hossam maghraby

شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

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شبكة المعلومات الجامعية

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

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بالرسالة صفحات لم ترد بالأصل

BIOCHEMICAL STUDIES ON SOME ENVIRONMENTAL POLLUTANTS IN EGYPT

BY

SHREEN SAMY AHMED

B.Sc. Agricultural Biochemistry, Cairo University (1988)

THESIS

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Under supervision of

Prof. Adel Sayed Afify
Professor of Biochemistry
Biochemistry Department
Faculty of Agriculture
Cairo University

Prof. Somaya Ahmed Hassanein
Professor of Soil Science
Environment Research Department
Soils, Water and Environment
Research Institute
Agricultural Research Center

Department of Agricultural Biochemistry
Faculty of Agriculture
Cairo University

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APPROVAL SHEET

NAME: Shreen Samy Ahmed

TITLE: Biochemical Studies on Some Environmental Pollution in Egypt

Department: Agricultural Biochemistry, Faculty of Agriculture, Cairo University.

This thesis submitted for the M. Sc. degree has been approved by:

Prof. Dr. A. S. Afify .....

Prof. Dr. M. A. Abo El-Seoud

Prof. Dr. G. S. El-Bat

Committee in charge

Date: 2 / 9 / 2001

Name of Candidate: **Shreen Samy Ahmed** Degree: **MSc**

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Supervisors: **Prof. Adel Sayed Afify and Prof. Somaya Ahmed Hassanein**

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ABSTRACT

The present investigation was carried out at Soil, Water and Environment Research Institute (SWERI), Agricultural Research Center (ARC), Ministry of Agriculture and Land Reclamation (MOALR), Giza, Egypt, during the period 1998 to 2000. The main objectives of this study were 1- Soil pollution:- Evaluation of heavy metal contents in different polluted locations in (Abu Rawash soils). In this study, Abu-Rawash soils, which irrigated with wastewater, were chosen as example of agricultural polluted soil in Egypt. Soil samples were randomly collected from five different locations. At the same time, control soil which irrigated with well water was collected from the same location. It was found that there increases in EC values of polluted soils which irrigated with wastewater as compared with control soil, their levels were still below salinity levels. Cations, especially Ca^{2+} and Na^{+}, were relatively higher than Mg^{2+} and K^{+}. Also, anionic composition was conformed the following order $SO4^{2-} > HCO_3^{-} > Cl^{-}$, while carbonate anions did not detectable in any location of studied soils. Also, It was recorded that continuos irrigation with wastewater increased the soil contents of macronutrients (N, P and K), both total and available micronutrients i.e.; Fe, Mn, Zn and Cu and the availability of heavy metals. Levels of some elements determined in studied soil, including Pb, Ni, Co, Cd and Cr were higher than the maximum acceptable levels. In spite of some elements (Mn, Zn and Cu), their concentrations were relatively higher than of control, but their average values were below the maximum acceptable concentrations for production of healthy food in agriculture soils. 2- Plant pollution:- Effects of different concentrations (0, 0.5, 5, 20, 40, 60, 80, and 100 ppm) of lead and nickel salts on seed germination, botanical characters and chemical composition of faba bean (*Vicia faba* L.) variety Giza 2 and wheat (*Triticum aestivum* L.) variety Sids 1. It was found that significant decrease of seed germination of both plants with the increasing of either Pb or Ni concentration. Significant decrease of botanical characters (roots length, shoot length, leaf area, fresh weight and dries weight) with the increasing of either Pb or Ni concentrations have been observed. Macronutrients (N, P and K) were decreased with increasing the concentrations of both metals (Pb and Ni), especially in case of nickel. Decreased micronutrients (Mn, Zn, B) with increasing the concentrations of both metals (Pb and Ni), but data showed that treatments of heavy metals did not influence on iron contents of faba bean and wheat seedlings. Lead and nickel accumulation in both plants illustrated that:- The first group, heavy metals significantly increased by Pb and Ni treatments. Progressive accumulation of Ni and Pb in faba bean and wheat seedlings by Ni and Pb application have been observed, receptively. In addition, Cu content was increased under Pb and Ni stress. Second group, heavy metals significantly decreased by Pb and Ni applications, and this group included Cr alone. The third group, heavy metals did not changed their contents by Pb and Ni applications, and included Co, Cd. The crude protein was gradually depressed with increasing the concentrations of both metals (pb and Ni) also, the irrigation of faba bean and wheat plants with wastewater did not show apparent effects on native protein and protein subunits of both seeds. Under metals-stress significant decreases of total lipid and marked alterations of fatty acid composition were observed. It is obvious that total saturated fatty acids slightly increased as metal (lead or nickel) concentrations increased. On the contrary, total unsaturated fatty acids slightly decreased as metal concentrations increased. Total carbohydrate, soluble sugar, reducing sugar and non-reducing sugar contents were markedly accumulated in seedling leaves relative to control. Total chlorophyll contents of both plants (faba bean or wheat) were decreased with increasing heavy metal concentrations. Increasing the inhibition of catalase, peroxidase and amylase activities relative to control followed increases of heavy metal concentrations.

