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"UTILIZATION OF FLY ASH AS SOIL AMENDMENTS IN AGRICULTURAL FIELDS OF KHANDESH AREA"

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ABSTRACT

In the recent decades, recycling or safe disposal of solid industrial waste has become a prime environmental concern through out the world; and fly ash (FA) is major amongst them.As a coal combustion residue, fly ash is generated in large amount by the thermal power plant. In India alone , more than 112 Million tons of fly ash is generated annually. Normally, the bulk of the fly ash was dumped in landfills in open land which harms our environment. Hence,many potential application have been identified for the utilization and management of fly ash such as its use in cement,concrete,bricks,wood substitute products,soil stabilization,road embankments,and consolidation of ground, land reclamation and as a soil amendments in agricultural fields.

We used fly ash as soil amendments in agricultural field and assessed its impact on soil health,and growth, physiological, biochemical and yield respoeses of Indian crops Brinjal, Chilli, Tomato,Marigold and Banana in black cotton soil under natural conditions.We used four different doses of fly ash amendments-5%,10%, 15% and 20% . The soil upto the depth of 30 cm ,in each of the 0.5 meter square experimental plots was plowed up and mixed homogeneously with fly ash of respective doses and left as such for fifteen days.

KEYWORDS- *solid industrial waste , fly ash (FA) , utilization and management .*

INTRODUCTION :

India's dependence on coal as a major source of energy had been of prime importance throughout this millennium. Actually, coal dominates the overall energy production sector in India, contributing about 55% of the total primary energy production. The provan global coal reserve was estimated to be 847 billion Mg during 2007.The USA had the largest share of the global reserve(25.4%) followed by Russia (15.9%) and India (8.6%). As a developing country, India's economic growth is expected to continue rapidly in the decades ahead.Since India, like the United States, possesses abundant coal reserves, coal based electricity generation is the current principal energy source in major parts of India.

Coal is predominant energy source for power production in India, generating approximately 70% of total domestic electricity .Energy demand in India is expected to increase over the next 10-15 years; although new oil and gas plants are planned, coal is expected to remain the dominant fuel for power generation. Production currently stands at around 290 million tons per year, but coal demand is expected to be more than double by 2020.While alternate source of energy have come into limelight in the last four decades, the increase use of coal as a

primary source of energy cannot be undetermined, especially in country like India which has sufficient coal reserves.

Fly ash is one of the most plentiful and versatile of the industrial by-product, thus fly ash management is a cause of concern for the future.Its appearance is generally that of light to dark grey powder of predominantly silt-size.Fly ash is normally a very fine respirable powder (less than 10 microns) which causes damage to human or animal lungs.During 2004-2005, generation of fly ash was about 112 million tons in India of which about 42 million tons (38%) was utilized by different sources.

Fly ash consists of all the elements present in the soil except organic carbon and nitrogen so it can be applied to the soil as an amendment.When the fly ash is added to the soil, its silt to clay size particles gives the binding strength to the soil and further minimizes the erosion.

In this present review, we mainly concentrate on the utilization of fly ash as soil amendments in the agricultural fields of Khandesh area of Maharashtra.We have tried to evaluate –hoe these amended fly ash affects the soil health, and quality; hence, the productivity of major agricultural crops.

LITERATURE SURVEY:-

The physical , chemical, biological and nutritional property of fly ash depends on the source of coal, combustion conditions storage and handling.

Capp (1972) mixed fly ash in various proportion upto 75% (w/w) with soil and conducted green house and field trials to evaluate its effect as soil conditions, soil neutralizer as source of trace elements to plants.

Chang et al. (1977) reported that , small amount of fly ash is added to soil does appears to affect some measured physical properties of the soil. Fly ash had higher water content. Possibly due to the porous nature of some particles.The small amount of fly ash showed a slight reduction in soil water content. However, at higher application rates fly ash amended soil decreased bulk density of silty clay soils.

Sanjay Bhoyar and Matte (2005) reported that, fly ash was silty loam in texture , the content of major nutrient (N and P) were very low,however, fly ash was very rich in micronutrients Fe, Zn, Mn, and Cu.

