An Asian Journal of Soil Science, Vol. 3 No. 2 : 307-309 (December-2008)

Effect of gold ore tailings on seed yield and uptake of micronutrients by sunflower [*Helianthus annuus* (L.)]

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Accepted : *November, 2008*

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ABSTRACT

A field investigation was conducted in a Vertisol at Main Agricultuarl Research Station, University of Agricultural Sciences, Dharwad during *kharif* 2006-07 to study the use of gold ore tailings (GOT) as a source of micronutrients on sunflower crop under irrigated condition. Application of GOT @ 1.0 t/ha along with poultry manure significantly improved yield attributing parameters eventually resulting in 22.5 and 26.5 per cent higher seed and stalk yield, respectively over control. The uptake of copper (2345 mg/kg), iron (91567.6 mg/kg), manganese (319.1 mg/kg) and zinc (284.1 mg/kg) also increased significantly due to the application of same level of GOT along with poultry manure. Similar results were observed with application of GOT alone @ 1.0 t/ha and with FYM and vermicompost.

Key words : COT, GOT, Seed filling, Oil content, Sunflower.

Environmental pollution problems are receiving utmost attention throughout the world and are most critical in industrialized countries. According to Day and Ludeke (1982) environmental pollution is mainly caused by mine ore wastes as they contain sulphides of copper, iron, manganese and zinc which accumulate in large quantities, causing a potential pollution hazard and deteriorate the favourable aesthetic of the natural environment. If disposal of these wastes is associated with a benefit to plant growth, its advantage would be realized as a source of micronutrients. Among mine ore tailings, gold ore tailings and copper ore tailings are rich in micronutrients and can be effectively used in crop production. Venugopal (2002) and Vidyavathi (2005) observed higher curd and pod yield in cauliflower and groundnut crops, respectively with application of gold ore tailings. The present investigation was conducted to know the effect of gold ore tailings (GOT) on yield and uptake of nutrients

MATERIALS AND METHODS

A field experiment was conducted at Main Agricultural Research Station, University of Agricultural Sciences, Dharwad during *kharif* 2006-07. Experiment was laid out in a randomized block design comprising of fourteen treatments replicating thrice and was conducted in typic chromustert with clay texture having pH 7.54 and EC 0.39 dS/m. The soil was medium in available nitrogen (312 kg/ha) and phosphorus (27.2 kg/ha) but high in potassium (439.5 kg/ha) contents. The DTPA extractable Cu, Fe, Mn and Zn contents of soil were 0.41, 3.04, 3.95 and 0.53 mg/kg, respectively. Application of recommended dose of fertilizer, GOT, COT, FYM, vermicompost and poultry manure was done before sowing of the crop. Chemical composition of two ore tailings are presented in Table 1.

Table 1 : Physical and chemical properties of GOT and COT

Particulars	GOT (Huti)	COT (Ingaldhal)
pH (1:2.5)	7.52	8.23
EC (1:2.5) dS/m	1.90	2.30
CEC (cmol (p+)/kg)	21.2	22.4
Coarse sand (%)	18.2	15.0
Fine sand (%)	66.3	53.5
Silt (%)	12.0	13.9
Clay (%)	4.00	19.1
MWHC (%)	25.4	21.4
Field capacity (%)	12.1	14.2
Exchangeable Ca (cmol (p+)/kg	8.60	6.90
Exchangeable Mg (cmol (p+)/kg	4.80	4.00
Available S (mg/kg)	193.0	198.0
Available P (mg/kg)	29.0	21.0
Available K (mg/kg)	42.0	18.0
Total Fe (%)	13.6	9.60
Total Mn (%)	1.74	0.78
Total Cu (%)	0.50	0.18
Total Zn (%)	0.06	0.51
DTPA – extractable Fe (mg/kg)	213.2	32.9
DTPA – extractable Mn (mg/kg)	65.2	24.5
DTPA – extractable Cu (mg/kg)	17.4	70.2
DTPA – extractable Zn (mg/kg)	47.8	75.2
Pb (mg/kg)	0.36	0.59