

Utilization of coal fly ash as a fertilizer for Cash Crop Plants & Check its Effect on the growth of METHI (*fenugreek*), SPINACH (*Spinacia oleracea*), DHANIA (*gotra*).

Patil Sujata N¹. Sanap Sandip R¹. Wagh Mayur A¹. Patil Nitinkuar P¹.
Bhamare Harshal M¹. Solanki Pooja V¹. Chaudhari Poonam B¹.
Sardar Vishal B¹. Sanap Pravin R².

¹Department of Microbiology & Biotechnology. S.S.V.P.S's Science College, Dhule.

²K.V.K.Y.C.O.U. Nasik India

Abstract: The coal fly ash is a residue of burning of coal, the organic source of energy. Present paper reports the result of the study on the effect of varying concentrations of the coal fly ash (2%, 4%, 6%, 8%) on growth of crop plants viz. Methi (*fenugreek*), Spinach (*Spinacia oleracea*) and Dhania (*gotra*). The coal fly ash was collected from Thermal Power Station, Bhusawal. Germination and early growth was affected adversely in selected crop plants but increasing levels of fly ash did not cause any harmful effect. The large scale use of fly ash in agriculture holds a potential to increase on an average 10-15 % yield of crop plants.

Key words: Fly ash, Agriculture, Crop plants, Methi (*fenugreek*), Spinach (*Spinacia oleracea*) and Dhania (*gotra*).

I. Introduction:

Fly ash one of the major waste material of Thermal Power Station. Fly ash constitute very fine and light particles. Size ranges from 0.5-100 micron. Fly ash is a mixture of aluminium and silicate. Fly ash is dominantly made up of Al, Si, Ca, Fe, Mg, Na, S, As, Cd, Cu, Zn, Cr, Ni, etc. 108 million tons fly ash produce per annum. Coal is the most abundant, extensively used, and important source of energy for power generation in the world. Among the total power generated annually in India, about 70% is produced by thermal power plants. The generation of fly ash depends on the type and ash content of the coal being used. Generally lower quality coal is used in Indian power plants, which contains a high percentage of ash. (*Pol.J. Environ. Stud. Vol. 21, No. 6 (2012) 1713-1719*).

In India, studies have been carried out toward management of fly ash disposal and utilization. Fly ash is utilized in the cement and construction industries, with the remainder trucked to landfills or piped to settling ponds. However the rate of production is greater than consumption. The disposal of such a huge amount of fly ash is one of the major problems of developing countries. Dumping of fly ash affects the quality of the surface and ground water, soil, and vegetation of the area. Besides these, the use of fly ash in agricultural fields is a good alternative (*Pol.J. Environ. Stud. Vol. 21, No. 6 (2012) 1713-1719*). Fly ash contains essential nutrients such as K, Ca, and Mg, which has an alkaline effect. Amending such alkaline fly ash can reduce soil acidity at a certain level and it is suitable for agriculture, and it can increase the availability of important nutrients. The use of fly ash can promote plant growth by increasing soil conductivity, organic carbon contents, and microbial activity, soil porosity and water holding capacity. Fly ash contains essential nutrients for plant growth and it can be used as a fertilizer to complete the deficiencies of several elements.

Use of fly ash in agriculture provides a feasible alternative for its safe disposal to improve the soil environment and enhance the crop productivity. (*Journal of Agricultural Physics Vol. 9, pp. 20-23 (2009)*). In the present study an attempt has been made to evaluate the effect of coal fly ash as a fertilizer for plant growth in agriculture (*Pol.J. Environ. Stud. Vol. 21, No. 6 (2012) 1713-1719*).

II. Materials and methods:

1. Selection of site
2. Collection of fly ash from selected site
3. Selection of plants
4. Selection of different concentration of fly ash for plant growth
5. Effect of fly ash on plant growth

Selection of site:

The coal fly ash was collected from the Thermal power station, Bhusawal. **Bhusawal Thermal Power Plant** is located 8 km away from [Bhusawal](#) city of [Jalgaon district](#) in [Maharashtra](#).

