IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 12, Issue 4, December 2021
Impact Factor: 5.731

Physico-Chemical Properties of Fly Ash and Its Applications in Agriculture Field

Suresh D. Dhage
Department of Chemistry
SSJES, Arts, Commerce and Science College, Gangakhed, Parbhani (M.S.), India
dhage137@gmail.com

Abstract: *The Physical properties of fly ash is depending upon the coal type, boiler type, ash content in coal, combustion method and collector setup. The factor affecting or influencing the physical properties are also responsible for wide variation of chemical properties of fly ash. Two types of fly ash are generated in the thermal power plants; it is also contain micro and macro nutrients, required for growth of plants. Quality of soil is affects the growth of plant, due to low pH of soil plant growth has been affected, it is minimizing with external addition. Fly ash has many micro and macro nutrients with application of fly ash in soil pH of soil becomes controlled.*

Keywords: Fly ash, Coal, Plant Growth, Micro and Macro Nutrients, pH.

I. Introduction

Fly ash is the end residue of combustion of coal, not fully burned and minerals constituents of coal which is comprises of wide range of inorganic particles bulk, density, high surface area, and sandy slit to loam texture. (Kumar et al) It has very fine spherical particles of 100 microns; it has Ferro aluminate silicate minerals with elements like Si, Al, and Fe together with significant amount of Ca, Mg, P, K, and S. (Aswar et al.) Two types of ashes are generated in the thermal power plants, one is fly ash and second one is bottom ash. Fly ash is chemically reactive but the bottom ash is unreactive due to the many smaller, heavy particles are present in the chemical composition of fly ash. (Adrino DC et al.) Fly ash produced by bituminous coal is very fine (Change et al). Presence of aluminum is bounded in the fly ash is due to biological toxicity. (Roy et al.) fly ash also contains essential macro nutrients including P, K, Ca, and S and micronutrients like Fe, Mn, Zn, Cu, Co, B, Mo.

The pH of fly ash is depended upon the presence of sulphur content, whereas the basic natures of fly ash depend upon the high concentration of sulphur. Addition of fly ash in the acidic soil has regulated the pH of soil, alteration of the soil texture is possible through the addition of approximate quantity of fly ash items have been performed to measure the physical properties of soils mixed with 50% fly ash. (Page et al.) Addition of fly ash at 200 t acre_1 improved the physical and chemical properties, size fraction of fly ash in general comprise high water holding capacity than the finer ones. (Manish et al.) The hydroxide and carbonate salts give fly ash one if it's principal beneficial chemical characteristics i.e., the ability to neutralize acidity in soil. (Maitasi et al.)

II. Material and Methods

2.1 Study Area

For the present work, Parli thermal power plant which is located in Beed district in state of Maharashtra. Fresh Fly ash sample is collected from the dumping site of power plant in carry bags.

2.2 Physico-Chemical Analysisof Fly Ash Sample

1. **pH**: The pH value of the most important physiochemical parameters affects the important properties of fly ash which observed by the pH metric method the result found in the range 8.410
2. **Electrical Conductivity:** The measurement of electric conductance is the measurement of the current.it gives a clue for the soluble salt that present in the sample. The value is found in the range between 0.180

IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 12, Issue 4, December 2021
Impact Factor: 5.731

3. **Total Nitrogen:** It is an important nutrient present in fly ash required for the growth of plants, it is affects the sample of pH. The nitrogen is found between the ranges of 0.004.
4. **Phosphorus**: It is the most important nutrient required for the growth of plants and present in oxide form in fly ash, it roles of fertilizers during the plant growth. It is measured by the titration method and its range is 0.176
5. **Calcium:** Calcium content present in oxide form it is very essential for the growth of plant in agricultural field. It is determined by titration method it its value 1.781 in fly ash.
6. **Organic Carbon:** It is the most important nutrient for soil and is responsible for the fertility of soil. It is determined by titration method, its value is 0.329
7. **Iron:**It is also an important nutrient for the growth of plants, due to presence of this elements, fly ash is beneficial for the crop production in agricultural field. It is determined by the titration method, it is present in oxide form and its value is 7.910

Physicochemical analysis of Fly Ash is shown by following table

S. No.	Parameters	Fly Ash
1.	pH	8.410
2.	Electrical Conductance	0.180
3.	Total Nitrogen	0.004
4.	Phosphorus	0.176
5.	Calcium	1.781
6.	Organic Carbon	0.329
7.	Iron	7.910

III. Conclusion

On the basis of above analysis the fly ash of Parli thermal plant is suitable for the crop production, due to presence of some elements, these are essential for the during the plant growth. We can apply these in soil and increase the fertility of soil in agricultural field.

References

[1]. Aswar W.R. fly ash disposal and utilization, national scenario, International conferences on fly ash disposal and utilization New Delhi, India80-86 (2001).

[2]. Adrino D.C. Weber J, Bolon N.S., Paramasivem S, Bon Jun Koo, Sajwan K.S. 2002 effects of high rates of coal fly ash on soil turgrass and ground water quality. Water, Air, Soil Pollution,139, 365-385 (2002).

[3]. Chang A.C. Lund L.J. page et al. physical properties of fly ash amended soil, J Environ. Quality,6:267-70 (1977).

[4]. Roy W.R. Theiery R.G. Schuller R.M. et al. coal fly ash- A review of literature and proposed classification system with emphasis on Environmental impacts. Environmental Geology Notes 96 Champaign, Illinois state, Geological (1981).

[5]. Page A.L. Elsewi, A.A. Shartughan, I R physical properties of fly ash from coal fired power plants with special references to environmental impacts, residue Review,71- 83- 120 (1979).

[6]. Manish Basu, Manish Pande, PBS Bahoria , S.C. Mahapatra Potential fly ash utilization in agriculture, A Global review Rural Development center , Indian institute of technology, Kharagpur, West Bengal India, Science Direct Progress in Natural Science 19: 1173-1186 (2009).

[7]. Matasi T, Kermidas, V Z. Fly ash application on two acidic soils and its effects on soil salinity, pH B.P. on reyergrass growth and composition, Environment Pollutant,104, 107- 112 (1999).