

Fly ash-an organic farming amendment

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Introduction

Fly ash is considered as the waste, it needs proper management and quality control for better use. Fly ash is a by-product from burning of coal in electric power generating plants. It is called fly ash because it is transported from the combustion chamber by exhaust gas . It is collected from the exhaust gases by electrostatic precipitators .It contains the micro and macro elements which are required for crop growth and development. So, it is used for making fertilizer , soil stabilizer and cattle feeders ,etc. India is the major producer and user of fly ash.



Classification of fly ash based on chemical composition:

- 1) **Class -C :-** It is originated from Sub- bituminous coal and containing more than 20% Cao.
- 2) **Class -F :-**It is originated from Anthracite and Bituminous coal and containing less than 10%Cao.

Constituents of fly ash

Fly ash includes substantial amount of silicon oxide (SiO_2), aluminium oxide (Al_2O_3), ferric oxide (Fe_2O_3) and calcium oxide (CaO).

It also includes minor constituents like Arsenic (As), Beryllium (Be), Boron (B), Cadmium (Cd), Chromium (Cr), hexavalent chromium cobalt, Lead (Pb), Manganese (Mn), Mercury (Hg), Molybdenum (Mo), Selenium (Se), Strontium (Sr), Thallium (Tl), Vanadium (V), along with small concentration of dioxins.

It also has unburnt carbon.

Physical properties of fly ash

- 1) pH 6.00- 10.00.
- 2) Specific gravity 1.45 -2.25.
- 3) Bulk density (g/cc) – 0.85 – 1.2.
- 4) grain size distribution – silt to silty loam.
- 5) Porosity (%) – 45-55.
- 6) water Holding capacity (%) - 25 -40.
- 7) Electrical conductivity(ds/m) – 0.15 – 1.10.

Chemical properties of fly ash)

- 1) Silicon oxide (SiO_2)- 35 -65 %
- 2) Aluminium oxide (Al_2O_3)-25 -45%
- 3) Iron oxide (Fe_2O_3)-0.5 -6.0%
- 4) Manganese oxide (MnO)-0.1-0.5%
- 5) Magnesium oxide (MgO)-0.01 -0.5%
- 6) Calcium oxide (CaO)-0.2 -8.0%
- 7) Potassium oxide (K_2O)-0.04 -0.9%
- 8) Sodium oxide (Na_2O)-0.07 -0.43%

Use of fly ash in agricultural field:

It may be use as :-

- 1) Soil amendments
- 2) For making fertilizer.
- 3) Cattle feeders

4) Soil stabilizer

Why fly ash uses in agriculture ?



- 1) Fly ash can increase moisture content in soil.
- 2) Improve soil texture and structure .
- 3) Enhance porosity and water holding capacity.
- 4) Improve air and water drainage .
- 5) Reduces crust problem in soil.
- 6) Provide nutrients for crop growth and development are:-
Micro element :- Iron, Zinc, Copper, Manganese, Molybdenum(Mo),
Macro element:- Potassium, Phosphorus, Calcium, Magnesium, Sulphur.
- 7) It can increase the crop yield 15 to 50% depending upon crop and soil type.

8) It can also stabilize soft soils (clay soil) .

Results on the effect of fly ash on the increase on yield of few crops grown in varied soils

Crop	% Increase over control	Soil type	Fly ash dose per hectare
Paddy	10-15	Alluvial	200t/ha
Wheat	15-20	Laterite	200t/ha
Maize	10-15	Black	30t/ha+FYM @ 20t/ha
Lentil	15-20	Laterite	100t/ha
Green gram	20-25	Black	150t/ha + FYM @ 12.5t/ha
Sunflower	20-25	Red	60t/ha + FYM @ 20t/ha
Mustard	15-30	Laterite	10t/ha
Tomato	35-40	Landfill	650t/ha + FYM
Cabbage	30-35	Landfill	650t/ha + FYM

Centre for fly ash Research and Management ,New Delhi

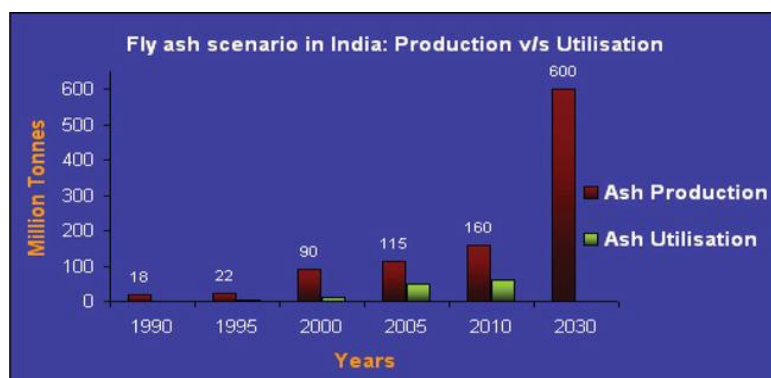
C-Farm is an expert institute for technology development and application for gainful utilisation and safe as well as economical management of fly ash.

Point to be remember:

Properties of fly ash relevant to various application are use specific . Standards , guidelines and specification prepared and issued.

Crop produce grown on fly ash:

- Safe for human consumption
- No change in proximate composition and trace mineral content
- Nutritional content generally increases.
- No increase in heavy metal content.



Fly ash Scenario in India

Conclusion:

Fly ash can be one of the most important waste materials. There is a huge scope for fly ash in upcoming years. Like its use in cement making, bricks making and structural fills, it can also be used in agriculture fields to improve soil fertility and productivity. Use of fly ash in farming has no bad impact on crops.