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Assessment of Treated Waste Water from Oil Refinery on Soil, Fruit and Tree Quality, El Obied North Kordofan State, Sudan

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Abstract

Effects of irrigation with treated waste water from oil refinery on accumulation of elements in the soil, fruit, leaves and roots of *Citrus aurantifolia*, *Moringa oleifera* and *Psidium guajava* was investigated. Two methods of treatments (lagoon and sand basin filter) were compared with fresh water. Elements (Ag, Al, As, Ba, Be, Cd, Co, Cr, Cu, Fe, Li, Mn, Mo, Ni, P, Pb, Sb, Se, Sr, Ti, V, and Zn) load in treated waste water was not significantly different from fresh water and lower than the permissible limits prescribed by World Health Organisation. However, content of soluble Ca++, K+, Mg++, Na^+ and Si was significantly higher than that reported in fresh water. Irrigation with treated waste water has resulted in significantly higher soil content of As, Ba, Ca++, K+, Mg++, Na^+ and Si(8.37, 49, 666, 1217, 821, 311.3, 61368 ppm, respectively) as compared to fresh water (02.08, 41, 800, 1058, 1305, 370.7, 23862 ppm, respectively). Generally, the content of elements such as As, Ni, Ba, Fe, Cu, Cr and Pb was significantly higher in the different parts of Morringa irrigated with treated waste water. Also, the content of Ba, Si, Li, Zn, Cu, Fe, Ti, V and Pb was significantly higher in the different parts of Citrus irrigated with treated waste water Similarly, the concentration of Ba, P, Pb, Sr, Zn, Li, Si, Ni and Al was significantly higher in the root, leaves and fruits of Psidium irrigated with treated waste water.

We conclud that (1) with the exception of slight to moderate salinity (EC of 1.39–1.5 dSm^{-1}), treated waste water could be reused for irrigation of plants (2) production activities at the refinery site have introduced lots of heavy metals in the soil due to air pollution (e.g. Al, Ba, Fe, Zn, P and Li) of 10711.6, 49, 8323, 65, 81and 6.4 ppm, respectively as compared to control samples (1.56, 25.5, 1.19, 10.7, 57.9 and 3.9) ppm respectively and (3)plants varied widely in their resistance to soil contamination where *Moringa* showed higher capacity for accumulation of metals and could therefore be used for bioremediation of soil pollution with heavy metals.

Keywords: Heavy metals, loads, oil refinery, soil, trees, waste water

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