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Effect of co-application of fly ash and sewage sludge on growth, yield of okra (*Abelmoschus esculentus* L.) and some soil properties

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ABSTRACT

Field study was conducted with the objective of improving physical condition of soil, nutrient use efficiency and uptake by the okra on addition of fly ash and sewage sludge. The study examined the nutrient solubility and availability resulting from land application of fly ash and sewage sludge. The nutrient uptake was monitored in different plant parts of the okra. The results of field experiments indicated that application of 52 t ha^{-1} fly ash or sewage sludge individually or together in 50: 50 proportion increased the pod yield of okra by 18.48, 61.88 and 64.00 per cent over no solid waste control. There was efficient use of nutrient during the early stage of crop up to 45 days after sowing, which contributed for higher pod yield and biomass. Further, incorporation of solid waste along with varied levels of recommended dose of fertilizers significantly increased the organic carbon content, nutrient availability and decreased the bulk density of the soil. The results support the use of solid waste as amendment and nutrient source for land application.

Key words : Coal fly ash, Sewage sludge, Land application, Nutrient solubility, Uptake, Okra.

One of the major endeavors of agricultural scientists in the present day is to find ways and means of maximizing the productivity of crops with less investment on fertilizers. Under such situation, alternative method of augmenting fertilizer usage and its use efficiency in crop production assumes greater priority. One such method in recent times, is the use of solid wastes like fly ash and sewage sludge for agricultural purposes.The use of sewage sludge along with fly ash has the advantage of combining several waste products produced in large quantities in to a material potentially more useful than each would be alone (Sims *et al.*, 1993). An attempt was made to study the effect of amendification of soil with solid wastes on growth, yield of okra and some soil properties in northeastern dry zone of Karnataka.

MATERIALS AND METHODS

Field experiment was undertaken in alfisols in new orchard of Division of Horticulture, RARS, Raichur Karnataka in split plot design with twelve treatment combinations of four main treatments and three sub plot treatments comprising absolute control, fly ash and sewage sludge at 52 t/ha applied individually or in 50:50 proportion and along with recommended dose of NPK fertilizer at 50 per cent and 100 per cent. The soil was sandy clay loam in texture, alkaline in reaction (pH 8.02), low in soluble salt content (EC: 0.15 dSm^{-1}), medium in organic carbon (0.66%), medium in available nitrogen (224.0 kg ha^{-1}), available P_2O_5 (24.0 kg ha^{-1}), available K_2O (225.5 kg ha^{-1}) and available SO_4-S (29.8 kg ha^{-1}). The DTPA extractable Cu, Fe, Mn and Zn was 0.79, 6.84, 13.28 and 0.49 mg kg^{-1}, respectively. The characteristics of fly ash and sewage sludge are given in the Table 1.

Biometrical observations *viz.*, plant height, number of pods per plant, dry matter yield and pod yield were recorded. Some physicochemical properties of soil were analyzed after the harvest of crop. Soil and plant analysis were carried by adopting standard analytical producers (Jackson, 1973).

RESULTS AND DISCUSSION

Application of solid waste *viz.*, fly ash and sewage

Table 1: Properties of soil, fly ash and sewage sludge.

Properties	Texture	BD (mg m^{-3})	MWHC (%)	pH	EC (dSm^{-1})	Organic carbon (%)	Available nutrients (kg ha^{-1})			DTPA micronutrients (mg kg^{-1})			
							N	P_2O_5	K_2O	Zn	Fe	Mn	Cu
Soil	SCL	1.46	14.11	8.02	0.15	0.56	224.30	24.0	225.50	0.49	6.84	13.28	0.79
Fly ash	SiL	0.98	63.10	8.81	0.23	0.48	122.00	10.36	150.10	1.04	8.66	13.40	0.29
Sewage sludge	-	0.69	72.30	6.28	3.25	8.30	990.30	96.20	1100.00	7.30	22.38	40.04	16.68