

Impact of Effluent and Ash on Essential Elements in the Soil around the NTPC SIPAT

Dr. Rita Bajpai

Dr. J.P. M. Government Science College, Mungeli, Chhattisgarh, India

Abstract: Industrial pollution is the biggest menace to our environment. It means adding impurity to environment. The environment consists of earth, water, air, plants and animals. During the last decade, a large area of irrigated lands in around the Bilaspur has been changed from extensive cropping to industrialization. Due to the effect of industrial effluent the soil became incapable to supply high yield crops¹. The required amount of essential elements sometimes decreases or increases, therefore the quality of soil affected by the mixing of industrial effluent. The soil contains essential elements as macronutrients and micro nutrients. From the plant /soil nutrient index the required amount of nutrients varied therefore, the deficiency or excess of N, P, K, Mn, Zn, Cu and Fe will change the fertility of soil. So this paper includes the “impact of effluent and ash on Essential elements in the soil around the NTPC Sipat”. The soil samples collected from the different five locations (up to 15 km) around the power plant. The results were found for five soil samples about macro & micronutrients (in % and in ppm) as N (4.9882 – 10.0325), P (6.2420 – 16.2434), K (21.2204 – 60.3006) Mn (0.3442 - 0.5646), Zn (0.1996 - 0.6884), Cu (0.1462 - 8024) and Fe (0.0336 – 0.7632) respectively. The lower values of abovementioned essential elements affected the fertility of soil and soil becomes low fertile soil, it is due to mixing of wastes and ash dispose off from power plant in the soil.

Keywords: Essential elements, fertility, environment, macro & micronutrients

1. Introduction

The sustainable productivity of soil mainly depends upon its ability to supply essential nutrients to the growing plants. The nutrients of soil^{1,2} essential for plant growth as macronutrients³ (N.P.K.) and micronutrients (Mn, Fe, Cu, Zn)^{3,4}, that control its fertility. But adverse effect of industrial effluents and wastes on the germination of seeds growth of seedlings & plants was observed and documented by many scientists. Excess of Zn, Cu & Fe contents in crop plants which may result in serious health hazards such as kidney damage, anemia, disorder of CNS and renal failure. However, very limited efforts have been made by the industries to improve the quality or reduce the quantity of wastes generated most of which is discharged without any pre treatment.

2. Study Area

Powerplant NTPC located at Sipat at 22 Km from Bilaspur, C.G. The samples were collected from different locations within 15 Km area round NTPC Sipat.

3. Materials and Method

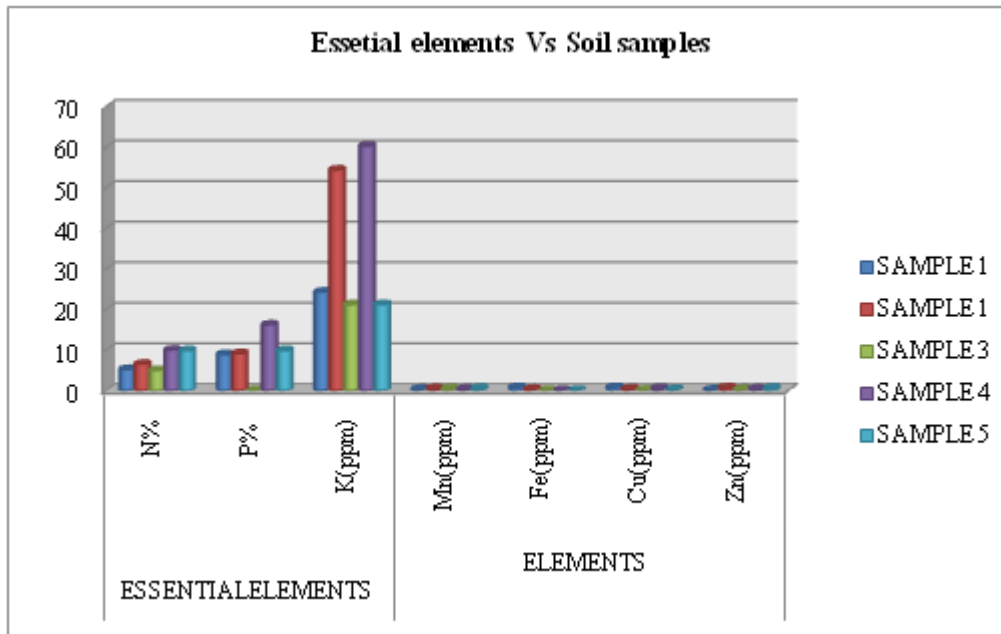
The collected samples have been analyzed to determine their status of some essential elements. The Samples were collected^{2,7} in clean plastic bags. The soil samples have been analyzed for various macro (N, P, K)^{5, 6, 6} and micronutrients (Mn, Fe, Zn, Cu)⁷ by appropriate methods, as nitrogen and phosphorous were analyzed by chemical method while potassium determined by flame photometric method. Copper, zinc, manganese and iron were determined by atomic absorption spectrophotometer (AAS)⁸. Chemical were used of AR grade.