A. S. Afify

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Shreen Samy

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INTRODUCTION

I. INTRODUCTION

Pollution is known as the introduction by man into the environment of substances or energy liable to cause hazards to human health, harm to living resources and ecological systems, damage to structures or amenity, or interference with legitimate uses of the environment. Other definitions use the term contamination where the anthropogenic inputs do not appear to cause obvious harmful effects and pollution is applied only to situation where toxicity has occurred. In practice, the term contamination and pollution are frequently used interchangeably, although pollution is usually more pejorative.

Kinds of pollution are air pollution, water pollution, plant pollution, land pollution, noise pollution, industrial pollution, light pollution, radiation pollution, pesticide pollution and biology pollution. Contamination has already become relatively common and is likely to continue. It is the result of both geochemical processes and human activities metal-smelting industries, coal combustion, auto emission and application of commercial fertilizer, liming materials, sewage sludge, animal wastes and irrigation waters.

Dangerous substances refer to the harmful chemical and biological materials that may be present in the air we breathe, the food we eat, the water we drink, the clothes we wear, the drugs we take and other toxic material we come in contact with. Exposure to any toxic substance is particularly harmful to human being because they are often in contact with the dangerous substance for an extended period of time. Children are also at a greater risk from exposure because they are generally more sensitive to these substances. The injuries caused by long term exposure to these substances are often permanent. These injuries may include birth injury, damage to the brain or nervous system, and many types of cancer. Heavy

metals in the environment may present a more insidious problem than organic chemicals because they cannot be degraded to innocuous products, such as carbon dioxide and water. Since atmosphere transports metals very well, many plants in the natural environment have great variation in the concentration of heavy metals depending on their growth place. Heavy metals exert a board range of toxic effects. Elements such as cadmium and chromium are carcinogenic, other metals such as lead and mercury possess a wide spectrum of toxicity that includes neurotoxic, hepatotoxic, nephrotoxic, teratogenic or mutagenic effects. The toxic levels for man are Co 500, Cr 200, Cu 250, Fe 200, Mg 10-20, Ni 50, Pb 1 and Zn 150- 600 mg/day **(Bowen 1979)**.

Soils can be contaminated by these metals, which can then bioaccumulate in plants and animals eventually making their way humans by way of the food chain or contamination of drinking water. The availability of heavy metals in the soil to plants, the possible phytotoxic effects on crops, and food chain contamination are governed by different soil and plant related factors. High concentrations of heavy metals are toxic to most plants. Two causal relations may be seen between high metal ion concentrations in the rooting medium and the expression of toxicity symptoms. Heavy metals may interfere with other essential nutrients, for example by competition for uptake systems, and there by disturb the mineral nutrition of plant. After uptake and accumulation in plant tissues and cell compartments, heavy metal ions may impair the metabolism. Mechanisms of toxicity may operate by altering the permeability of cell membranes, by reacting with essential metabolites, or by replacing one another in enzymatic pathways and receptor protein. The majority of metals, when present at abnormally high available levels in solution or soil, can cause visible injury to plants, inhibit plant growth by damaging the roots, or can cause crop failure. Phytotoxicity and clastogenicity test in