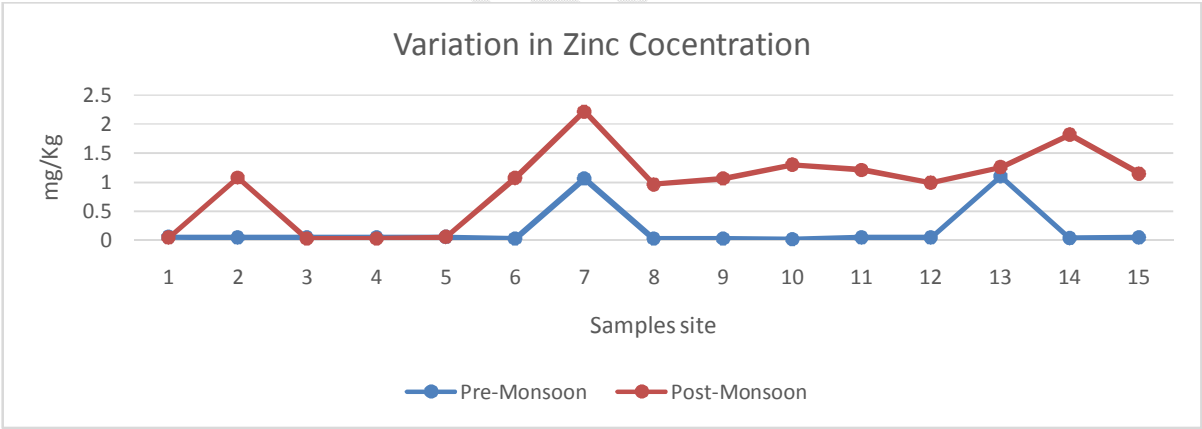
The maximum concentration of iron was 151.2 mg/Kg and mean 78.88mg/Kg observed during pre-monsoon season. While during post-monsoon season maximum was 131.3mg/Kg with average value 74.42 mg/kg. The soil of the Konkan region is red soil having high concentration of the iron contents. Results obtained was almost similar to Borkar V.S. (2018) and these are hardly distinguishable from the analysis of soil carried out by Omar. A. Al-Khashman (2004).

Copper



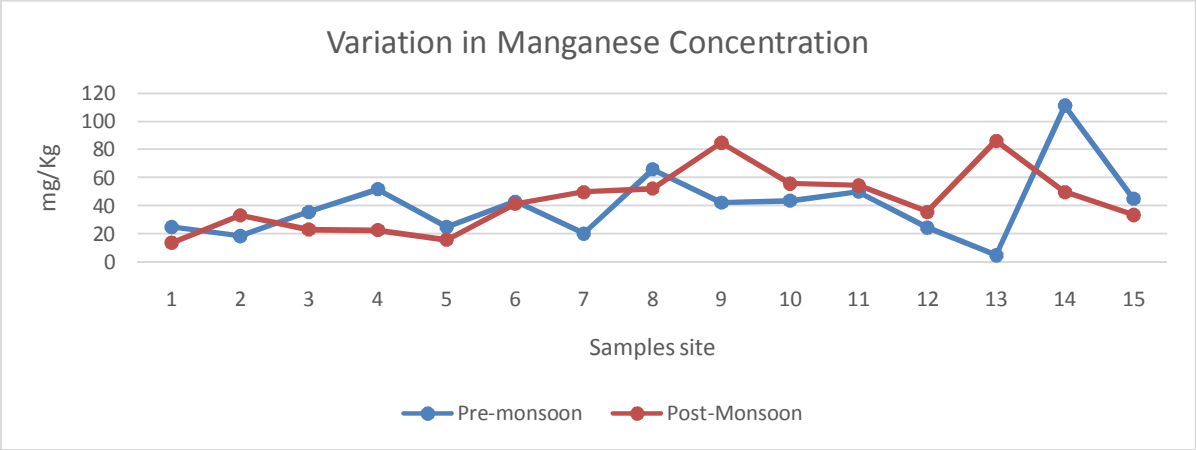
The maximum concentration of Copper before monsoon was 6.05mg/Kg with average of 4.01mg/Kg. The concentration of Copper was maximum up to 7.34mg/Kg with average value 4.98mg/Kg after the monsoon. The concentration of Copper in the soils of Poland was found to be 5 mg/kg; but, the studies carried out by other researcher's shows higher values (Baize and Sterckeman, 2001; Blaser et al., 2000; Steinnes et al., 1997; Thuj et al., 2000).

