

## **Effect of sewage sludge application on Zn and Cu accumulation in soil and radish uptake of these metals**

G. Samouie<sup>1</sup>, M. kalbasi<sup>2</sup>, and A. Mohammadi<sup>3</sup>

Graduate student, Professor and Assistant professor, respectively. College of Agriculture, Azad Univ., Khorasgan Campus, Esfahan, Iran.

Ghazalsamouie@yahoo.com

### **INTRODUCTION**

Sewage sludge, being an organic waste, is a rich source of plant nutrients including N, P, K, Ca, Mg, Fe, etc. (Martinez et al., 2003). Sewage sludge also contains high concentration of heavy metals that could accumulate in soil and may be taken up by plants. Cabbage, amaranthus, spinach, radish, lady's finger and forage grasses grown in sewage sludge amended soils showed higher concentrations of Cd, Cr, Co, Cu, Pb, Ni and Zn as compared to those grown in unamended soils (Sekhar et al., 2002). Sewage sludge is applied for growing several vegetables including radishes in Esfahan. The possibility, therefore, exists that heavy metals could be taken up by vegetables grown in sewage sludge amended soil and could be transferred into the food chain. It was, therefore, the objective of this study to investigate the effect of increasing rates of sewage sludge applications on possible accumulation of Zn and Cu in soil and their uptake by radish.

### **MATERIAL AND METHOD**

A pot experiment was conducted in greenhouse of Azad University, Khorasgan Campus to investigate Zn and Cu accumulations in soil and their uptake by radish as the results of increasing rates of sewage sludge application. Three rates of sewage sludge (0, 4, and 16%) were mixed with 1 Kg of soil in pots replicated 3 times and radish plants were grown in the pots. Radishes were harvested and analyzed for Zn and Cu content using AAS.

### **RESULTS AND DISCUSSION**

Accumulation of heavy metals in plants depends on various factors such as soil physico-chemical properties, sewage sludge composition, sludge application rate and plant species. Concentrations of Zn and Cu increased in soil and plant with sewage sludge treatments compared to the control. Highest accumulations of Zn and Cu in soil and highest uptake of these metals by radishes were obtained in the highest rate of sewage sludge treatment (16%). This could be due to the high Zn and Cu content of sewage sludge and decrease in soil pH. High organic matter content of sewage sludge also contributed to the higher availability of Cu and Zn due to the metal complexation with organic matter.

**Keywords:** sewage sludge, zinc; copper, radish

### **REFERENCES**

- Martinez, F., Cuevas, G., Calvo, R., Walter, I., 2003. Biowaste effects on soil and native plants in a semiarid ecosystem. *J. Environ. Qual.* 32, 472–479.
- Sekhar, K.C., Supriya, K.R., Kamala, C.T., Chary, N.S., Rao, T.N., Anjaneyulu, Y., 2002. Speciation, accumulation of heavy metals in vegetation grown on sludge amended soils and their transfer to human foodchain—a case study. *Toxicol. Environ. Chem.* 82(1), 33–43