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Research Paper

A comparative study of soil and fly ash by their physical characteristics Dhanbad, Jharkhand

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Abstract:

Life cannot exist without soil, which makes soils valuable natural resources. They support the health of ecosystems. It is employed in agricultural production and aids with ground water replenishment. Soil is composed of organic matter, organic carbon, air and water. on the other hand, fly ash, a byproduct of thermal power plants, is considered waste today and cannot degrade. It is utilised in agricultural land because consists nutrient. Comparing fly ash with soil is the main topic of this study report.by turning fly ash into a useful goods, it will lessen waste and improve the economic wellbeing of the local population.

Keywords: pH, Bulk density, salinity, conductivity, organic carbon

1. Introduction

A byproduct of burning coal, fly ash (FA) is an amorphous ferroalumino silicate with a matrix that resembles soil. The types and sources of coal that are utilised affect the elemental makeup of fly ash, containing both harmful and nutritional components. The amount of change relies on the characteristics of both soil and the fly ash. Adding fly ash to the soil can increase its physico-chemical qualities as well as its nutritional quality. (Pandey, V. C.,et al 2010).The nature of the parent coal is a determining factor in the availability of different sources of fly ash for soil amendment. Fly ash composition depend upon origin of coal from which they formed and their effectiveness of pollution control mechanisms, the circumstances during coal burning, and the storage procedures materials, procedure and management are necessary (Pathan,et.al 2003). Fly ash helps conserve soil for example Construction of roadways on soft organic soils can be problematic because organic soils typically have low shear strength and high compressibility, for construction of roadways over organic soil subgrades mostly involve the removal of the organic soil to a sufficient depth and replacement with crushed rock (referred to as “cut and replace”) or preloading to improve engineering properties. Chemical stabilization with binders such as cement, lime, and fly ash can be undertaken rapidly and often at low cost, and therefore chemical stabilization is becoming an important alternative. (Tastan, E. O., et al 2011).

Even though it may be one of the first areas of focus for soil fertility research, soil organic matter is still a hot subject. Despite the critical importance of SOM research in maintaining soil fertility, the discipline has made substantial strides in been sluggish thought the previous century. It is commonly acknowledged that

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maintaining a profitable cropping system and preserving soil fertility are largely dependent on striking the right balance between residue management and the application of inorganic fertilisers. (Merckx, R., et. al 2001). Organic carbon and other parameters were affected by soil pH suitable range 5.5 to 6.6. it is well knowledge that there can be variations in pH levels and hence, liming needs within an agricultural area. Therefore, Utilising precision agriculture (PA) technology, it would be advantageous to apply lime based on the geographical variation of soil pH within the fields. (Schirrmann, M.,et.al 2011) . Among other qualities, a soil with high SOC content is thought to be fertile and to have a high level of biodiversity, buffering capacity, and efficient carbon sequestration. (Acín-Carrera, M.,et.al 2013).

2. Study Area

The district of Dhanbad is located in the middle of the state of Jharkhand. It is bordered by the districts of Jamtara in the east, Purulia district in the south, Bokaro in the west, Giridih in the north.it is connected to the state capital and other district heads of the states by NH-2 and NH-32.

In the district, residual soil predominates and due to high temperature, precipitation have resulted lateritic type soil. (Jharkhand government)

3. Method and Methodology

Soil samples were collected from the garden at P.K. Roy Memorial College, and fly ash samples were collected from the coal thermal plant in Dhanbad, Jharkhand.

a) pH: pH were analysed with the help of a pH metre.

b) Conductivity: Conductivity were analysed with the help of conductivity meter

c) Salinity: The salinity of soil and fly ash can be checked by taking 10g of both samples separately, adding distilled water, stirring for 15 minutes, and leaving for half an hour. Filter the paste of the sample with what Man Filter paper No. 42, and then check the percentage of salinity in the soil and fly ash samples with the help of the kit.

d) Bulk density: weigh the 200 grammes of both samples separately taken into the measuring cylinder. then add distilled water or normal water, tapping it for 20 to 30 times, measuring the level of soil and fly ash and water.

e) Organic carbon: Walkley-Black method (De Vos, B.,et.al 2007)

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4. Result

S.No	Parameters	Soil	Fly Ash
1.	pH	10.9	11.12
2.	Conductivity (mS/m)	3.45	3.66
3.	Salinity(mS/m)	32.5	34.60
4.	Bulk density(gm/cc)	1.30	1.31
5.	Organic Carbon(%)	0.618%	0.312%

5. Conclusion

Various lab trail experiments were conducted regarding soil and fly ash properties. It was observed that soil samples contain alkaline properties. soil having a large percentage of organic carbon is used for plantations of vegetables and crops. But pH was not in a in a suitable range. Fly ash contains very little organic carbon. Bulk density in both samples showed different sizes of particle distribution. Fly ash can be used for brick-making purposes, and it can also add cement.

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