Zinc



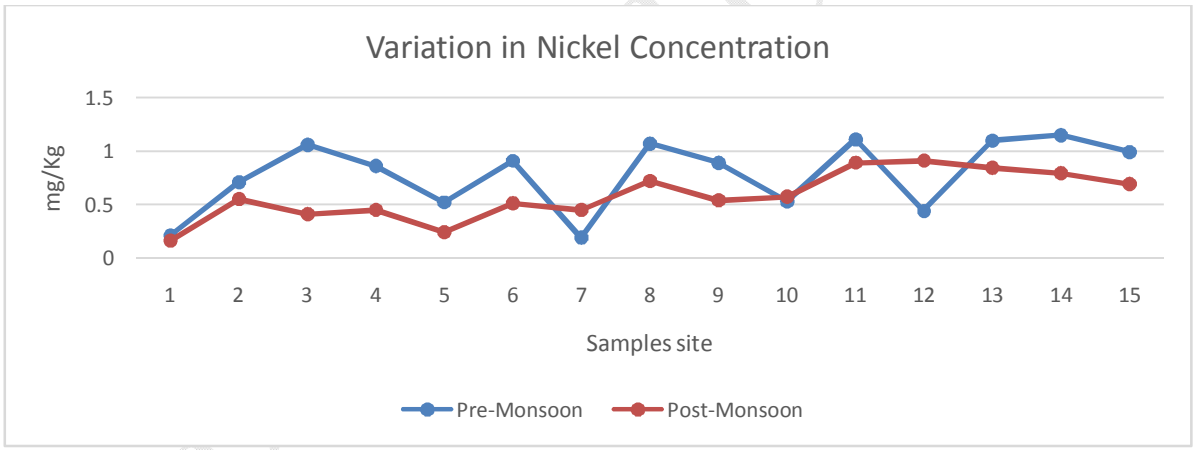
The Zinc metal maximum concentration was 1.1mg/Kg with average value 0.174mg/Kg before the monsoon and after the monsoon it was 2.22mg/Kg with average value 0.9506 mg/Kg. almost similar values of Zn contents was observed in Harare, Zimbabwe(F. Mapanda et.al. 2004) but more zinc was detected in Norway (53.8 mg/kg; Steinnes et al., 1997), Vietnam rural soil (65.5 mg/kg; Thuj et al., 2000) and Switzerland forest soils (60 mg/kg; Blaser et al., 2000).

Manganese



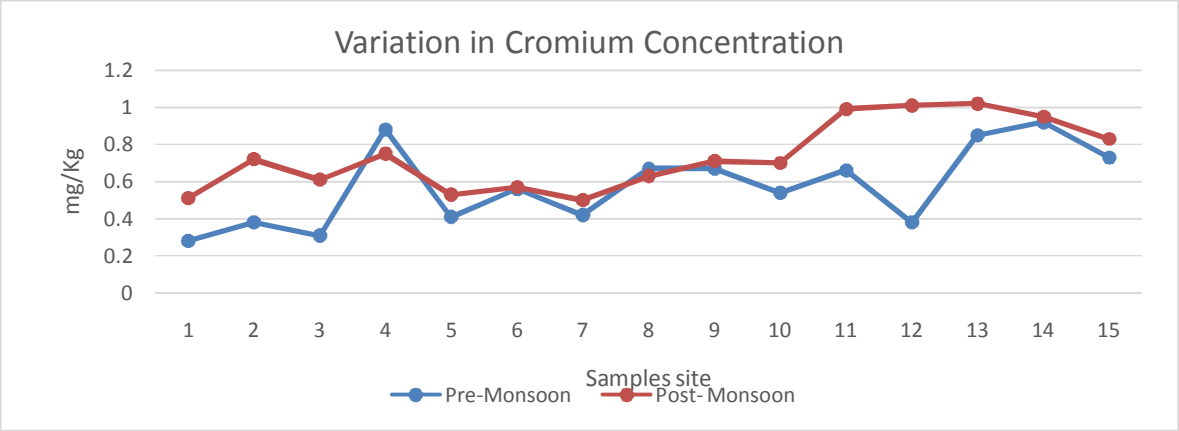
Manganese metals concentration was maximum upto111.2mg/Kg with average value of 40.44mg/Kg before the monsoon while after the monsoon it was maximum about 86.09mg/Kg with average 43.35mg/Kg.The values obtained are much lower than the reported values in soil analysis at industrial area, Turkey (Gülten Yaylalı-Abanuz, 2011) and Thrace Region, Turkey (Mahmut Coskun, 2004).however it was found to be more than study carried out at Haryana, India (R.S. Malik, 2017).

