PHYTOREMEDIATION POTENTIAL OF *BRASSICA JUNCEA* L. FOR HEAVY METALS POLLUTED SOIL IN EL – GABAL EL – ASFAR REGION.

By

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B. Sc. Agric. Sc. (Horticulture), Ain Shams University, 2006.

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ABSTRACT

Ali Said Mohamed Abo Al –Nagaa: Phytoremediation Potential of *Brassica Juncea* L. for Heavy Metals Polluted Soil in El–Gabal El–Asfar Region. Unpublished M.Sc. Thesis, Department of Agricultural Botany, Faculty of Agriculture, University of Ain Shams, 2012.

The results of this study revealed that spraying Indian mustard plants with humic aicd irrigated with treated water in presence of magnetic iron achieved an increase in root length, plant height and number of leaves to be significantly higher than EDTA treatment without magnetic iron. It also activated dry matter production for root and shoot. Furthermore, such behavior reflected itself on yield production not only above EDTA without magnetic iron, but also in the presence of magnetic iron to be significantly higher in terms of number of pods, their weights and weight of 100 seeds. At the same time, increased oil percentage to surpass that attained by EDTA treatment without magnetic iron Although less than that of EDTA treated with MI yet, higher than that attained with humic in presence of magnetic iron.

The repeation of cultivation with the same treatment in presence of magnetic iron induced high total amounts of N, P and K for shoot against the 1st season. Also, it increased shoot and root micronutrients. Whereas, it differed for heavy metals and Na. These results are in accordance with the soil analysis of these treatments. Since N, P and K as well micronutrients in presence of magnetic iron decreased with the repeation of cultivation of Indian mustard plants, meanwhile heavy metals and Na still higher in the soil. So, it may be discussed on the role of magnetic iron in preventing the uptake of heavy metals as well Na by mustard plants. Thus, it is obvious the beneficial effect of magnetic iron in preventing the deleterious effect of heavy metals and Na to induce healthy seeds.
Keywords: *Brassica juncea*, Phytoremediation, Heavy metals, EDTA, Sulfur, Humic acid, citric acid, Spermidine and Magnetic iron.

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INTRODUCTION

Water scarcity is projected to become an important determinant for agricultural production and food security worldwide, particularly in arid and semi-arid regions, where one-sixth of the world population lives (World Bank, 1999; UNDP, 2007). The upcoming challenge of global climate changes are further adding to the deteriorating situation of water shortage (FAO and IFAD, 2006; Geissler *et al*., 2010). As a consequence of increasing competition over limited water resources, agriculture (dominant user, accounting for about 80% of global water use) is inevitably forced to utilize marginal or sewage water (treated or even untreated) to meet the increasing demands.

Although disposal of wastewater to crop irrigation is as ancient as humankind's cultivation of land, large-scale controlled waste water utilization for irrigation dates only back to last century when so-called sewage farms were established for the purpose of disposing of waste water to prevent river pollution. Estimates on wastewater utilization indicate that about 20 million hectares of agricultural land is irrigated with (treated and untreated) wastewater in around 50 countries worldwide (Bartone and Arlosoroff, 1987). When used properly, this approach is reliable and coast effective with substantial benefits for soil and water resources management as well as plant growth and yields due to its nutrient contents (Sadek and Sawy, 1989; Peterson *et al*., 1994; Pradhan *et al*., 2001; Abd-Elfattah *et al*., 2002). However, it can lead to the accumulation of phytotoxic levels of heavy metals in soils and plant tissues, especially when untreated water is used for crop irrigation (Lutric *et al*., 1982; Eid, 1984; McBride *et al*., 1999; Bansal, 2004; Kafeel *et al*., 2011). Therefore, this poses a great potential threat to the environment and human health.

In Egypt, the use of sewage effluent for irrigation has been practiced more than 100 years ago. The first tree plantation, originally of 200 ha, utilizing treated sewage water in El-Gabal El-Asfar farm (about 30 km from Cairo) was established in 1911 to dispose of the city