Selection of plants:

1. METHI (*fenugreek*) :-

Botanical Name :- *Trigonella foenum-graecum*

Uses :-

- It is a good source of protein, vitamins & minerals.
- It is used to treat a large number of disorders like diabetes, bronchitis, skin irritation & reproductive problems.
- Extracted oil is used extensively in perfumery.
- It is used in manufacture of oral contraceptives.

2. SPINACH (*Spinacia oleracea*) :-

Uses :-

- It is very nutritive food.
- Gargling with the juice of spinach cures the inflammation of the throat.
- The juice extracted from the leaves of spinach, melts the stones formed in the kidney and the fragmented stones come out through urine.

3. DHANIA (*gotra*)

Uses :-

- It is used in spices.
- It is vata, pitta and kapha suppressant and maintains them in normal levels.
- It is used in inflammation, skin diseases and respiratory disorders.

III. Methods:

1. Selection of different concentration of fly ash.
 - Control plant (soil without fly ash Solution)
 - 2% (2gm fly ash in 100ml water)
 - 4% (4gm fly ash in 100ml water)
 - 6% (6gm fly ash in 100ml water)
 - 8% (8gm fly ash in 100ml water)
 - Soak it for overnight.
 - Filter by filter paper and adjust p^H 5.6
 - Soak the seed in the prepared solution for 10 min. Then sow it into the soil.