Nickel



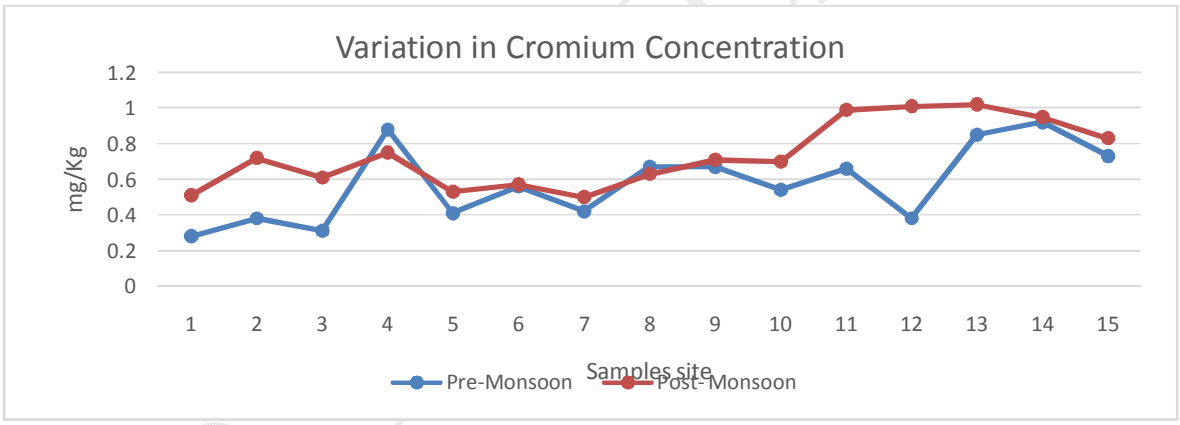
Before the monsoon Nickels concentration was maximum about 1.15mg/Kg with average 0.782 mg/Kg. and after the monsoon its maximum value was 0.91mg/Kg and average was 0.581mg/Kg.The mean Nickel contents was found to be about three times lower than the soil of Poland (K. Loska et al, 2004)also quite low concentration was observed than in the Switzerland forest soils (Blaser et al., 2000).

Chromium



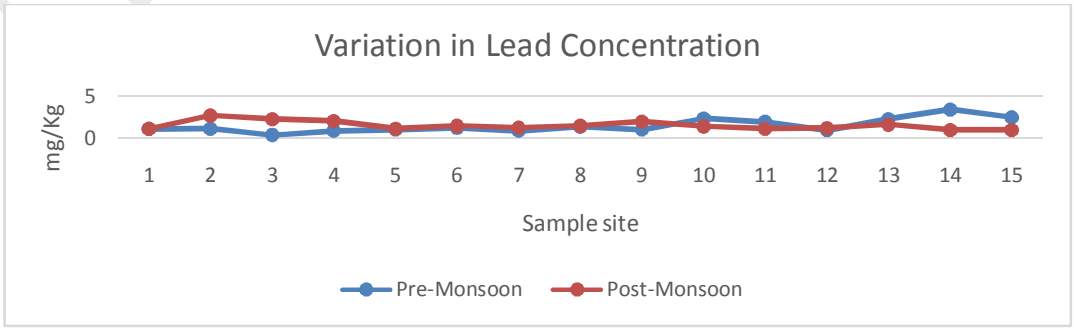
Chromium's concentration was maximum up to 0.92mg/Kg with mean value 0.577mg/Kg before the monsoon while after the monsoon it was observed to be high up to 1.02mg/Kg and average 0.735mg/Kg. This heavy metals in Vietnam indicates considerably more elevated amounts: 80.8– 116.7 mg/kg. Furthermore, 23.2– 174.5 mg/kg for urban soils (Thuj et al., 2000),likewise in the forest of Switzerland it was higher (Blaser et al., 2000).

Cobalt



Before the monsoon maximum concentration of cobalt was found to be 1.02mg/Kg and average was 0.4626mg/Kg. After monsoon the maximum concentration was found to be 3.1mg/Kg while the mean was 0.942mg/Kg. The mean concentration of cobalt in the soil was much lower than the 16.9 mg/kg, Chennai, Southern India, (A. K. Krishna, 2007) and Central India (K.S.Patel, 2015).

Lead



The lead concentration was ranged from 0.34mg/Kg to 3.46mg/Kg with average 1.49mg/Kg before the monsoon. After the monsoon it was ranged from 0.97mg/Kg to 2.73mg/Kg with an average of 1.61mg/Kg. The obtained mean content was very low compared to the topsoil's of the Baltic countries (Reimann et al., 2000), soils analyzed by Baize and Sterckeman (2001) and Norwegian soils (Steinnes et al., 1997).

CONCLUSION

The present investigation shows that the soil contamination by industrial effluent is increasing day by day. Presence of heavy metals in the soil is worrying condition for all organisms in the surrounding area of Mahad MIDC. This study provide an important data in relations to soil contamination which could be further useful to investigate the industrial pollution influence on soil quality. Obligatory actions like biodegradation and bioremediation policies are need to be followed for the industrial effluents before release into the atmosphere to secure all living organisms and human life.

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