

Effect of Adding Compost or Loam to The Sandy Soil on Helping (*Murraya paniculata* L.) Jack Plants to Overcome the Toxicity of Some Heavy Metals

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ABSTRACT

Two pot experiments were conducted in the open field at the Experimental Farm of Hort. Res. Inst., Giza, Egypt during 2008 and 2009 seasons to detect the role of application of either compost or loam to sandy soil at the rate of 20% (by volume) in reducing the deleterious effects of lead (Pb), cadmium (Cd) and nickel (Ni) combinations at concentrations of 00.00 ppm for each metal (as a control) (T₁), 500 ppm Pb + 50 ppm Cd + 25 ppm Ni as treatment number two (T₂), and 3-and 5-fold of these concentrations for treatments numbers three (T₃) and (T₄), respectively on the growth and chemical composition of one-year-old (*Murraya paniculata* L.) Jack plants grown in 20-cm-diameter black polyethylene bags filled with 2.5 kg of each of the soil mixtures mentioned above.

The obtained results indicated that survival (%) and vegetative and root growth were progressively decreased in the two seasons with increasing heavy metals concentration, while were improved in response to addition of either compost or loam with the superiority of compost treatment, which gave the highest means in both seasons. Root length, however was significantly reduced in response to either heavy metals treatments or compost. A gradual decrement in the percent of pollution resistance index (PRI %) was also noticed with elevating heavy metals level, but application of either compost or loam greatly improved this parameter. Chlorophyll a, b and carotenoids content in the leaves were cumulatively decreased as the rates of heavy metals were increased, while the contents of Pb, Cd and Ni in the leaves and roots were augmentatively increased. Supporting the sand with either compost or loam markedly decreased the content of Pb, Cd and Ni in the leaves and roots. The mastership in all previous measurements was due to compost treatment.

So, it could be recommended to supply a polluted sandy soil with 20% of compost (by volume) to minimize the harmful effects of heavy metals and improve growth and quality of (*Murraya paniculata* L.) Jack transplants grown in such type of soil.

Key words: *compost, loam, toxicity, Murraya paniculata*

INTRODUCTION

Many ornamental shrubs are widely used for landscaping and gardening due to their attractive shape, regular form and fragrant flowers. Among these shrubs may be (*Murraya paniculata* L.) Jack (formerly *M. exotica* L.) orange jasmine, satinwood, cosmetic barks shrub or Chinese box. Fam Rutaceae. It is a shrubs or small tree up to 10-12 ft.; leaves odd-pinnate, leaflets 3-9 ovate, rhombic ovate to obovate, glossy; flowers white and fragrant; cultivated widely in tropics as ornamental, blooms several times a year (Bailey, 1976).

However, heavy metals pollution, as an ever growing crisis in different parts of the world, is still the most serious problem that needs a quick solvent, which may involve planting some ornamentals, which are considered not food chain crops, to reduce metals toxicity and protecting the environment from hazards of these metals. In this connection, Shahin *et al.*, (2002) found that *Salvia splendens* plants are more tolerant to Pd, Cd and Hg toxicity than *Vinca rosea* plants, although high concentrations of such metals reduced top and root growth, delayed flowering and depressed floret diameter and stalk length. Chlorophylls a and b

content in the leaves of both plants was also decreased, while carotenoids content in as well as Pb, Cd and Hg content in the leaves and roots were greatly increased.

On the same line, were those results attained by Bush *et al.*, (2003) on *Betula nigra* and *Ulmus parvifolia*, Laypheng *et al.*, (2004) on *Bougainvillea spectabilis*, *Ixora coccinea* and *Heleconia sp.*, (Shahin and El-Malt 2006) on sant, oak and Shahin *et al.*, (2007) on *Matthiola incana* and *Dimorphothica ecklonis*. Also, (Abdalla and Mahmoud 2008) stated that *Acalypha wilkesiana* plants are better than *Asclepias curassavica*, *Tabernaemontana divarigata* and *Dodonaea viscosa* ones for landscaping contaminated soils with Pb, Cd and Ni metals, as it gave higher percentages of survival and pollution resistance index.

On the other hand, growing plants in the polluted sandy soil subject them to higher stress of toxic pollutants, but this could be minimized by the addition of either loam or organic matter which chelates such pollutants and make them unavailable for plants. Moreover, compost improves soil structure, porosity, water holding and soil fertility (Erhart and Hartl, 2006). In this regard, (Patra and Bhowmike2006) mentioned that metal sequestration