

Phytochemicals Quatification, Trace Metal Accumulation Pattern and Contamination Risk Assessment of Different Variety of Tomatoes Cultivated on Municipal Waste Sludge Treated Soil

Authors : Mathodzi Nditsheni, Olawole Emmanuel Aina, Joshua Oluwole Olowoyo

Abstract : The ever-increasing world population is putting extreme pressure on the already limited agricultural resources for food production. Different soil enhancers were introduced by famers to meet the need of the ever-increasing population demand for food. One of the soil enhancers is the municipal waste sludge. This research investigated the differences in the concentrations of trace metals and levels of phytochemicals in four different tomato varieties cultivated on soil treated with municipal waste sludge in Pretoria, South Africa. Fruits were harvested at maturity and analyzed for trace metals and phytochemicals contents using Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES) and a High-Performance Liquid Chromatography (HPLC) respectively. A one-way analysis of variance (ANOVA) was used to determine the differences in the concentrations of trace metals and phytochemical from different tomato varieties were significant. From the study, Rodade tomato bioaccumulated the highest concentrations of Mn, Cr, Cu and Ni, Roma bioaccumulated the highest concentrations of, Cd, Fe and Pb while Heinz bioaccumulated the highest concentrations of As and Zn. Cherry tomato on the other hand, recorded the lowest concentrations for most metals, Cd, Cr, Cu, Mn, Ni, Pb and Zn. The results of the study further showed that phenolic and flavonoids content were higher in the *Solanum lycopersicum* fruit grown in soils treated with municipal waste sludge. The study also showed that there was an inverse relationship between the levels of trace metals and phytochemicals. The calculated contamination factor values of trace metals like Cr, Cu, Pb and Zn were above the safe value of 1 which indicated that the tomato fruits may be unsafe for human consumption. However, the contamination factor values for the remaining trace metals were well below the safe value of 1. From the results obtained either for the control group or the treatment, the tomato varieties used in the study, bioaccumulated the toxic trace metals in their fruits and some of the values obtained were higher than the acceptable limit, which may then imply that the varieties of tomato used in this study bio accumulated the toxic trace metals from the soil, hence care should be taken when these tomato varieties are either cultivated or harvested from polluted areas

Keywords : trace metals, flavonoids, phenolics, waste sludge, tomato, contamination factors

Conference Title : ICAACS 2023 : International Conference on Agriculture, Agronomy and Crop Sciences

Conference Location : New York, United States

Conference Dates : July 06-07, 2023