

Determination of Soil Health In Coal Mine Affected Area, Singrauli – Madhya Pradesh (India)

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Abstract

The study presently undertaken in Singrauli, A district of state Madhya Pradesh in India , it is mostly known as the power hub of India because it generates approx. 13000 watt of electricity by the combustion of coal, it includes thermal power plant(coal combustion) and water dam(generates electricity naturally). Burning of coal causes the major problem as different type of toxic as well as nontoxic compounds are released in air e.g.:- mercury, fluoride etc. These heavy metals and other chemical compounds mixed with the environmental components like air, water and in soil. This lead to drastic change in the physical and chemical parameters of soil.All parameters are fluctuating. The results suggest that there is need of attention toward Singrauli, because due to combustion of coal causing damage to the environment, not only soil but other components are also being affected by this.

Key words: Singrauli, Environment, Coal, Thermal power, Heavy metals, Combustion

Introduction

Water and soil are life essentials.The availability and quality changes with the location and time.Different sources of pollution produces different order of pollution in the natural resources. Burning of coal causes the major problem as different type of toxic as well as nontoxic compounds are release in air e.g.:- mercury, fluoride etc. later on, Heavy metals and other chemical compounds mixed with the environmental components like air, water and in soil. This lead to drastic change in the physical and chemical parameters of soil [1].

Soil is one of the major component for life on this earth as it is the mixture of organic matter, lot of gases, precious minerals, liquids and also habitat for many living organisms such as plants, microorganisms, decomposers etc. [2]. There are majorly five physical and chemical properties on which all the scientists all over the world Wide . These are the following parameters which are basically measure to check the soil health:-

Soil fruitfulness is characterized as the status of the dirt in connection to the sum and accessibility to plants of components essential for plant generation. A rich arable soil needs to meet the present and future needs of developed plants. Every single rich soil have a satisfactory supply of natural issue. Soil

natural issue alludes to the natural portion of the dirt; it incorporates plant and creature deposits at different phases of decay, cells (living and dead) and tissues of organisms, and substances orchestrated by the dirt populace [3]. In a prolific soil, the capacity of a natural issue is both immediate and roundabout. Its immediate job is worried about the arrangement of plant supplements through the procedures of disintegration and mineralization; its circuitous job is related with its impact on the physicochemical properties of the dirt. The section further portrays the supplements required by plants [4].

The ashes generate from the combustion of coal from the mining and the thermal power plant leads to destroy the soil health by changing their chemical and physical properties. Closer the soil area, more will be the effect [5].

Material and Methods

Study area: The area chosen for the study is district which is a region which has large number of industries ,coal mines, power plants for the generation of electricity. There are about total 13 coal mines spreaded all over the area in which 7 of them are in the singrauli region of Madhya Pradesh and other 6 are in the sohnbadra of Uttar Pradesh.

Collection of Soil Sample:-A chunk of soil is expelled. A pit of Angular shape is framed. Its profundity ought to be 0- 15 and 15-30.Gathered the sample in polythene bags. The centers ought to be of some volume and speak to a similar cross segment of the testing volume.

Estimations:Surface (0-15cm.) examples are utilized for deciding soil pH, lime need, natural issue, phosphorus, potassium, sulfur and accessible micronutrients. Various methods and techniques are used to analyze these all parameters, like for soil pH analysis directly a pH meter is used and it is based on direct current amplifier, Organic carbon and organic matter are estimated by Walkley and Black method (1947) by rapid titration, Nitrogen estimation is done by using Kjeldahl distillation Unit, Phosphorus estimated by Bray and Kurtz method (1945), Similarly Potassium estimation is carried out by the help of Flame Photometer [6; 7; 8].

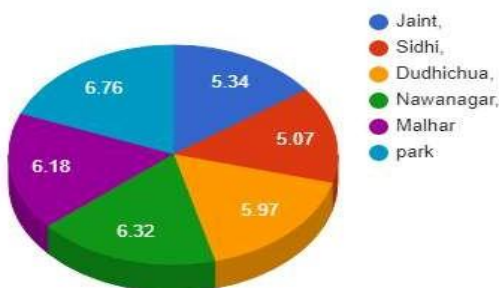
Result and Discussions

Sampl e no.	pH	Organi c carbon (%)	Organi c matter (%)	Nitroge n (Kg/ha)	Phosphoru s (Kg/ha)	Potassiu m (Kg/ha)	Name of location	GPS Location
S1	5.34	6.86	11.83	192.14	12.25	157.7	Jaint	24°09'00"N82°18'24' 'E
S2	5.07	6.21	10.71	216.76	17.01	176.55	Sidhi	24°09'34"N82°37'34' 'E

S3	5.97	5.99	10.33	321.42	20.07	103.89	Dudhichua	24°06'17"N82°39'00'E
S4	6.32	5.23	7.29	367.9	14.01	201.27	Nawanagar	24°06'08"N82°36'44'E
S5	6.18	4.88	8.41	391.67	23.47	195.74	Malhar park centre, Waidhan	24°04'02"N82°37'32'E
S6	6.76	4.67	8.05	402.51	18.52	212.63	Vindhya Nagar, Waidhan	24°03'46"N82°38'08'E

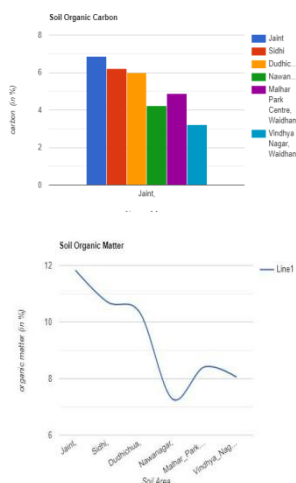
pH of Soil: There were six soil samples were taken for pH determination and the pH reading are in the above table of result. PH gradually decreasing is going toward the coal mine. And increasing away from coal mines [9; 10; 11].

