Treated municipal wastewater for irrigation: effect on turnip
(\textit{Brassica rapa})

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\textbf{ABSTRACT}

A study was conducted to explore the possibility of using treated municipal wastewater to grow turnip (\textit{Brassica rapa}). Two aspects namely (1) effect on plant growth and (2) accumulation of Cd, Cr, Ni, Fe, Cu, Mn and Zn in leaves and roots of the plant have been presented in this paper. The heavy metal concentration of wastewater used for irrigation was within the limits however, the concentration in the plant parts showed a significant rise due to continuous use. The levels of all the heavy metals except Mn in the edible plant parts (leaves and roots) were estimated to be more than the toxic limits given by Pendias and Pendias. The concentration of heavy metals was at excessive levels in 40 and 55 days after sowing (DAS), while at 70 DAS, metal concentration was low. Concentration of heavy metals in plants was found in the order of Fe > Zn > Ni > Mn > Cr > Cu > Cd.

\textit{Keywords:} Wastewater irrigation; Heavy metals; Turnip

1. Introduction

Agriculture is the greatest user of water all over the world. The water consumption for crop irrigation amounts to 70% and in some cases 90% of the world water requirements [1]. In view of the irrigation water shortage faced in many countries, wastewater reuse constitutes an alternative source of irrigation water [2]. The application of treated wastewater for agricultural purposes has been evaluated as the most convenient recycling option for environmental and economic reasons. In many countries, huge quantities of reclaimed water are produced from the wastewater treatment processes. This wastewater is not only a source of irrigation water, but it is also a carrier of significant quantities of macro and micro nutrients and organic matter. However, apart from these benefits, wastewater pollution by trace metals and toxic organic contaminants must also be taken into account. The irrigation water quality has been shown to affect soils, crops, food quality, safety [3] and the management of water [4]. Industrial and domestic effluents are either used or disposed off on land for irrigation purposes that create both opportunities and problems. The main concerns are the risk due to pathogens, heavy metals and other chemicals that may be present in the wastewater [5]. The treated municipal wastewater is basically a carrier of plant nutrients (N, P, K, S, etc.) and generally has low levels of heavy metals [6].

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