Extensive experiments had been conducted for bulk use of fly ash in agriculture, the encouraging result of work carried out by number of scientists indicated that , fly ash has a good potential as a soil conditioner and source of some plant nutrient to improve the yields of almost all field crops.

Shankar et al. (1995) studied the influence of lignite fly ash on groundnut yield and uptake of nutrient. They noted that fly ash was effective source of supplying plant nutrient like Ca, Mg, and K etc.among the level of fly ash 1.0 t ha-1 was found to be optimum level for improving the yield of pod and nutrient uptake under lateriter loamy sand soil.

Bhople (2006) reported that , use of fly ash in black soil observed significant increase in growth and yield parameters in sunflower.

Meshram (2007) concluded from the experimentation that , application of fly ash @60 t ha-1 can be helpful to improve the physical , chemical and nutritional properties of soil and to obtained a maximum seed cotton and dry matter yield of Kharif cotton.

OBJECTIVES:-

- To experimentally investigate the effect of fly ash on the physical and chemical properties of soil.
- To experimentally investigate the effect of fly ash on soil amendment.
- To experimentally investigate the effect of fly ash on the growth of plants.
- To experimentally investigate the standard quantity of fly ash to be used for soil amendment and growth of plants.

METHODOLOGY:-

Fly ash for the experimentation was brought from Thermal Power Station, Deepnagar, Tal. Bhusawal, Dist. Jalgaon and added during the period of July 2016.

We used four different doses of fly ash like 5%, 10%, 15% and 20% as per the weight of soil.The soil upto

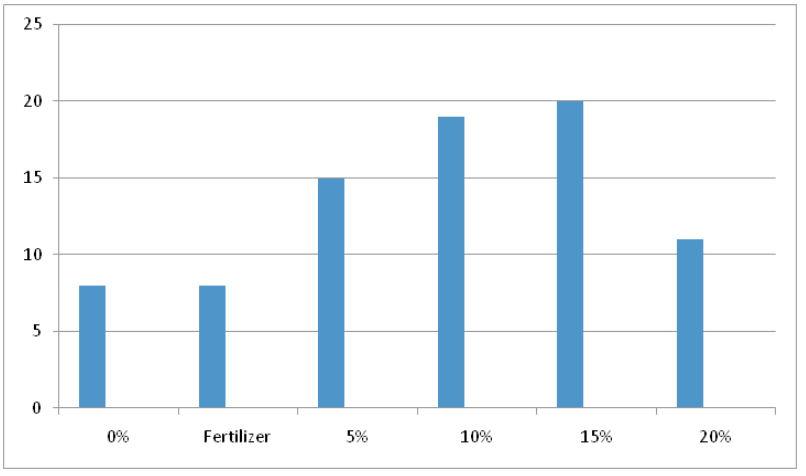
the depth of 30 cm in each of the 0.5 meter square experimental plots plowed up and mixed homogeneously with fly ash of respective doses and left for fifteen days. After 15 days we planted crops of each plant. We planted one crop of each plant separately in each plot.

MATERIAL SPECIFICATION:-

1.Fly ash- The fly ash use in this work is taken from Deepnagar thermal power station, Tal. Bhusawal, Dist. Jalgaon.
2. Crops- The Indian crops like Brinjal, Tomato, Banana, Marigold and Chilli.
3. Fertilizers- NPK dose.
4. Water- Rain water is used for the experimentation.