IV. Result:

Response of Methi to Fly ash-

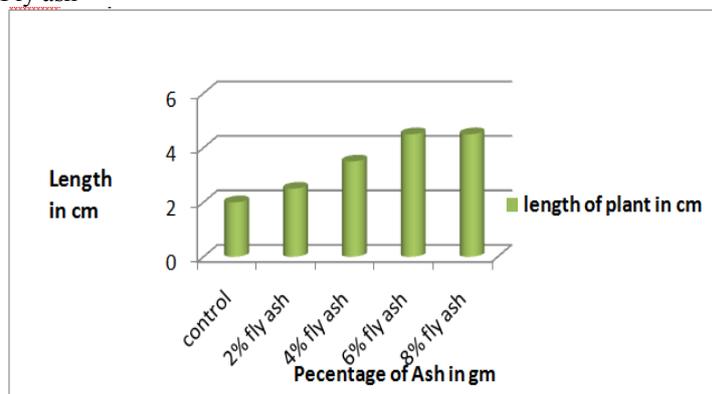


Figure. 1

Response of Spinach to fly ash-

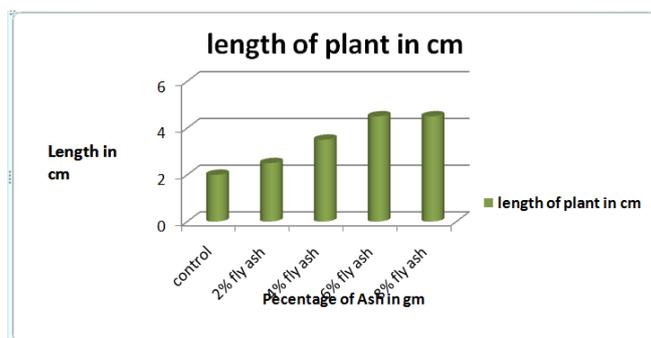


Figure. 2

Response of Dhania to fly ash-

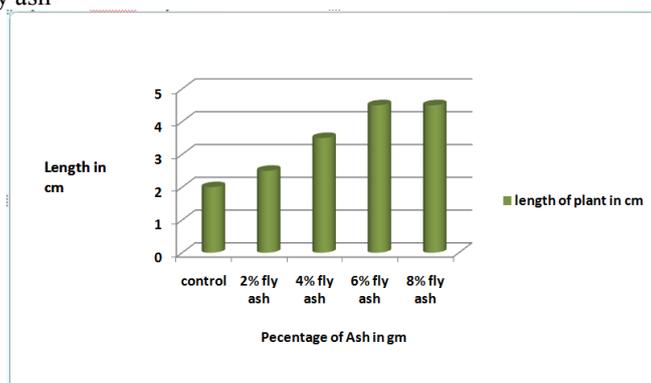


Figure. 3

V. Conclusion

Fly ash is a heterogeneous mixture of amorphous and crystalline phases and generally considered as ferroaluminosilicate. It has been proved, beyond doubt, that use of fly ash in agriculture has no significant ill effects. Mineralogically, fly Ash is broadly similar to soil but rich in macro and micro nutrients. Particle size distribution of fly ash improves physical conditions of soil.

In Fig.1,2 & 3 shows that the concentration of fly ash increases length of crop.

Acknowledgement

This research is conducted with support of Dr. Nitinkumar P. Patil & Prof. Harshal M. Bhamare. Authors are specially thankful to Secretary Mr. Utkarsh V. Rawandale of S.S.V.P.S's Science College, Dhule and Prof. Dr. D. A. Patil Principal, S.S.V.P.S's Science College, Dhule for providing necessary laboratory facilities.

References

- [1]. AGGARWAL S. SINGH2 *, G.R. AND. YADAV3 B.R Utilization of Fly ash for Crop Production: Effect on the Growth of Wheat and Sorghum Crops and Soil Properties Journal of Agricultural Physics, Vol. 9, pp. 20-23 (2009).
- [2]. Aneja, K.R. 2002. Experiments in microbiology plant pathology, tissue culture and mushroom production technology. New age International Publishers, 3rd edn: pp. 165-167
- [3]. Bhattacharya S.S., Chattopadhaya G.N (2002); Increasing bio-availability of phosphorous from
- [4]. Chang, A.C., Lund, L.J., Page, A.L. and Warneke, J.E. 1977. Physical properties of fly ash-amended soils. J. Environ. Quality, 6(3): 267-270 fly ash through vermicomposting. Journal of Environmental Quality, 31: 2116-2119.
- [5]. Garg, R.N., Singh, G., Kalra, N., Das, D.K. and Singh, S. 1996. Effect of soil amendments on soil physical
- [6]. Jamwal, Nidhi 2003. Looks the ways to utilize fly ash. Down to earth, 12(3): 1-5.
- [7]. Kalra, N., Joshi, H.C., Sharma, S.K., Harit, R.C. and Brij Kishor 1996a. Effect of fly ash incorporation on soil and crop productivity. ICAR News, 2(2): 18.
- [8]. Mahale N.K., Patil S.D., Sarode D.B. and Attrade S.B. Effect of Fly ash as Admixture in agriculture and the study of Heavy Metals Accumulation in wheat (*Triticum aestivum*), Mung Bean (*Vigna Radiata*), Urad Beans (*Vigna Mungo*) Pol.J.Environ.Stud.Vol. 21, No.6 (2012) 1713-1719
- [9]. properties, root growth and grain yields on maize and wheat. Asian Pacific J. Environ. Dev., 3(1): 54-59.
- [10]. Sinha, K.S. and Basu, K. 1998. Mounting fly ash problems in growing coal based power stations few pragmatic approaches towards a solution, in Proc Int Conf fly ash Disposal and Utilization, edited by C.V.J. Verma et al. (Central Board of Irrigation and Power, New Delhi). 1 15-27.
- [11]. Subbian, P. and Chamy A. 1984. Effect of Azotobacter and Azospirillum on the yield of sesamum (*Sesamum indicum*). J. Madras Agric. Vol. 71, pp. 615-617.
- [12]. Use of Fly Ash in Agriculture and Related Studies, Report of FAUP, TIFAC, DST, 2005.
- [13]. Vimal Kumar *, Gulab Singh **, Rajendra Rai** FLY ASH: A MATERIAL FOR ANOTHER GREEN REVOLUTION Fly Ash India 2005, New Delhi.