شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

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التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأفلام قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

To be Kept away from Dust in Dry Cool place of 15-25- c and relative humidity 20-40%

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بالرسالة صفحات لم ترد بالاصل

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BALANCE OF SOME TRACE ELEMENTS IN SOIL AND PLANT UNDER POLLUTED CONDITIONS

BY

Mostafa Helmy EL-Sayed

B.Sc. Agric. (Soil Science), Ain Shams Univ., 1976
M.Sc. Agric. (Soil Science), Ain Shams Univ., 1992

A thesis submitted in partial fulfillment

of

the requirements for the degree of

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in

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Department of Soil Science
Faculty of Agriculture
Ain Shams University

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Mostafa Helmy EL-Sayed

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This thesis for Ph. D. degree has been approved by :

Prof. Dr. A. A. El-Sherbieny ..... A. E. EL-Sherbiny
Professor of Soil Sci., Fac. of Agric., Zagazig Univ.

Prof. Dr. M. E. El-Nennah..... M. E. El-Nennah.....
Professor of Soil Sci., Fac. of Agric., Ain Shams Univ.

Prof. Dr. M. A. Mostafa M. A. Mostafa.....
Professor of Soil Sci., Fac. of Agric., Ain Shams Univ. (Supervisor)

Date of examination : 12 / 1 / 1999

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UNDER THE SUPERVISION OF :

Prof. Dr. Mohamed Ahmed Mostafa
(Professor of Soil Sci., Fac. of Agric., Ain Shams Univ.)

Dr. Abd El-Latif Saleh El-Sebaay
(Ass. Professor. of Soil Sci., Fac. of Agric., Ain Shams Univ.)

Prof. Dr. Somaya Ahmed Hassanein
(Professor of Soil Sci., Soils, Water & Environment Res. Inst. ,ARC)

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Abstract

Mostafa Helmy El-sayed. Balance of some trace elements in soil and plant under polluted conditions. Unpublished Ph.D., University of Ain Shams, Faculty of Agriculture, Department of Soil Science, 1998.

Three pot experiments were carried out under controlled conditions. The first one was achieved using sand culture technique to investigate the phytotoxicity of Cd and Ni for both bean and barley plants. While the other two ones were performed under polluted conditions to assess and evaluate heavy metal accumulations (i.e., Cd and Ni) in soil and plant along with their distribution in different chemical fractions in the soil. Also, the bioavailability of the concerned elements for bean and barley plants as well as their balance with some nutrients in the plant tissue were taken into consideration.

Obtained results, of the first experiment, showed a reduction effect for elevating Cd or Ni concentration in the nutrient solution on the dry weight of both shoots and roots of bean and barley plants. When the reduction in the dry weight of both shoots and roots of bean and barley was about 20% of the control, as example, the concentration of Cd in the plant tissues was about 9 and 200 ppm for bean and about 3 and 13 ppm for barley, respectively. On the other hand, Ni concentration in the two plant parts versus 20% reduction in the dry weight was about 40 and 150 ppm for bean, and about 60 and 240 ppm for barley, respectively.

Results of the second experiment declared that reuse of wastewater in irrigation for different periods relatively increased the accumulation of Zn in soil followed by Pb, Cu, Ni and Cd, in turn. Most of Zn, Cu, Ni and Cd accumulations in the soil were associated with the

available, organic and carbonate fractions. Whereas, Pb available and organic fractions took an opposite trend.

Cadmium and Ni accumulations in bean and barley shoots generally decreased as the irrigation period with wastewater increased up to 76 yrs, despite the opposite trend was encountered at any period of irrigation when the Cd^{2+} or Ni^{2+} applied was increased. In addition, Cd or Ni accumulation in the plant tissue mostly correlated with their concentration in the different chemical fractions in the soil than the physical and chemical characteristics of the soil.

Elevating Zn or Cu concentration in the plant tissue, to a great extent, had a synergistic effect on the accumulation of Cd in the plant tissue, opposite to that found for Ni.

Finally, the obtained results of the third experiment, declared that elevating phosphorus concentration in the soil generally decreased the accumulation of Cd in barley shoots, whereas no clear effect was mostly found in bean. On the other hand, increasing the phosphorus applied to the soil had, to a great extent, no effect on the accumulation of Ni in both bean and barley shoots.

Key words :
Cadmium - Nickel - Zinc - Copper - Phosphorus - Pollution - Soil - Wastewater - Faba bean - Barley - Bioavailability - Phytotoxicity - Interaction.

CONTENTS

LIST OF TABLES