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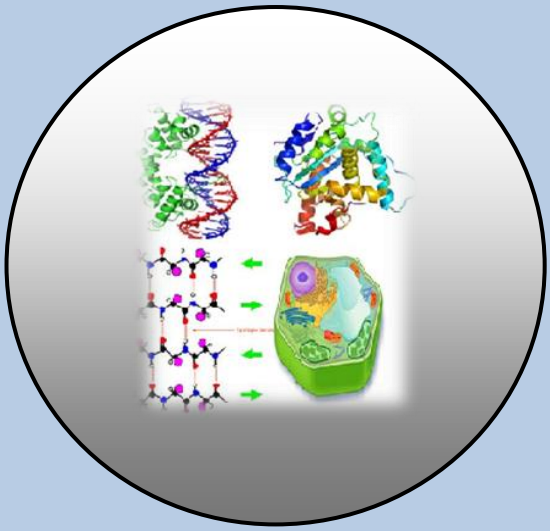

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**REVIEW ARTICLE**
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# Beneficial Effects of Fly Ash on Crops and Protein Yield in Green Gram

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## ABSTRACT
***The soil of chattisgarh state is acidic in nature and soil analysis reveals presence of lateritic soil containing hydrated iron oxide and aluminium Oxide. One the toxicity due to soil acidity and aluminium ion has been described elaborately and demonstrated the adverse effect of aluminium ion on the root length of cotton crop. Fly ash treatment improved nutrient uptake from the soil and resulted in increased root length, chlorophyll a and b and protein contents so fly ash should be encouraged to ameliorate, soil acidity for better crop yield.***
***Key words: Acidic Soil, Fly Ash, Root Length, Chlorophyll and Protein contents.***

## INTRODUCTION
Fly ash is a disposal problem. In India, the generation of 45 million tonnes/year of fly ash is projected of increase to 100 million tonnes per year in 2002. The present work deals with ameliorating the acidic soil by fly ash.
Fly ash not only ameliorates soil acidity but also supplies trace element like Zn, Cu, Mn and Mo to the crop. These elements are not available to the plants in acidic soil. Even today the two element H+ (pH) and AI ions are still considered to be the most important causes of toxicity to fresh water biota and in soil solution.

### Literature Survey
A careful literature survey reveals that in acidic soil, the majority of crop plants produce yield less than their potential when grown on less acidic for one or more of the following reasons-

1) Aluminium toxicity
2) Reduced micro organism activity

3) Manganese toxicity
4) Iron toxicity
5) Calcium and magnesium deficiency
6) Molybdenum deficiency
7) Nitrogen, phosphorus and sulphur deficiency

Although most studies have shown marked growth increase when soil are limed to pH 6.0 or 6.5 Al $(OH)_2$ at pH 6.8 i still toxic to the plants [Barlett and Riego, 1972]. $H_2 PO_4$ rapidly reacts in soil to from insoluble FE and Al ions to from insoluble phosphates. [Sah and Mikkelson, 1986].

Green gram is not an exception to suffer the yield loss and protein loss.

Careful literature survey reveals that fly ash contains a number of trace element require for plant growth M.O, Zn Fe, and Cu are few of them [Schwitzeebel, et al., 1972, Ondaav et al., 1978 and Boltel et al., 1975].

**A brief review of the work already done in the field**

The effect of power plants effluents on soil has been discussed by Roffman et al [1977]. Plank and Martens have advised utilisation of fly ash for better crop yield and proteins contents.

Tripathi et al [1996] have showed that use of trace element increase crop yield and protein contents in soya bean crop. But consideration of soil acidity as;

1) Micelle –Al = $Al^{+3}$ in soil solution.
   Adsorbed Al
2) $Al^{+3} + H_2O$ –$Al(OH)_2{}^{+2}{}_{+H}{}^{+}$

High concentrations of exchange of soil Al in acid soils are toxic to plants roots [Adams ad Lund, 1966 and Nobel and Alva, 1998].

Again trace element availability is pH dependent

[13] The desirability of maintaining pH at or slightly below is obvious.

These are the details of the work done already in the field.

**Objectives of the present work**

1) Analysis of fly ash for compound. Trace and toxic element.
2) To analyse the soil for compound and trace element.
3) To compare the physico-chemical properties of soil and fly ash so that their mixture will not produce any problem in the crop field.
4) To growth, the plant (Green gram) phaseolus radiates in the different mixture of soil and flash and study the plant growth parameters and protein contents.
5) Protein will be hydrolysed and amino acids contents obtained by HPLC will be compared critically after pot experiments carried out in soil and fly ash combinations.

## MATERIAL AND METHODS

Fly ash and soil of NTPC korba will be kept in 1 sq ft pots after analysis. Details will be as under. Analytical details will be duly recorded. Laboratory procedures will be followed [Hesse, 1997 and Vogel, 1999] for estimation of trace element like Zn, Cu Mo and $Fe_2O_3$ $SiO_2$ $Al_2O_4$ NA, K and Ca for growth of crop plant is supplied by fly ash.

Physico-chemical properties like pH and electrical conductivity will be measured.

Plants (Green gram) will be grown and growth parameter like root length shot length, chlorophyll contents , leaf area and 1000 seeds weight and crops yields will be recorded.

**Estimation of Protein**

Protein hydrolysate will be analysed by HPLC for amino acid contents.

**Table 1. Effect of Fly Ash and NPK on Crop Yield.**

| S.N. | Treatment | Crop Yield |
|---|---|---|
| 1 | Soil | Low |
| 2 | Soil + N P K (400:600:300) | Moderate |
| 3 | Soil 90% + 10% fly ash + N PK | Moderate |
| 4 | Soil 80% +20% fly ash + N P K | High |
| 5 | Soil 70% +70% fly ash +N P K | High |
| 6 | Soil 60% + 40% fly ash +N P K | Very High |

**Expected outcome of the present work**

Soils of Chhattisgarh are acidic or acid prone. $H^+$ (pH) and $AL^{+3}$ are main causes of toxicity to the plants.

Fly ash basic nature and its physico chemical properties are quite comparable with that of soils. Fly ash will ameliorate soil acidity and create optimum conditions for plant growth and fly ash will supply essential micro nutrients like (Cu, Zn and Mo) in the leguminous crops which are known for their protein and amino acid contents (Table 1).

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