

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

II. EFFECT ON CHEMICAL COMPOSITION

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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 of 2006/2007 and 2007/2008 seasons, as each season contained two periods of growth, to detect the effect of long-term stress with lead (Pb), cadmium (Cd) and nickel (Ni) added in combinations as thawing acetate salts to the soil mixture at six rates on chemical composition 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. grown in 25-cm-diameter black polyethylene bags filled with 3 Kg of a mixture composed of sand and loam at 1:1 (v/v). The chemical analysis of the studied shrubs was conducted two times in the second season only; i.e. at the terminal of October 2007 (first growth period), as well as at the end of October 2008 (second growth period).

The obtained results indicated that chlorophylls a and b, carotenoids, total carbohydrates, N, P and K contents in the leaves of all studied shrubs were progressively decreased with increasing heavy metal concentrations to reach the minimum values in transplants subjected to the highest level of toxic metals with highly significant differences compared to the means of unpolluted ones in most cases of the two periods of growth. An exception was only obtained for transplants treated with the lowest level of heavy metals, as all previous constituents were slightly increased in the leaves of both *Acalypha* and *Asclepias* transplants, while in *Tabernaemontana* and *Dodonaea* transplants many of them were increased and many others were decreased. In general, prolonging the period of subjecting to the toxic metals stress caused a gradual decrement in the content of aforementioned constituents.

On the other hand, a progressive increase was noticed in the content of Pb, Cd and Ni in the leaves and roots of the four used shrubs with elevating heavy metals concentrations. Moreover, the content of such metals was higher in the roots than in the leaves, and in the second growth period than in the first one. So, the highest content of them was observed in the roots of transplants polluted with the highest level in the second period of growth.

From the above mentioned results, it could be recommended to use *Acalypha wilkesiana* and *Asclepias curassavica* transplants to landscape areas suffering from Pb, Cd and Ni pollution, as they absorbed the highest amounts of these metals under the conditions of the present study, followed by *Tabernaemontana divaricata* then *Dodonaea viscosa*.

INTRODUCTION

Some of ornamental shrubs widely used for landscaping and gardening are sensitive to heavy metals toxicity. Among them may be the