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The impact on gut microbiota and bio accessibility of heavy metals and hormones from potato irrigated with wastewater by using in vitro gastrointestinal batch fermentation

Harmanjot Kaur
McGill University, Canada

In many parts of the world, water scarcity is problematic. Therefore, irrigation with waste water has become a crucial option to overcome the expansion of population, globally. However, the reuse of wastewater can introduce several of contaminants; inorganic (heavy metals) and organic pollutants (hormones and pharmaceuticals) to soil. Consequently, the uptake of plants can take place and cause serious health concerns to human after consumption. The goal of this study is to evaluate the safe consumption of potato irrigated with wastewater on human health by using batch cultural fermentation of intestinal microbiota. Lysimeter study was conducted to grow russet potato using wastewater for irrigation. Two soil amendments namely, biochar and superabsorbent polymers (SAP) have been applied to soil aiming to increase the production of crop while reducing the uptake of heavy metals and hormones presented in the wastewater. After harvesting, potatoes are collected, washed, cooked (boiled) and freeze dried. Cooked freeze dried potato was introduced to the fermenters and then samples was taken from fermenters at 0, 12, 24, 36, 48 and 72 hours. Heavy metals (Cd, Pb, Cu, Fe, Zn and Cr) were also measured. Additionally, the biotransformation of polyphenols and the residues of organic contaminants such as hormones (Estrone, 17 Bestradiol, Progesterone and Estriol) will be quantified as well. The microbial population was monitored by SCFA and microbial plate count of Lactobacillus sp. The extent of the bioaccessibility of heavy metals is crucial factor and could have serious implications on human health. Our experiment will give more insights on the safe use of crops irrigated with wastewater and the evaluation of the risk associated with human consumption of such crops.

harmanjot.khaira@mail.mcgill.ca