Degradation of the Quality of Soil of Itahara due Cement Industry

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ABSTRACT

Soil is one of the most important Ecological factor, which istransformed from the surface rocks and plants depend on it for their nutrition, water supplyand mineral supply. Portland cement is one of the most important building material atpresent time. It also causes the pollution in soil as well as in water and air where cementindustries are situated. Chemically cement is a mixture of calcium alumino silicate containingsmall amount of Cd, Pb, Fe, Ti and silica. It has been observed that constant fall of cement dust on soil causes pollution. Chemical analysis of soil in the industrial area of cement hasbeen studied and it was observed that as the distance from factory increases, the effect ofsoil pollution decreases, considerably for pH, Nitrogen, Phosphorus, Organic Carbon and Calcium Carbonate content.The loss of agriculture is great hazard to the mankind forgenerations together.

Index Terms: *Soil Pollution, pH, Nitrogen, Phosphorous, Calcium.*

1.0 INTRODUCTION

The soil on the earth is the store house of nature and mother of all living beings. Imbalancing this resource may create dangerous problems in natural process. It directly effects the human health so effective step should be implemented to control the pollution without further delay. Modern development, economic growth, intercommunication and modern trade have changed the life style to a great extent. To fulfill the above necessities we are exposed to a variety of toxicants. Soil is a valuable material of our heritage (Schut P. 1987). It plays an important role in our life. Soil is a receptor of many pollutants which enters into our system due to human activities like use of pesticides, cement-dust fertilizers, insectisides, synthetic harmful chemicals, heavy metals, power plant smoke etc (Janick J. Schery. R.W Woods. 1994). These effects have changed the biological properties. Among these, cement industries are emerging as one of the vulnerable source of soil pollutant (Katyal T. and Satake, M. 1989). It has been observed that due to constant fall of cement-dust, the percentage of calcium silicate and calcium aluminate is increasing in soil in form of colloidal gels. These after crystalisation and solidification develop into a hard crust-causing low yield crops. All living things are directly and indirectly dependent on soil. Thus in the present study, the pollution of soil due to cement factories has been studied. The area of Itahara villages has been studied in the present case.

2.0 MATERIAL AND METHODS

Five soil samples were collected from different distances and places of cement factory situated at Itahara. The importance of soil analysis is to know the nature of soil because the production of crop of this region depends on the properties of soil. All human being indirectly related with soil. The soil samples collected by the following procedure:

In clean different polythene bags, soil is collected from different distances of cement factory area with an angle boring about plough deep 10 inches marked and pulled it up, the collected soil dried. After sufficient drying and removal of foreign matter like roots and small stones has done. The dried samples after grinding in wooden pestle and mortar were mixed thoroughly and passed through 1 cm diameter sized sieve and then are ready to use for analysis (Black O.A., 1965, Chopra S.L. and Kanwar J.S. 1982).

3.0 RESULTS AND DISCUSSION

3.1 Study of pH of the Soil: Data of the pH analysis of different soil samples are given in table 1. It varied from 9 to 6.73 at study area. Hence soil was found to be alkaline type and having decreasing pH with the increase of distance. Such pH levels can retard the germination of seeds and growth of seedlings (Dzombak D.A. 1987, Bauder J., 1999).

3.2 Calcium Carbonate: It varied from 33.55 to 10.4 instudy area with the increase in distance from industry upto 5 km. It was seen that calcium carbonate content decrease with increasing distance. The higher content of $CaCO_3$ the higher is the basic nature near cement factory which is due to higher dust fall.

3.3 Organic Carbon: There was a gradual decrease in organic carbon content from 2.5% to 1.0% in the soil in accordance to distance from the cement factory. This is because the organic compound is getting accumulated and slower will be the decomposition which will lead to infertility of soil.

3.4 Phosphorous: The amount of Phosphorous increased with the increasing distance from the cement industry. It was 7.30 kg/hectare at factory and 26.87 kg/hectare at 5 km from industry. These results show that availability of phosphorous is heavily dependant upon the pH of soil (Smith M.L. and Campbell, C. 2000).

3.5 Nitrogen: The analysis of nitrogen showed a decrease in the analytical results for available N in polluted soil. Near the industry it was found that the nitrogen content was 245kg/hectare which decreases as the distance from industry increases. Such increased concentration of nitrogen decreases the nitrogen mineralization process.

Thus cement dust affects the physiological and biological process of the plants (Seker, C. and Ozaytekin H.H. 2002). These conditions are not favorable for growth of plants and microbes thus making the soil infertile and thus decreasing the crop yield.

Table1

Study of change of pH, $CaCO_3$, percentage Organic Compound and Amount of Phosphorous and Nitrogen in the soil with the distance from Factory

S. No.	Distance from Industry (in km)	pH	$CaCO_3$	Organic Compound (%)	Phosphorous (Kg/hectare)	Nitrogen (Kg/hectare)
1	1	9.0	33.55	2.5	7.30	830
2	2	8.7	29.05	2.48	8.60	793
3	3	8.1	20.14	1.8	12.20	540
4	4	7.4	15.72	1.3	18.51	422
5	5	6.7	10.40	1.0	26.87	360

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