

Status of heavy metals in agricultural soils as affected by different patterns of land use

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Abstract This study was conducted to determine status of heavy metals in agricultural soils under different patterns of land use. A total of 38, 40 and 45 soil samples for bare vegetable field, greenhouse vegetable field, and grain crop field were respectively taken from surface layer (0–20 cm) from selected experimental areas away from suburbs of ten counties (or districts or cities) in four provinces or municipalities of Huabei plain in north China. Information of crop production history, including varieties, rotation systems and fertilizer use, at the corresponding sampling sites was surveyed. Soil total Cu, Zn, Cd, Pb, Cr, As and Hg were measured. The results showed that the contents of total Cu, Zn, Cd, Pb, Cr, As, and Hg in the soil samples, especially soil total Cu and Zn contents, were higher in the bare vegetable field and the greenhouse vegetable field than that in the grain crop field. Long-term use of excessive chemical fertilizers and organic manures in the bare vegetable field and the greenhouse vegetable

field contributed to the accumulation of Cu, Zn, and other heavy metals in the soils. The contents of total Cu, Zn, and other heavy metals in soils increased with increasing vegetable production history of the research areas. In comparison with the grain crop field, the comprehensive pollution indices of the seven soil heavy metals and the single-factor pollution indices of soil Zn, Cu, Cd, Cr, and Hg based on the second criterion of Environmental Quality Standard for Soils were significantly higher in the bare vegetable field and the greenhouse vegetable field. Soils from the greenhouse vegetable field were slightly contaminated according to the comprehensive pollution index, and soils from the bare vegetable field and the grain crop field were at the warning heavy metal pollution level. The soils were contaminated with Cd according to the single-factor pollution index. The Cd pollution was relatively more serious in the bare vegetable field and the greenhouse vegetable field than that in the grain crop field. The soils selected with different land use patterns were not contaminated with Zn, Cu, Pb, Cr, As and Hg.

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Introduction

Soil is a long-term sink for the potentially toxic elements often referred to as heavy metals, including