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Impact of open cast Limestone mining activities on soil quality status, Tilakhera, District Chittorgarh, India

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ABSTRACT
Open caste mining being an impermanent activity, at most times, and leaves long term negative impact on the environment. The present study comprises of soil quality around of Tilakhera opencast mine, Chittorgarh District, India. To find the effect of this opencast mining on surrounding soil, soil samples were collected from surface to a depth of 15 feet and were analyzed. The different physical (soil texture, soil moisture,) and chemical (pH, organic carbon, nitrogen,) parameters have been analyzed. The increasing effects of the pollution loads on the soil resources affected the land uses in the communities.
Keywords: Limestone, Mining Industry, Soil Health

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INTRODUCTION

Mineral exploitation contributes considerably to economic growth and development in most world economies. Soil is polluted due to disposal of industrial/mining and domestic solid wastes, wet and dry deposition from the atmosphere, infiltration of contaminated water and acid mine drainage [10, 8, 1,3]. Some methods of mining cause soil loss. For example, the digging of strip mines and open-pit mines involves the removal of plants and soil from the surface of the ground. Mining industry affects the agricultural land area and induces human settlement pattern thereby causing disruption of social relations [4]. Open cast quarrying is responsible for several negative environmental and socio-economic impacts, mainly when the quarrying is carried out randomly and not as per prescribed norms and regulations [7]. Top soil management plays an important role reclamation plan to prevent nutrient losses [9]. Mining can become more environmental friendly and sustainable by adopting and integrating social, environmental and economic developments that will minimize the environmental impact of mining operations [6].

MATERIAL AND METHODS

The location of the lease area lies approximately between the Latitudes 24^0 41' 30" N - 24^0 42' 43" N, and longitudes, 74^0 41' 02" E- 74^0 41' 50" E The Tilakhera limestone lease area is located at a distance of about 2 km from Gambhiri road railway station in the eastern direction near Tilakhera village. The nearest railway station on meter gauge is Gambhiri road railway station & Nimbahera on broad gauge. The area of the mining lease is to the extent of 299.20 Hect. Out of which 22.52 Hect. is proposed to be used for the mining of Limestone. The physico-chemical characteristic of soil was carried out to evaluate the effect of limestone mining on soil properties in the neighbouring region as Tilakhera. APHA and IS standard methods were used for analysis of collected soil samples.

