Change in availability and fractions of zinc in the rhizosphere of bean (*Phaseolus vulgaris* L.) in some calcareous soils

H. R. Motaghian[1]* and A. R. Hosseinpour[1]

(Received: 11 March-2013 ; Accepted: 14 Apr-2013)

Abstract

Rhizosphere is a micro zone with profoundly different microbiological and chemical properties compared to the bulk soil, where availability and fractionation of zinc (Zn) may also vary from the bulk soil. This greenhouse research was performed to study the available Zn and its fractions in the bean rhizosphere and bulk soils of 10 calcareous soils using rhizobox. Total organic carbon (TOC), dissolved organic carbon (DOC), microbial biomass carbon (MBC), pH and available Zn using 7 chemical extraction procedures and Zn-fractions were determined in the rhizosphere and bulk soils. The results indicated that in the bean rhizosphere soils, TOC, DOC and MBC increased significantly ($P<0.01$) and pH decreased significantly ($P<0.01$). Extracted Zn using several chemical extractants (except Mehlich 1 and HCl) in the rhizosphere was significantly ($p<0.05$) lower than the bulk soils. Also, concentrations of Zn-fractions in the rhizosphere were significantly ($p<0.05$) lower than the concentrations of Zn-fractions in the bulk soils. Results indicated that significant correlation coefficients between bean indices and extracted Zn using different extractants in the rhizosphere soils were more than the bulk soils. Significant correlation ($p<0.05$) was found between concentration and uptake of Zn in bean with exchangeable Zn and Zn associated with Fe and Mn in the rhizosphere soils, and with Zn associated with Fe and Mn in the bulk soils. The results of this research illustrated that availability of Zn in the rhizosphere soils are different from the bulk soils. Therefore, using rhizosphere soil would be recommended in the study of available Zn after planting.

Keywords: Fractionation, Chemical extractants.

1. Dept. of Soil Sci., College of Agric., Shahrekord Univ., Shahrekord, Iran.
*: Corresponding Author, Email: hrm_61@yahoo.com