Research Paper—Computer Science

Feb, 2010

Effect of fly ash amended soil on plant growth Parameters and crop yield in *Brassica campesrtis* L.

***Kaushal Kumar Mishra **Kamesh Agrawal**

***Corresponding Author: Asst. Prof., Dept. of Chemistry, TC.L. Govt. P.G College, Janjgir**
****Research scholar, Department of Chemistry, TC.L. Govt. P.G College, Janjgir**

A B S T R A C T

In the present study a series of pot experiments has been carried out to observe and evaluate the effect of fly ash on plant growth parameter and Protein contents in Brassica campestris L. For the experiment different fly ash composition with soil (10%, 20%, 30%, 40%, 50%) were taken in pots and plain soil filled po~ was served as control. Evaluation of experimental data reveals that plant growth parameter and crop yields significantly increased from 10% to 40% level offly ash amended soil and were found optimum at 40%. Level, whereas at higher level i.e. 50% offly ash Plant growth decrease significantly.

Key words: Fly ash, Plant growth, Brassica campestries, yield.

Introduction

Fly ash is the residue trom coal combustion in thermal power plant. Fly ash is generally captured trom the chimneys of coal-fired power plants. In the past, fly ash produced trom coal combustion was simply entrained in flue gases and dispersed into the atmosphere. This created environmental and health concerns that prompted laws which have reduced fly ash emissions to less than 1 % of ash produced. Worldwide, more than 65% offly ash produced trom coal power stations is disposed of in landfills and ash ponds. In India alone, fly ash landfill covers an area of 40,000 acres (160 km2). Indian coal has 30% - 40% fly ash content(l). Analyses by many research groups have shown that

Table no. 1:Composition of fly ash /soil in pot experiments (w/w)

Sr. No.	Treatment	Symbol
1.	Control (No Fertilizer applied)	A
2.	Control + NPK (200:500:300mg)	B
3.	Control 90%+NPK+10% Fly ash	C
4.	Control 80%+NPK+20% Fly ash	D
5.	Control 70%+NPK+30% Fly ash	E
6.	Control 60%+NPK+40% Fly ash	F
7.	Control 50%+NPK+50% Fly ash	G

Table No. 2: Physico chemical characteristics of flyash, soil and their combinations.

Sr. no.	Details Combination	pH	Electrical conductovity in mmhos/cm	Organic Carbon%	Available P%	Available N%	Symbol
1.	Plain Soil	5.58	0.075	30	2.95	0.084	A
2.	Soil + NPK	6.58	0.076	35	3.25	0.086	B
3.	Soil 90% + Flyash10% +NPK	6.60	0.079	40	4.30	0.088	C
4.	Soil 80% + Flyash 20% + NPK	7.95	0.080	40	4.50	0.90	D
5.	Soil 70% + Flyash30% +NPK	7.20	0.090	44	5.60	0.095	E
6.	Soil 60% + Flyash 40% + NPK	7.22	0.120	46	6.70	0.098	F
7.	Soil 50% + Flyash50% + NPK	7.28	0.125	46	6.76	0.099	G

Each value is mean of five replicants.

Table no. 3: Effect of Fly ash on plant growth parameter in Brassica Campestries L.

Treat--ment Symbol	Length of shoot in cm	Length of root in cm	Fresh weight of shoot in gm	Dry weight of in gm	Dry weight shoot in gm	Dry weight of root in gm	Leaf /Plants	No of branches	No. of pods	Weights of 100 seeds in gm
A	47	16.3	87.8	38.6	16.3	10.3	52	17	138	4.18
B	58	16.1	89.7	42.1	18.2	10.5	60	18	148	4.58
C	62	13.4	90.2	44.5	19.4	10.9	72	21	153	4.65
D	59	13.1	96.4	49.2	23.6	11.6	74	26	158	4.68
E	62	13.1	104.2	55.7	26.6	12.0	79	28	157	4.65
F	65	17.3	105.8	54.8	28.0	11.5	77	32	168	4.30
G	63	16.4	90.4	42.7	27.3	10.2	68	32	148	4.34

Each value is mean of five replicants.

fly ash contain most of essential nutrients re-quired for plant growth (2) (3)(4). The neutralizing effect of alkaline fly ash on acidic soil has been known for some time. (5)(6)(7). Martens and Beahm have conducted micronutrient investigation in order to evaluate the plant availability of B, Mo, and Zn in fly ash. Fly ash ameliorates soil acidity and help trace element uptake. So keeping in views this nature and properties of fly ash it was planned to evaluate their effect on plant growth and crop yield in *Brassica campestris* L.

