

# Co-relationship between the soil pH and organic matter in mining area Bastacola, Dhanbad

Sonam Bharti

University Department of Environmental Science and Disaster Management, BBMKU,  
Dhanbad, Jharkhand, India

## ABSTRACT

Organic carbon, is an essential tool for carbon sequestering in soil and also balancing carbon dioxide concentration in the atmosphere. Soil organic carbon indicates the soil quality such as organic matter and water holding capacity etc. Soil pH help in solubilizing mineral nutrient helping sustain agricultural process. This research paper mainly focuses on study area near mining zone and know the soil quality status with the help of these two parameters. In order to help in socio-economic benefit to local livelihood.

**Keywords :** pH, organic carbon, correlation ship, organic matter and water holding capacity.

**Introduction-** Soil plays essential role for survival of life by the help of crop production. It also helps in balancing the nutrient cycle on earth and it can reduce the risks of global warming. Now a days soil quality deteriorates due to anthropogenic activities, such as mining etc. Due to mining activities soil quality i.e., physical and chemical parameters alter as result the crop production will decrease. This research paper mainly focuses on physical parameter of soil which help to indicate in early stage of soil deteriorate.

Soil pH is an essential parameter help for knowing soil quality such as biogeochemical process, fertility. Importance of soil pH supporting in regulating nutrient availability in soil indirectly helps in vegetation, primary productivity, microbial survival process<sup>1</sup>. Soil pH depend upon the various factors such as topography, origin of rock, time scale and seasonal variation etc<sup>2</sup>. Low pH value reduces absorption rate of nitrogen availability because it reduces activities of leguminous bacteria for nitrogen fixation<sup>3</sup>.

Analysis of pH helps to know hydrogen ion and hydroxyl ion concentration and activity of soil water system. It acts as an indicator of acidic, alkaline or neutral nature of soil<sup>4</sup>.

Another important parameter is organic carbon. It helps in regulating carbon cycle which has essential role in global climate change, for it indicates succession process of different species on terrestrial ecosystem and maintains carbon sequestration process.<sup>5</sup> If soil pH is in favourable condition, crop nutrient uptake by crops will be enhanced and increase the crop root system helping in maintaining of organic carbon in soil. Properties like aggregation, compaction, energy flow, surface

sealing, microbial activity, water infiltration enhance if the organic carbon is in standard level. Organic carbon indicates organic matter in soil.<sup>6,7</sup>

**Study Area** - Dhanbad is known as the coal mining capital. Mostly, red soil which is lethargic in nature, is found in Dhanbad. Dhanbad has humid subtropical climate and consists dry deciduous forest.<sup>8</sup>

The soil quality is not so good for agricultural purpose due to anthropogenic activity. Samples were collected from Bastacola near mining area. Three soil samples were collected from the plot for analysis of physical parameter (pH and Organic Carbon). Sampling was done to check quality of cultivation. Random systematic sampling was done for collection of soil sample during summer season.<sup>9</sup>



Fig: Map of Dhanbad

## Methodology

### pH

1:2.5 (w/v) soil to water ratio for the soil sample that was obtained. Put ten grams of air-dry soil in a beaker. Add 25 milliliters of double-distilled water, give it a good shake with a glass rod for five minutes, and let it sit for thirty minutes. After a 30-minute break, switch on the pH meter and give it a 15-minute warming period. normalize the glass electrode by using pH 7, pH 4, and pH 9 buffer solutions. After calibration, wait 30 seconds after dipping the electrode in the soil solution. Take note of the reading.<sup>10</sup>

