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ABSTRACT

Electricity is one of the blessings that science has ever given to mankind but its generation through coal based thermal power stations is a matter of great environmental concern due to one of the byproduct of the process known as fly ash. Proper handling of this huge amount of fly ash is really needed. As we know that fly ash is a coal residue, so it is entirely organic in composition. It has various micro and macro nutrients like soil. Present investigation was carried out at Agra College to evaluate the impact of fly ash on the growth parameters of wheat through pot culture experiments. Soil- ash mixture was prepared and used on wheat variety HD-2967 in different conc's (0%, 15%, 30%, 50%, 75% and 100%) and positive responses related to different growth parameters were recorded. The amendment of fly ash with elevated conc. (0%-30%) enhanced the germination of seed in test crop. Highest stimulation was noted at 30%-50% fly ash concentration. Further increase in concentration significantly inhibited the growth parameters.

Keywords: *Coal, Electricity, Fly ash, Growth, Nutrients, Residue.*

INTRODUCTION

In order to generate electricity, burning of coal in thermal power plant produces different residues which are collectively called coal combustion residues (CCRs). Among these different residues fly ash is produced in large amount. Coal is the best available natural fuel used by TPP's in our country for electricity generation [1]. TPP's in India use a huge amount of coal approx. >430 million tons for energy production and approx. 145.42 million tons of fly ash is being generated annually [2]. In India mostly, there are coal based TPP's which are producing millions of tons ash every year and possibly it may cross 1000 million tons by the year 2031-32. Management of this huge amount of fly ash is really a great global lucrative issue. Multidimensional research is to be needed to develop the alternate utilization of fly ash, especially its utility in agriculture [3]. Fly as is rich in different trace elements like Arsenic, Boron, Calcium, Molybdenum, Sulphur, Selenium and Strontium etc. [4]. Soil gets enriched by fly ash amendment due to macro and micronutrients. Fly ash has very fine particles with moderate amount of BD, high surface area and low weight texture [5]. Fly ash can be used as a source material for some nutrients like Ca, S, B, Mo and some other essential metals [6] Application of fly ash, modify the bio physiochemical characteristics of soil [7]. Fly ash can be used in a effective manner in badlands/ soil for enhancing the grade to improve state of being fertile [8].

Fly ash also contains essential elements in its composition so it can be used in agriculture as a source of natural manure which can increase the plant growth attributes [9]. The use of fly ash for soil amendment proved beneficial to *Rhizobium* sp. population and a reduced growth of several soil born micro pathogens was observed [10].

MATERIAL AND METHODS

For the present investigation, fly ash was brought in sufficient quantity from N. C. P. S., Dadri (U.P.). For pot culture experiments, the dried soil- ash mixture (V/V) in six proportions i.e. 0 %, 15 %, 30 %, 50%, 75 % and 100 % and then their effect was studied on growth parameters of HD- 2967 cultivar of wheat.

Preparation Of Fly Ash- Soil Mixture

Pot culture studies were performed to fix the appropriate amount of fly ash for soil reformation to enhance soil fertility resulting in better wheat production.

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METHODOLOGY OF BIOASSAY

Sandy loam soil was used in present investigation. Polythene bags of about 30 cm in diameter were used as culture pots. Sun dried soil- ash mixture (V/V) was prepared in six proportions i.e. 0 %, 15 %, 30 %, 50 %, 75 % and 100 %. Each polythene bag was filled with 5 kg fly ash-soil mixture. All treatments were carried out in triplicate by using RBD. 500 gm. soil-ash mixture has been removed from each bag before irrigation. Soil of each pot was pressed and leveled. For irrigation, 900 ml. of tap water was poured in each pot. Next day for each treatment 10 seeds of test wheat varieties were sown per pot. The seeds were kept on soil surface and then covered with 500 gm. of dry soil ash mixture (removed from pot before irrigation) to avoid crust formation on germinating seeds. The pots were irrigated with tap water and thinning of plants was done 15 days after sowing and only five plants were left in each pot.

RESULTS AND DISCUSSION

During present investigation, the effect of 0%, 15%, 30%, 50%, 75% and 100 % conc. of fly ash-soil mixture was evaluated on the different growth parameters of wheat cultivar HD-2967 under pot culture experiment. Wheat cultivar responded positively to soil- ash mixture. A reduction in growth parameters was noted with increasing conc. of fly ash in soil (75 % and 100 %) in test crop (Table 1). The lower conc's. of fly ash (15 %, 30% and 50 %) were stimulatory for growth parameters. Application of higher conc's. of fly ash (75 % - 100 %) proved inhibitory with a maximum reduction noted in 100 % fly ash.

In wheat cultivar, number of tillers got increased up to 50 % fly ash concentration in soil. The stimulation in number of tillers was maximum at 30 % (13.9 %) fly ash concentration over control. While higher concentration of fly ash (75 % and 100 %) inhibited this parameter. Likewise the number of ears also got increased up to 50 % fly ash concentration in soil. The stimulation in number of ears was maximum at 30 % (15.4 %) fly ash concentration over control. While higher concentration of fly ash (75 % and 100 %) inhibited this parameter also. The maximum inhibition was observed (12.8 %) at 100 % fly ash concentration. Almost similar results were recorded when days to 50% flowering were observed (Table 1).

Different researchers already advocated the agricultural application of fly ash. In their study they found that application of fly ash proved beneficial for several crops like *Medicago* sp., *Hordium* sp. *Cynodon* sp., *Vigna* sp. and *Triticum* sp. [11]. In the cultivar of wheat growth attributes were stimulated maximum at 30 % and 50 % fly ash concentration with soil (Table 1).

However some studies reported the risk of heavy metals related to agricultural use of fly ash. On the other hand, FASAT proved as a gift which advocates the ash utilization at lower rates as soil conditioner and according to available literature HMs conc's. were found within permissible limits in soil and the concerned risk can be ignored [12-15].

Table 1. Effect of fly ash on growth parameters of HD-2967 cultivar of Triticum aestivum L..

Characters	**Growth Parameters**		
Fly ash %in soil	**HD-2967**		
	No. of tillers	**No. of ears**	**Days to 50% flowering**
0 %	3.83	3.66	68.00
15 %	3.96	3.86	67.00
30 %	4.36	4.23	66.00
50 %	4.16	4.10	64.00
75 %	3.60	3.46	70.00
100 %	3.46	3.20	72.00
CD at 5 %	**0.10**	**0.11**	**0.66**

CONCLUSION

Present study suggests the application of fly ash in a justified amount for improved productivity of wheat cultivar through FASAT.

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