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"EFFECT OF FLY ASH ON GERMINATION AND SEEDLING OF SOYABEAN (GLYCINE MAX)" GROWTH RATE: A REVIEW"

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ABSTRACT: Fly ash management would remain a great concern all over the world. Several studies indicated that there is an ample scope for safe utilization of fly ash as a soil ameliorant that may improve physical, chemical and biological properties of the soil and is a source of readily available plant micro and macro nutrient.

KEYWORDS:- Fly ash management and Soyabean.

INTRODUCTION:-

Soil microorganism specially rhizospheric plant growth promoting rhizobacteria play vital role in the growth and yield of crop plants. Rhizobium sp. belongs to Plant growth promoting bacteria(PGPR) group are the beneficial symbioants that enhance the plant growth. Rhizoshphere is the area around root region where plants roots were influenced by microbial activity. These organisms promote plant growth by enhancing nitrogen fixation, facilitate nutrient uptake from soil and enhance phytohormone production (Burd et al.2000). Rhizobium bacteria are known to participate in many biological activities such as biological control of plant pathogens, nutrient cycling and seedling/plant growth (Wu et al. 2006), (Dubey et al.2001). Fly ash is a heterogeneous mixture of ferro-allumino-silicate is the residue produced in Thermal power plants. Fly ash contains micro and macro nutrients viz. Cu, Fe, Mn, Mg, Ca, Na and K. It also contains toxic heavy metals like Cd, Cr, Co and Pb but found within permissible limit (Aggarwal et al. 2009), (Rai et al, 2010) Use of fly ash in agriculture with recommended doses provides better alternative in fly ash disposal problem and also in agronomic practices. Numerous researchers revealed that appropriate doses of fly ash incorporarion in soil alter the physico-chemical and biological properties of soil. Fly ashes are deficient of nitrogen and organic carbon content (Siddiquei et al. 2004). Many researchers used the Farm Yard Manure (FYM), biofertilizers and organic waste to provide the nitrogen and organic carbon source to the plants grown in fly ash amended soils. Soils physico- chemical properties determine the functioning and diversity of soil microbiota (Kodobocz. 2008). The objective of this paper was to study the growth parameters viz. germination % and root and shoot length of soybean plant grown in the soil amended with Rhizobium sp. and fly ash from thermal power plant.

MATERIAL AND METHODS:-

Fly ash was collected from dumping sites of Shahdol and soil sample was collected from farm field. Different concentration of soil-fly ash admixture was taken in pots viz. 0%, 10%, 20%, 30%, and 40%. Experiment was performed in randomized manner (in triplicate) by pot assay method. Seeds of soybean cultiar-335 were purchased from local market and then washed with distilled water and were sown in pots containing soil+ Rhizobium sp.+ fly ash in respective pots viz. 0%(A), 10%(A1), 20%(A2), 30%(A3) and 40%(A4). 0% was without fly ash and consider as control. Pots were irrigated at regular interval avoiding subsequent seepage. During the growth period, morphological parameters viz. germination % and root and shoot length of soybean plants were recorded. After termination of experiment (after 45-60 days), root shoot length was measured. Seed germination percentage was calculated by counting normal seedling growth after a week of sowing from each pot.

The plants were removed from the soil and the roots were traced on paper and root length was calculated from the soil line with measuring scale. Similarly shoot length was measured from above the soil line to the top of the plant by tracing the plants on the paper. (Abady.2015).

RESULTS AND DISCUSSION:-

Above table presents results pertaining to the seed germination of soybean studied under various soil matrix containing Fly Ash (FA) and microorganisms (Rhizobium sp.) as an amendment. Overall there are five different soils, identified as A (soil with no FA), A1 (soil with 10% FA), A2 (soil with 20% FA), A3 (soil with 30% FA) and A4 (soil with 40% FA). The experiment revealed that there is a significant (P0.05) difference in the soybean seed germination as a function of different Fly ash addition to the soil. Specifically, for A, 30% seeds germinated, while for A1, A2, A3 and A4, the percentage of seeds germinated is 40%, 70%, 40% and 60% respectively. The study results indicated that highest germination rate of 70% was obtained when the soil contained 20% FA and Rhizobium sp. amendment. Thus, it is concluded that the percentage of FA does play a role in the germination of soybean seeds.

Above table presents results pertaining to the plant root length of soybean studied under various soil matrix containing Fly Ash (FA) and microorganisms (Rhizobium sp.) as an amendment. Overall there are five different soils, identified as A (soil with no FA), A1 (soil with 10% FA), A2 (soil with 20% FA), A3 (soil with 30% FA) and A4 (soil with 40% FA). The experiment revealed that there is a significant..

Germination Percentage

Table 1: Soybean seed germination in soil (Soil + FA) in presence of Rhizobium sp.

Treatment (Soil + FA)	N	Mean	SD	SE	Min.	Max.	F	P
A (0%)	3	30	±5.0	2.9	25	35	94.186	<0.05
A1 (10%)	3	40	±2.0	1.2	38	42		
A2 (20%)	3	70	±3.0	1.7	67	73		
A3 (30%)	3	40	±1.0	0.6	39	41		
A4 (40%)	3	60	±2.0	1.2	58	62		
Total	15	48	±15.4	4.0	25	73		

SD: Standard Deviation; SE: Standard Error; Min.: Minimum; Max.: Maximum; F: 'f' ratio, P= Probability

CONCLUSION:-

In present study we found that judicious use of fly ash in agriculture was recommended. Fly ash amendment can change the physico-chemical properties of soil and provides micro and macro nutrients to the plants. In present work, highest root and shoot length of soybean plant was recorded in soil amended with Rhizobium sp. and 20% fly ash. High rate of seed germination was recorded in 20% fly ash amendment with rhizobium sp. Rhizobia can fix atmospheric nitrogen and by that increase the plant growth. Growth response of plant was showed significant increase in growth parameters as compared over the control i.e. at 0%. Fly ash and Rhizobium sp. has been played a vital role in degraded agricultural soils for reclamation process.

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