Material and methods:

Test plant: The *Brassica Campestris* L. variety used in present work was K-l is an early maturing dwarf variety. It has adaptability to stress condition. Soil Preparation: Collected soil sample ware dried, grounded sieved then mixed with fly ash in different proportion, homogenized and filled in the pots. The details of the experiment are tabulated ahead.(Table no. 1) Fertilizer application: Basal dose of fertilizer i.e. 200 mg N, 500mg P and 300mg K was given as urea, single super phosphate and muriate of potash respectively. It was incorporated well in the soil before sowing.

Seed sowing: Seeds ofB. campestris was sown at 0.5 cm depth. No. of seed sown in each pot was 05 at equidistance from each other. Insecticide application: Monocrotophos 1 % solution was

Table 4: Grain yield

Sr. no.	Treatment	Grain yield/pot (in gms)	Grain yield in Kg/ha
1.	Control (plain soil)	47	900
2.	Control + NPK.	48	950
3.	Control 90%+NPK+10% Fly ash	51.41	1000
4.	Control 80%+NPK+20% Fly ash	52.30	1100
5.	Control 70%+NPK+ 30% Fly ash	53.30	1300
6.	Control 60%+NPK+40% Fly ash	58.44	1400
7	Control 50%+NPK+50% Fly ash	55.83	1350

Each value is mean of five replicants.

sprayed on the plants, when plants ware infected by insects. After 45 days plants ware harvested carefully. The plant growth parameter ware taken. Physiochemical characteristics of soil and their combinations with fly ash ware analyzed by stan-dard methods (8).

Result and Discussion

The data represented in table 3 and 4 shows the plant growth parameter (Length of shoot and root, fTesh and dry weight of shoot, no. of leaf, no. of branches, No of pods/Plants weights of 100 seeds and grain yield) were significantly increased at all fly ash combination as compared to control set. The plant growth was better in 10%, 20%,30%,40%, combination irrespective of control maximum being at 40%. Above all growth parameters were decreased in 50% fly ash level. Fly ash amended soil also found to be beneficial to grain yield (Table no. 4) which were increased from 10% to 40% gradually however decrease at 50% level as compared to lower level of fly ash. Application of fly ash to the soil has ameliorated soil acidity provided trace elements to optimum conditions for nutrient uptake in the plant B. campestris. and hence fly ash can be use as eco iliendly non conventional fertilizer at 30% to 40%. Beside this the use of fly ash will also solve in some extent the disposal problem of fly ash which is being continuously produced in thermal power plants and became environmental problem.

REFERENCE

1. Vlado Valkoic (1981) Trace elements in coal, CRC Press Londan 2. Chaddha YR(1990) -Wealth ofIndia, CSIR, New Delhi. 3. Allway, W.H. (1945), Soil Science 4. National Symposium on Rice, Ian 1999, Tech. Source- Indira Gadhi niversity,Raipur (C.G) 5. Mishra KK, 2003. Studies on Chemical analysis of soil of Has do Bango Major irrigation Project and Impact of Fly ash on soil for increase in crop production and Protein contents in Brassica Campestries- Ph.D. Thesis. Guru Ghasidas University Bilaspur (C.G) 6. RRizvi.AA Khan, (2009) Respnce of EggPlant (Solenum melongena L) to fly ash and brick kiln dust amended soil- Biology and Medicine, Vol 1(2): 20-242009 7. Martens D.C. and Bealm, B.R(196) Growth of plants in fly ash amended soils Proc: 4th, lnt Utility, Syn.St.Louis, MERC/SP. 8. Hess P.R,(1995) - A text Book of soil chemical analysis, CBS Publication, New Delhi. 9. Vogal, A.E. (1980) ATB of Quantitative Inorganic Analysis ELBS Delhi.