

## ABSTRACT

**Impact of some industrial and agricultural activities on the ground water quality of Sadat city.** The objective of this work was to study the effect of some industrial and agricultural activities on the quality of groundwater, soil and plant in cultivated area surrounded the oxidation pond at Sadat City and their remediation. The obtained results can be summarized in the following::

1-salinity and hardness of groundwater increased with the maximal the summer season. Sodium dominated the soluble cations, whereas  $\text{Cl}^-$  dominated the soluble anions. Micronutrients were generally low. The increase in heavy metals reached their maximum in summer, indicating the following order  $\text{Ni} > \text{Pb} > \text{Cd}$ . High counts of pathogenic bacteria were recorded only in oxidation pond and lakes, while the studied wells are safe. Evaluation of groundwater wells for either drinking irrigation, discovered that the safety drinking water was only for well No. 5, while all wells were safe for irrigation.

2- Results of soil chemical and physical characteristics showed that the soil are mainly sandy soil and relatively high in salinity in the surface layers than the subsurface ones. Data of available micronutrients and heavy metals showed some contamination with Mn, Cd, Ni and Pb. This contamination was in turn reflected in plant tissues in high values.

3- Phytoremediation experiment.- A pot experiment was carried out using five selected plant species i.e. a- ornamental plants ( Dimorphotheca, Salvia Rose and salvia Blue). b-Fiber plants (Flax strain 5 and Flax strain 8) which can be used to remove heavy metals i.e., Cd, Ni and Pb. Seeds of plants were sown in sandy soil collected from site near oxidation pond which contaminated with heavy metals and irrigated with sewage water. Plant were harvested after 180 days and separate into roots, shoots and flower or seeds, then digested and analyzed for Cd, Ni and Pb.. The obtained results could be summarized as flow: The uptake of heavy metals by ornamental plants arrange in the following order Salvia rose > dimorphotheca > salvia blue, while in flax varieties arranged in the following order flax strain 5 > flax strain 8 . The uptake of Ni by all plant species is greater than (Cd and Pb) and were exceeded than the permissible in soil and water sewage effluent. The accumulation of elements depended on plant species. specific heavy metals it self and the content of these elements in the soil and water.

| CONTENTS                                              | Page |
|-------------------------------------------------------|------|
| INTRODUCTION                                          | 1    |
| REVIEW OF LITERATURE                                  | 4    |
| I. Industrial activities effects.....                 | 5    |
| I.1. On irrigation water.....                         | 5    |
| I.2. Industrial activities effects on soil.....       | 7    |
| I.3. Industrial activities effects on plant.....      | 9    |
| II. Agricultural activities effects.....              | 11   |
| II.1. Using of industrial waste water for irrigation. | 11   |
| II.2. Irrigation with sewage water.....               | 13   |
| II.3. Fertilizers effects on soil and plant.....      | 14   |
| II.4. Pesticides effects on soil and plants..         | 16   |
| III. Phytoremediation.....                            | 18   |
| <b>MATERIALS AND METHODS</b>                          | 20   |
| I. Field work                                         | 20   |
| I.a. Locations.....                                   | 20   |
| I.b. Sampling.....                                    | 21   |
| I.c. Preparation of samples.....                      | 21   |
| II. Phytoremediation experiment.....                  | 23   |
| III. Method of analysis.....                          | 24   |
| III.1 Water analysis.....                             | 24   |
| III.2. Soil analysis.....                             | 25   |
| III.3. plant analysis.....                            | 26   |
| RESULTS AND DISCUSSIONS                               | 28   |
| 1.Chemistry of water samples .....                    | 28   |
| 2.Micro nutrients and heavy metals.....               | 38   |

| CONTENTS                                                                                           | Page |
|----------------------------------------------------------------------------------------------------|------|
| 3.Biological and chemical Oxygen demand.....                                                       | 44   |
| 4.Bacteriological characteristics.....                                                             | 45   |
| 5. Evaluation of groundwater for various uses.....                                                 | 47   |
| 5.1 Drinking.....                                                                                  | 47   |
| 5.2. Irrigation.....                                                                               | 48   |
| 6. Some characteristics of soils as affected by different activities.....                          | 52   |
| 6.1. Chemical and physical characteristics.....                                                    | 52   |
| 6.2. Total and available content of metals and non metal ion in soils.....                         | 55   |
| 6.2.a. Micronutritive metals Fe,Mn and Zn.....                                                     | 59   |
| 6.2.b. Non-nutritive heavy metals Cd,Ni and Pb                                                     | 64   |
| 7. Accumulation of micronutrients and heavy metals in some growing plants in the tested soils..... | 75   |
| 8. Phytoremediation experiment .....                                                               | 78   |
| 8.1. Dry weight of tested plants as affected by soil polluted.....                                 | 78   |
| 8.2. Concentration of heavy metals in plant tissues                                                | 78   |
| 8.3. Heavy metals uptake by different plant species.                                               | 80   |
| Summary                                                                                            | 83   |
| References                                                                                         | 89   |
| Arabic summary                                                                                     |      |