

EFFECT OF LONG-TERM STRESS WITH HEAVY METALS COMBINATIONS ON GROWTH AND CHEMICAL COMPOSITION OF SOME ORNAMENTAL SHRUBS

I. EFFECT ON VEGETATIVE AND ROOT GROWTH

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ABSTRACT

Four separated pot experiments were carried out in the open field at the Experimental Station of Vegetable and Floriculture Department, Faculty of Agriculture, Mansoura University during the two successive seasons of 2006/2007 and 2007/2008, as each season contained two periods of growth, to find out the response of six-months-old transplants of *Acalypha wilkesiana* Müll. Arg., *Asclepias curassavica* L., *Dodonaea viscosa* (L.) Jacq. and *Tabernaemontana divaricata* (L.) R. Br. ex Roem & Schult. to long-term stress of lead (Pb), cadmium (Cd) and nickel (Ni) combinations added as thawing acetate salts to the soil mixture at the rates of 00.00 ppm for each metal as a control, 500 ppm Pb + 50 ppm Cd + 25 ppm Ni for treatment number one (T₁) and 2-, 3-, 4- and 5-fold of these concentrations for treatments number two (T₂), three (T₃), four (T₄) and five (T₅), respectively. Planting was in 25-cm-diameter black polyethylene bags filled with 3 Kg of a mixture of sand and loam at 1:1 (v/v).

The obtained results indicated that no mortality was observed among *Acalypha* and *Asclepias* transplants, as they recorded 100% survival during the two periods of growth in the two seasons, but in case of *Tabernaemontana* and *Dodonaea* transplants, such parameter was reduced, especially for the transplants which were exposed to T₄ and T₅ combinations in the second period of growth. However, survival % of *Tabernaemontana* transplants was higher than that of *Dodonaea*. In general, top and root growth of the four shrubs was declined with various significant differences, specially with prolonging growth period under high level of toxic elements, except for *Acalypha* transplants which gave longer roots than those of control transplants under low and medium concentrations of heavy metals (T₁, T₂ and T₃). However, under high concentrations (T₄ and T₅), the length of their roots was quite similar to that of control. So, it gave the highest pollution resistance index percentage (PRI %) compared to the other shrubs.

In brief, according to the aforementioned results (in particular survival % and PRI %), ornamental shrubs undergo long-term stress of Pb, Cd and Ni combinations under conditions of the present work should be arranged in the following descending order: *Acalypha wilkesiana* > *Asclepias curassavica* > *Tabernaemontana divaricata* > *Dodonaea viscosa*.

INTRODUCTION

Air, soil and water pollution with some toxic metals, as an ever growing crisis in different parts of the world, is still the most serious problem all over the world. It is difficult to solve the problem completely, but we can only reduce the excessive increment in these toxic pollutants and protect the environments from their hazards through planting more ornamental plants, which are not food chain crops. Among shrubs may serve in this concern, Jacob's coat, blood flower, hop bush and crepe jasmine ornamental shrubs.