



**EFFECT OF FLY ASH OF ON CERTAIN BIOCHEMICAL PARAMETERS
OF *COLEUS FORSKOHLII*,**

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ABSTRACT

Coleus forskohlii is an herb grows wild in the warm, subtropical, temperate areas in India. Planting material of *Coleus forskohlii* K-8 variety was procured from a nursery near Kurnool, Andhra Pradesh. The field experiments were carried out from 2006–2008 at Botanical Garden, Osmania University, Hyderabad. The growth and metabolism of *Coleus forskohlii* was studied in different soils added with different levels of fly ash. It is an attempt to know the impact of fly ash and to test its possible utilization in agricultural practices.

The main chemical constituent of *Coleus forskohlii* is Forskolin. The aim of the present investigation is to measure the differences in chlorophyll and phenolic compounds levels in *Coleus forskohlii* grown in different fly ash amendments.

Key Words: *Coleus forskohlii*, fly ash,

I. INTRODUCTION

Medicinal plants are playing an important role in human treating the health related problems and his livestock too since time immemorial. In developing countries, 80% of the population relies on the indigenous medicines derived from medicinal plants for their primary health care needseven today. India is rich in medicinal plant bio-diversity. *Coleus forskohlii* is a perennial herb, grows wild in the warm, subtropical, temperate areas of India. In traditional Ayurveda systems of medicine, *Coleus* has been used for a variety of purposes, including treating asthma, bronchitis, insomnia, epilepsy and angina.

Earlier studies were confined to the experiment of tuber yield in *Coleus forskohlii*. But there are no reports available on the influence of nutrients (bio fertilizers and inorganic) on the improvement of biochemical contents. By keeping this view in mind, the present investigation was taken up to study the levels under different fertilizer amendments.

Fly ash is a powder produced from the burnings of coal for the thermal power production and from Iron industries. The NTPC at the Karimnagar district is major producer of fly ash in Telangana. They are small sized elements consist of silica, alumina and iron. In India, more than 70% of energy needs are met by coal based thermal power plants (Jala and Goyal, 2006). Burning of coal releases, oxides of sulphur and nitrogen and tremendous quantity of fly ash, which gets deposited on the soil and the plants.

Fly ash also contains various nutrients like S, B, Ca, Mg, Fe, Cu, Zn, Mn, and P, which are pre requisite for the plant growth, apart from that it also posses certain toxic metals like Cr, Pb, Hg, Ni, V, As, and Ba. Summation of Fly ash increases the availability of Na, K, Ca, Mg, B and

other nutrients (Basu *et al.*, 2009). It neutralizes the acidic nature of the soil apart from increasing the nutrient availability (Kunta *et al.*, 2004).

Phenolic are intermediate compounds produced in metabolic activities, on the other hand they also exhibit certain potential applications in the treatment of certain diseases. Phenolic and chlorophyll content of plants depend on the soil P^H and nutrients. It can be treated as a marker to assess the soil quality (Ramana *et al.*, 2001). Fly ash can also be used as nutrient supplementing compounds instead of chemical fertilizers in agriculture practices.

Sarangi *et al.*, (1998) reported the effect of fly ash on soil metabolic activities. Thetwar *et al.*, (2007) have reported the impact of fly ash and plant hormones on soil metabolic activities. Similarly wide variation in morphological and yield parameters among the genotypes of *C. forskohlii* was reported by several workers (Mukherjee *et al.*, Patil *et al.*, 2001). Plant grown in fly ash treated soils exhibited profuse vegetative growth (Reddy NS *et al.*, 2001).

C. forskohlii has long been cultivated in India. The main chemical constituent of *Coleus forskohlii* is Forskolin. In traditional Ayurveda systems of medicine, *Coleus* has been used for a variety of purposes, like treating asthma, bronchitis, insomnia, epilepsy and angina. It is also used in treatment of psoriasis. The roots are also used in treatment of worms. The plant is also used for veterinary purposes.

The present work is planned to study the effect of increasing amounts of fly ash on plant chlorophyll content and phenolic compounds.

II. EXPERIMENTAL PROCEDURE

Materials

The field experiments were carried out from 2006 – 2008 at Botanical Garden, Osmania University, Hyderabad. Planting material of *Coleus forskohlii* K-8 variety was procured from a nursery near Kurnool, Andhra Pradesh.

Soil fields of 5 X 5 (Meter) separated by distance are prepared. The humidity, soil micro and macro contents, organic composition and the availability of light in all three fields are made equal to avoid variation. The plot of soil without Fly ash is the control. 5% and 10% fly ash amended soils are prepared with 100 liter solution of 5% fly 10 % ash per week.

Chlorophyll Estimation

Chlorophylls are the essential for photosynthesis present in the plastid, chloroplasts as green pigments in all photo synthetic plant tissues. The Chlorophyll pigments were estimated according to the procedure of Arnon (1949). The contents of Chlorophyll a, chlorophyll b, and total chlorophylls were calculated using the following formulae:

$$\text{Chlorophyll a} = [(12.7 \times \text{OD } 663) - (2.69 \times \text{OD } 645)] \times V / 1000 \times W.$$

$$\text{Chlorophyll b} = [(22.9 \times \text{OD } 645) - (4.68 \times \text{OD } 663)] \times V / 1000 \times W.$$

$$\text{Total Chlorophylls} = [(8.02 \times \text{OD } 663) - (20.2 \times \text{OD } 645)] \times V / 1000 \times W.$$

Phenols are aromatic compounds with hydroxyl groups are extensive in plant kingdom. They occur in all parts of the plants.

They are estimated by using folin –ciocalteus reagent, the concentration of phenolics was read (mg/ml), the content of phenolics in the extracts was expressed in terms of gallic acid equivalent (mg of GAE/g of extract).

III. RESULTS AND DISCUSSION

The data obtained was presented in the table.no.1

SNO	Sample	chlorophyll.a mg/g	chlorophyll.b mg/g	Total chlorophyll. mg/g	phenolic compounds mg/GAE/gm
1	control (grown on plain soil)	2.17	2.76	4.93	1.6
2	plants grown on 5% ash	2.48	2.96	5.14	2.1
3	plants grown on 10% ash	2.56	3.10	.566	2.65

The chlorophyll content of a plant is depends on the total area of plant and it is a growth parameter of plant. Fly ash contains several nutrients including S, B, Ca, Mg, Fe, Cu, Zn, Mn, and P, which are beneficial for plant growth. The soil enrichment is because of fly ash. It contributes to higher pH (Devarajan *et al.*, 1994). plants take up nitrogen in the form of nitrate (NO_3^-) they move through the roots and lesser content of nitrate in 5% and 10% fly ash containing soils may be due to more hydraulic absorption because of higher water holding capacity in the fly ash amended soil (Schwartz and Lorenzo, 2001).

Fly ash increases water holding capacity and decreases porosity. It facilitates the absorption of nutrients and increases the photosynthetic activity. Similar findings have been reported by (Thetwar, 2007). It was found that higher chlorophyll a and b and higher phenolic compounds concentration in *Coleus forskohlii* grown in fly ash containing soil.

The higher chlorophyll in fly ash containing soil is due to the presence of high N, K and Mg which are present in fly ash resulting in higher content of chlorophyll a (Rai *et al.*, 2002). The higher content of chlorophyll b in fly ash containing fields is due to higher P content in fly ash amended soil (Canjura *et al.*, 1991). It is a mix of macronutrients such as nitrate, phosphate and potassium and micronutrients like Mg, S, B, Fe, Mn and Zn come from the fly ash.

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