



Research Paper

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Effect of coal ash on physio-morphological and bio-chemical parameters of pomegranate (*Punica granatum* L.)

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ABSTRACT : A pot culture experiment comprised of five treatments such as T₁: 100% soil mixture + 0% coal ash, T₂: 75% soil mixture + 25% coal ash, T₃: 50% soil mixture + 50% coal ash, T₄: 25% soil mixture + 75% coal ash, T₅: 0% soil mixture + 100% coal ash was laid out in Completely Randomized Design with five replications to assess the effect of varying levels of coal ash on physio-morphological and bio-chemical parameters of pomegranate. The results revealed that the combination of 50:50 soil and coal ash mixture invariably increased the seed germination, seedling characteristics, biomass, vegetative growth and chlorophyll content of the crop tested in the current investigation. The increase in growth traits was mainly attributed to increase in nutrient acquisition of plants grown under above combination. However, 100% coal ash in the growing medium reduced seed germination, seedling vigour, growth and biomass per plant. The leaf nutrient status in relation to the macro nutrients like N, P, K, Ca, Mg, S and the micro nutrients Zn, Mn, B, Mo, Fe and Cu were found higher in the treatments having high coal ash content in the growing medium than other treatments and the lowest was recorded in control (no coal ash).

KEY WORDS : Coal ash, Pomegranate, Germination, Growth, Nutrient acquisition

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The industrialists and also the environmentalists are finding difficulty in recycling of some of the industrial wastes, one such difficult to handle industrial waste is coal ash. Coal ash is one of the major solid waste products and environmental pollutant from thermal power plant. Basically, coal ash is ferro-alumino-silicate characteristically high in potassium, sodium, calcium, magnesium and sulphur content. With the promotion of more and more coal based thermal plants, the ash generation is getting multiplied geometrically. Disposal of these large amounts of ash required large patch of land causing reduction in cultivable land. There is a thumb rule that for every mega watt of power, one acre of land is required for disposal of ash accumulating to a height of 8-10 m in ash pond (Patnaik, 1992). There are several reports of the use of coal ash as a soil amendment to field crops. Coal ash acts as a feasible alternative to lime for amelioration and amendment of acid soils and acid mine spoils. Potential of coal ash as amendment and micronutrient carrier has been

identified. Furr *et al.* (1979) cultured a variety of vegetables, millets and apple trees on potted soils amended with coal ash showed enhanced absorption of B, Cu, Co, Fe, Mg, Mn Mo, Se and Zn. Coal ash can, therefore, be used as a fertilizer or soil conditioner. Efforts are being made to devise strategies on purposeful use and safe disposal of huge amount of coal ash produced. The mode and extent of damage caused by this pollutant to the pomegranate plants has not been systematically studied. Therefore, a pot culture experiment was conducted to find out the effect levels of coal ash on the growth and development of pomegranate plants and to evaluate the tolerance level of the plants to coal ash.

RESEARCH METHODS

The experiment was carried out in the Regional Research and Technology Transfer station, OUAT, Semiliguda, Koraput in the state of Odisha during 2006-2007 with the support of National Aluminum Company (NALCO), Damanjodi Unit,