Soil pH



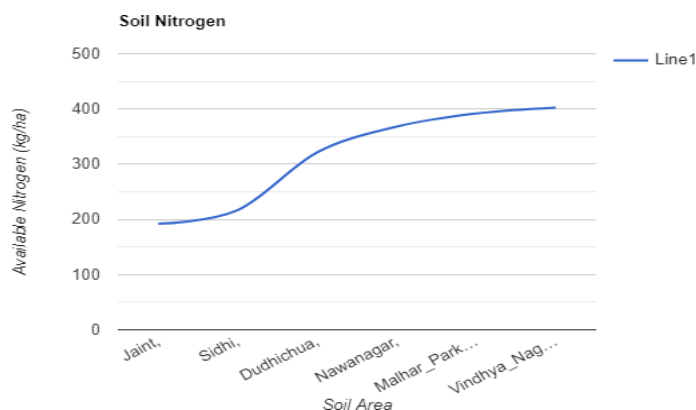
Soil from Jaint ,Sidhi and Dudhichua is acidic in Nature because its pH is < 6.0. Soil of Nawanagar ,malhar park center and vindhyanagar , waidhan are having normal to saline pH.> 6.0 but less than 8 [12].

Soil organic Carbon and Organic matter : Below are the graphs showing available organic carbon and organic matter in soil with respect to soil from different areas. Average range of organic carbon is 0.5- 7.5 % and for organic matter it is in between 4%- 6%. Value of both is high in soil near to coal mine and decrease when go far from coal mine [13; 14].



Soil Nitrogen

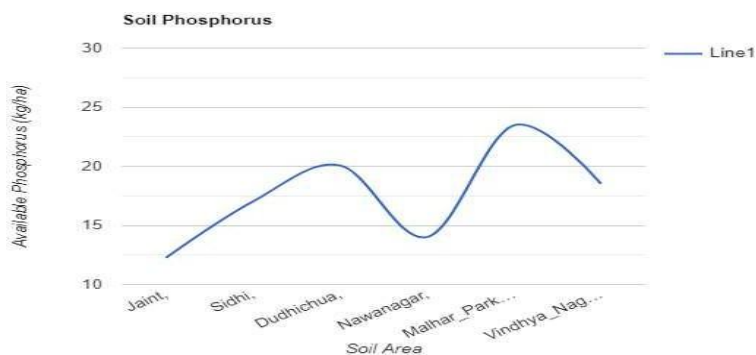
Given below is the graph showing the available nitrogen in soil with respect to area from where the soil is collected,



Average range of Nitrogen in Soil is in between 240-480 (kg/ha). Joint area soil in Singrauli is having less nitrogen. Expected result for this area soil is 192.14 kg/ha which is less than the average range. Other soil of area contains the nitrogen within the range [10].

Soil Phosphorus

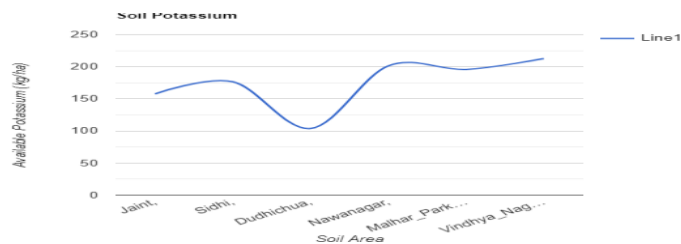
Given below is the chart showing the available phosphorus with respect to area from where the soil were collected



Average Range of phosphorus is in between 11-22 (kg/ha). All the expected results are in between this range.

Soil Potassium

Given below is the graph showing the available potassium (kg/ha) with respect to area from the soil is collected. Average potassium within the soil is in between 110-280 (kg/ha). In expected results only sample 2 collected from Sidhi is having less amount of potassium.



Conclusions

The soil samples which were taken from Singrauli district areas like Jiant, Sidhi ,Dudhichua, Nawanagar, Malhar Park Waidhan, Vindhya Nagar Waidhan, (in increasing order of distance from center of coal mine). pH values of soil found acidic near to coal mines. There is higher value of organic carbon and organic matter in soil because of coal mines. Soil of Other all areas except Jaint contain good amount of minerals I.e, in between the average range(as per the Experimental results). So it can be said that the soil taken from the Singrauli district isaffected by ashes of coal burning, which leads to increase high amount of organic carbon and organic matter. Nitrogen, phosphorus and potassium minerals are in average range except in joint area.

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