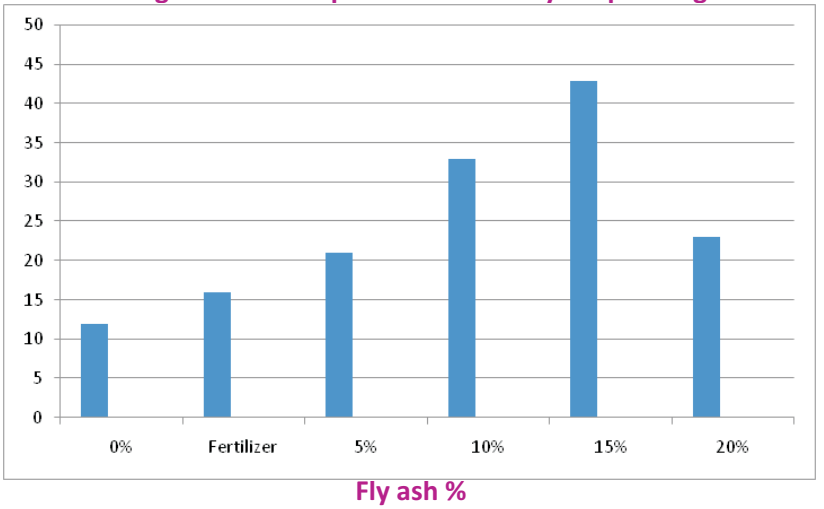
Mixing of fly ash :-

Tomato Plants



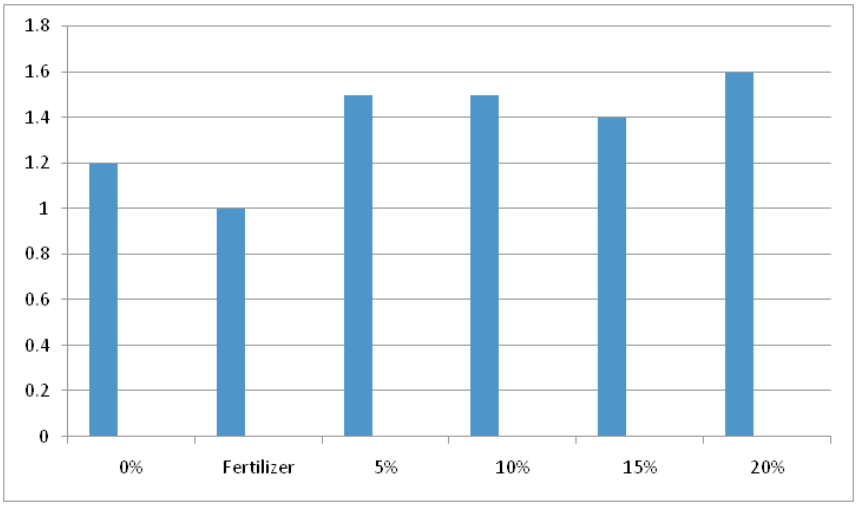
Fly ash %

Height of Tomato plants after 15 days of planting



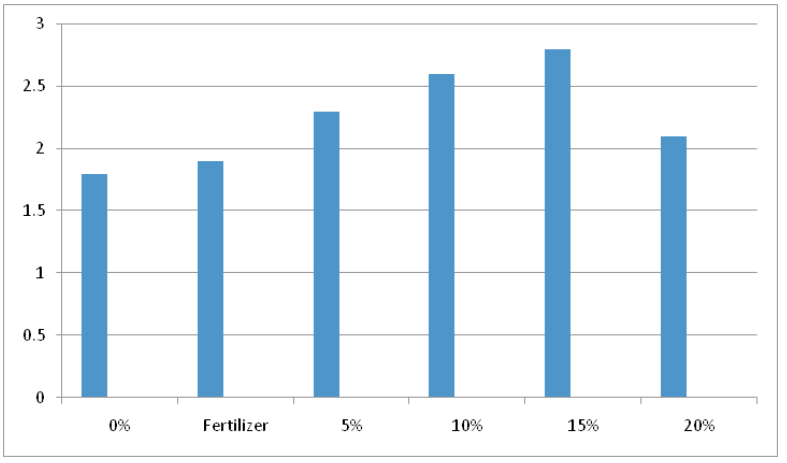
Fly ash %

Height of Tomato plants after one month of planting



Fly ash %

Tomato plants stem breadth after 15 days of planting



Fly ash %
Tomato plants stem breadth after one month of planting

CONCLUSIONS

A per the observations we are taken, the fly ash is useful for the growing of plants. In Tomato, the best results are observed in 15% of fly ash plants.

EXPERIMENTAL IINVESTIGATION

• The experimental studies have shown that there exists an optimum proportion of Fly ash that can be used for particular crop.The optimum proportion comes out to be as follows for :

Crops	Optimum Fly ash %
Tomato	15%

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