**Organic carbon (Walkley & Black method)**- Fill a 500ml Erlenmeyer flask with 1.0 g of air- dried soil sample(0.2mm) to minimize heat loss and 20ml of concentrated  $H_2SO_4$  and gently spin the flask for one minute. Then, let the flask stand on an insulated sheet in a fume hood for thirty minutes. Add 10ml of 0.167 M  $K_2Cr_2O_7$ .<sup>11</sup> Colour changes to deep violet- blue. Take 0.5 M  $FeSO_4$  Solution in 50ml burette

and titrate it till the end point i.e., the colour changes sharply to brilliant green Next, gradually add 10ml of 85% $H_3PO_4$  and 200ml of distilled water to the flask add the diphenylamine sulfonate indicator colour changes.<sup>12</sup>

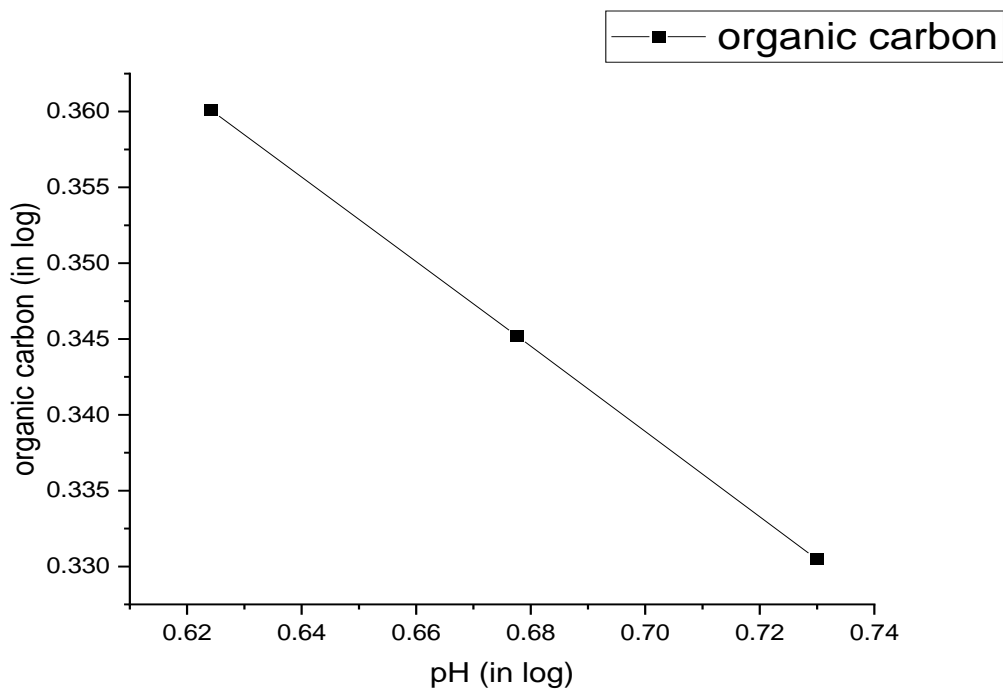
**Results-** The results after the analysis process of sample are given below. The soil sample was analysed by pH meter and organic carbon measured by titration process. The value of both physical parameters is given in table below:

Table 1- pH and Organic value given in log value given below:

Sl. No	pH (in log value)	OC (in log value)
1.	0.6240	0.5035
2.	0.6774	0.3323
3.	0.7294	0.2000

Table 2 pH value in log and derived value of organic carbon given below:

Sl.no	pH (x)	OC(y)
1.	0.6242	0.36008
2.	0.6776	0.3452
3.	0.7299	0.3305



Graph1- show relationship between pH (x axis) and organic carbon (y axis)

$$\text{Organic Carbon} = -0.2804 \log \text{pH} + 0.5351 \dots \dots \text{eq}(1)$$

The regression equation of organic carbon shows the significant negative co- relationship between the pH and organic carbon in the experimental soil sample.<sup>13, 14</sup>

**Discussion-** The pH value of soil sample is 0.6242 (log) minimum and maximum 0.7299 (log). and organic carbon is minimum 0.2000 (log) and maximum 0.5037 (log). Regression value is -0.981. soil

sample is acidic in nature due to mining activity. organic carbon availability is leached out .this sample needs addition of lime for proper cultivation.

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