Geophysical Research Abstracts
Vol. 12, EGU2010-12336, 2010
EGU General Assembly 2010

Effects of Sulfur application on DTPA- extractable Cadmium in soils and its uptake by Spinach (spinacea oleracea) in presence of Thiobacillus sp.

Ali Kasraian (1) and Najafali Karimian (2)

(1) Islamic Azad University of Shiraz, Soil Science, Islamic Republic Of Iran (alkasra@yahoo.com), (2) Shiraz University (Nkarimian@yahoo.com)

Phosphors (P) compounds like other chemical fertilizers are inseparable part of cropping management in arid and semiarid regions with low organic matter. On the other hand, Cadmium (Cd) present as impurities in P fertilizers is one of the most common toxic heavy metals which is widely distributed in crop lands.

Soil treatment with elemental Sulfur (S) which produces acid sulfuric and dissolves calcium carbonate is a proved approach to increase P and other micronutrients (e.g. Fe, Zn and, Mn) availability in calcareous soils and hence improving plant growth.

On the other hand, acidifying fertilizers, like S, may change Cd availability through dissolving calcium carbonate, which retains more than 70 percent of this element, and so enhance Cd availability and subsequently increase Cd uptake. Increasing Cd not only depresses microorganism communities in soils and changes soil quality but also endangers human health by using plants which is grown in contaminated soils.

This experiment was conducted to study the effect of different rates of S application on DTPA- exactable Cd, its availability, and plant uptake.

To prove this hypothesis, the effects of S oxidation on Cd availability and its uptake by Spinach in a split plot experiment was conducted. Four levels (equivalent 0, 2 , 4 and 6 Mg/ ha) of S were applied to two different soils which were contaminated by 20 mg $Cdkg^{-1}$ as cadmium sulfate in 4 replications during six weeks of incubation under green house condition. To ensure the process of S oxidation, elemental S was inoculated by *Thiobacillus* sp.

After two months DTPA-extractable Cd and other elements (e.g. P, Zn, Mn, and Fe) in soils and also Cd concentration in edible parts of spinach were determined. The results clearly showed that elemental S oxidation was significantly affected by Cd contamination in soils and only 2 percent of S was oxidized in all S application rates after two months incubation. Although DTPA extractable Cd after incubation period was not changed significantly, in comparison with no S treatment, Cd concentration and plant uptake increased significantly in other treatments. The results shows about the danger of application of S and probably other acidified fertilizers, in contaminated calcareous soils because of effects on biological activities in soil and also human health.

1-Assistant professor of Soil Science, Islamic Azad University of Shiraz,

2- Professor of Soil Science, Shiraz University.