4. Results and Discussion

The result of macro and micronutrients of five soil samples were given in table-1 and also presented graphically in graph – 1. The results obtained about N, P(%) between 4.9 – 10.0 and 8.9 – 16.2 respectively. the soil sample 4 shows higher value than others, similarly sample – 4 shows higher value of K (ppm). the results obtained for Mn, Fe, Cu, and Zn (ppm) were obtained higher in soil samples – 5, 1, 1 and 2 respectively. Among the four micronutrient⁹ available Fe, Cu, Mn and Zn were sufficiently present in all the soil samples. Status of Nitrogen, Phosphorus and Potassium, Percentage of Nitrogen in standard fertile soil is 10 to 15% so the study area of soils were found low fertility because they effected by power plants waste.

Table 1: Status of Essential Elements in Soil Samples

Soil Samples	Essentialelements			Elements			
	N%	P%	K (ppm)	Mn (ppm)	Fe (ppm)	Cu (ppm)	Zn (ppm)
SAMPLE 1	5.2350	8.9000	24.3220	0.3442	0.7632	0.78024	0.1996
SAMPLE 2	6.5438	9.1312	54.4463	0.4687	0.3042	0.4040	0.6884
SAMPLE 3	4.9882	6.2420	21.2204	0.5342	0.0336	0.1462	0.3240
SAMPLE 4	10.0325	16.2434	60.3006	0.3548	0.0384	0.5372	0.4235
SAMPLE 5	9.8824	9.8832	21.2668	0.5646	0.0422	0.2662	0.6530



Graph - 1

5. Conclusion

Obtained results concluded that soil is badly affected by effluent¹⁰ and fly ash which are discharged from power plant without pretreatment. Therefore the fertility of soil is reduced due to the concentration of essential elements in soil is not according to soil – plant nutrient index.

References

- [1] Rita Bajpai, Research Digest Oct. – Dec. 2013
- [2] Soil Sampling and Analysis: James L. Walworth cal.arizona.edu/pubs/crops/az1412.pdf, originally published: 2006 P
- [3] Recommended Soil Tests for Macro and Micronutrients Ann Wolf and Douglas Beegle, Last Revised 10/200.N
- [4] G.W. Vanloon, S.J. Duffer, Environmental chemistry - A global perspective, oxford university press (2000).
- [5] Nitrogen-Inorganic Forms. *In* Methods of Soil Analysis: Chemical Methods. Part 3. D.L. Sparks, editor. Soil Sci. Soc. of Am., Madison WI. Mulvane, R.L. 1996.
- [6] Phosphorus. *In* Methods of Soil Analysis: Chemical Methods. Part 3. D.L. Sparks, editor. Soil Sci. Soc. of Am., Madison WI. Kuo, S. 1996.
- [7] Chopra Chopara S.L. and Kanwar J.S. - Analytical Agricultural chemistry, kalyani publishers, New Delhi (1989)
- [8] Lindsay, W.L. and Norvell, W.A. (1978) Development of DTPA AAS soil test for Zn, Fe, Mn, & Cu soil Science Am. Proc. 42 : 421-428.
- [9] Yadav, K.K. (2008). Micronutrient status in soils of Udaipur district of Rajasthan, Hydrology Journal, 31 93 & 48. Sudhir Kumar et al. "studies impact of textile industry on ground quality of sagas" (2001)
- [10] Sudhir Kumar et al. "studies impact of textile industry on ground quality of sagas" (2001)