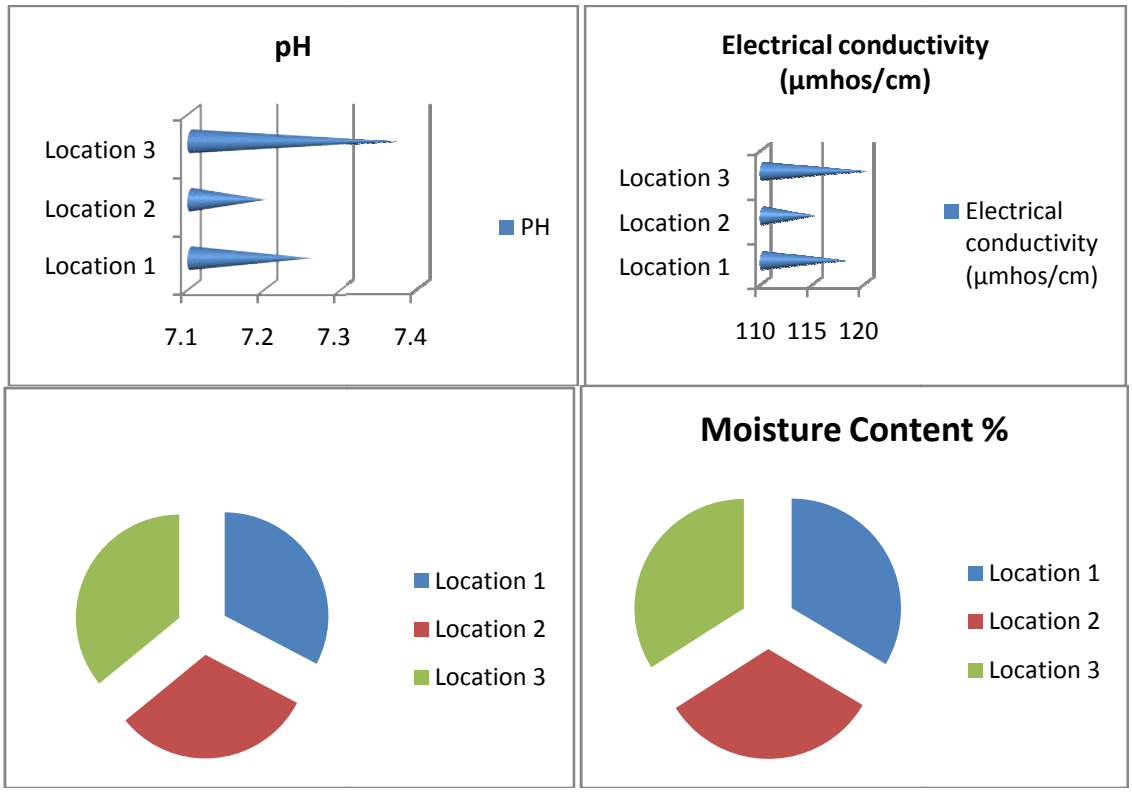
RESULT AND DISCUSSION

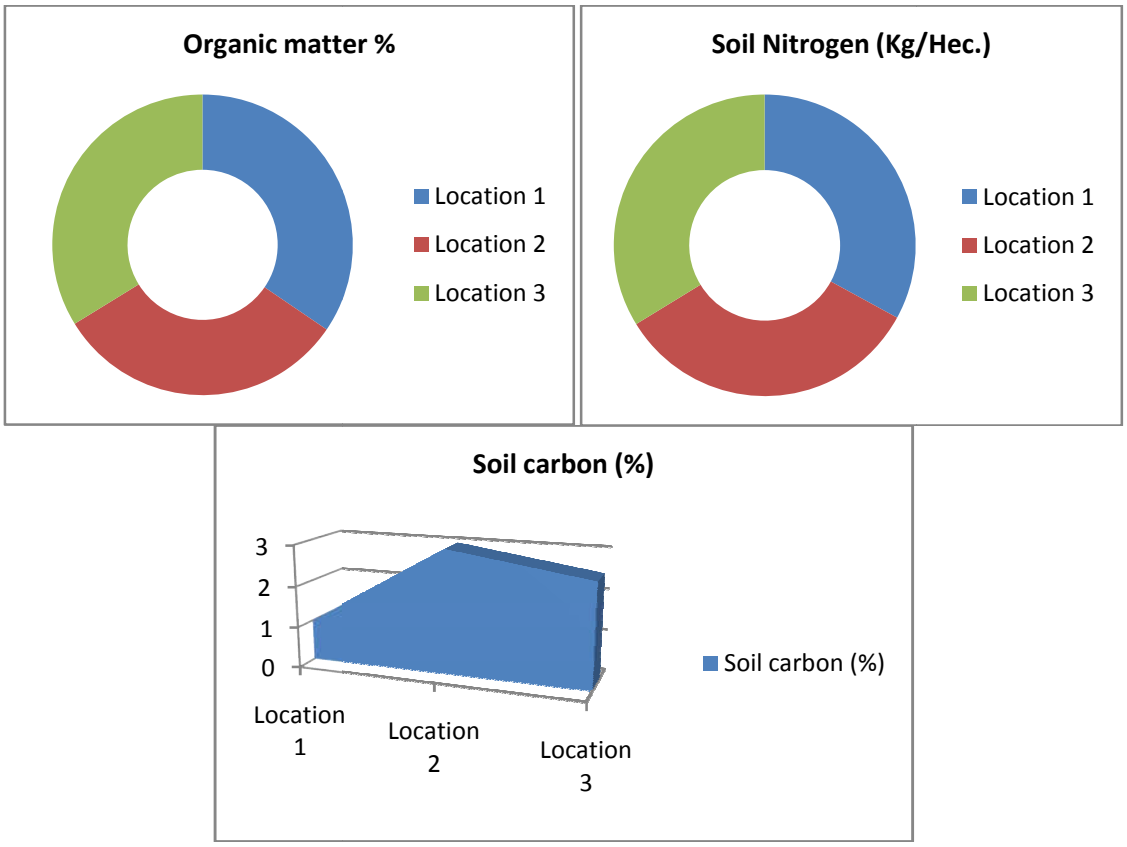
From the study is found that soil is sandy- clay in texture. pH which determines the basic and acidic properties of soil, plays a significant role as nutrients namely Nitrogen (N), Potassium (K) and

Phosphorus (P) are carried by soil which are n eeded by plants in varying amounts for their growth [2]. The pH value of the site varies from 7.20-7.37 which shows soil is slightly in alkaline in nature. Occurrence of clay and lack of organic material may be the major cause for the alkaline nature of these soils. Water holding capacity (WHC) of soil usually refers to amount of maximum water which can be held by the saturated soil. Both, location 1 (21.3%) and location 2 soil (20.50 %) respectively from Tilakhera showed lower WHC. While on location 3 soils recorded higher WHC (23.4%). Lack of macro and micro nutrients and humus are the major reasons for lower values of field capacity (FC) and water holding capacity (WHC) of mine soils. Organic carbon is a significant parameter of any soil, which improves both the physical and chemical properties of soil and has several positive effects on soil quality. The quality of soil improves if the organic carbon in the soil is greater than 0.8% [5]. Carbon content of different site varies (from 1-3%). Nitrogen is the principal growth promoting nutrient element which influences soil productivity and is an important element for plant development. In the present study the available nitrogen content in the soil ranged from (213-218kg/hec.) The quantity is nitrogen present in the soil is lower than the requirement. Moisture content in soil of different location varies from (6.5-6.8%).

Table No: 1 Average value of soil parameters at three sites near Tilakhera- Mangrol mining site

S. No	Soil Parameters	Location 1	Location 2	Location 3
1.	Soil texture	Sandy clay	Sandy clay	Sandy clay
2	Soil temp.	26 ºC	36 ºC	39 ºC
3	PH	7.26	7.2	7.37
4	Electrical conductivity (µmhos/cm)	118	115	120
5	Water holding capacity (%)	21.3	20.5	23.4
6	Moisture Contents (%)	6.7	6.5	6.8
7	Organic matter (%)	0.96	0.88	0.94
8	Soil Nitrogen (Kg/Hec.)	213	215	218
9	Soil carbon (%)	1	3	2.5





CONCLUSION

The present study exposed that limestone mining activity is responsible for alteration in the basic physic-chemical properties of the local soils and this is causing a major adverse environmental impact as the result of changed land use on the soils in the study area. These open cast mining procedures are resulting in biodiversity loss, loss of nutrients and microbial properties of the natural fragile soil ecosystems. By the results and soil quality monitoring we can say soil quality status around the open cast mines is degraded day by day due to the mining activity so we should to take some steps for save the quality status of soil.

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