

Characterization of some selected compost samples for the presence of microplastics and heavy metals associated with them

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Microplastics are ubiquitous in terrestrial environments as land-based sources mainly contribute to their origin. Mismanagement of solid waste can contribute to heavy loads of microplastics, which is of serious concern in Sri Lanka. The current study focuses on assessing the abundance and characteristics of microplastics from urban compost as an entry route for microplastics into the soil. Compost samples were taken from Karadiyana, Muthurajawela, and Kalutara municipal solid waste dumpsites. Microplastics were extracted in triplicates from 100 g of compost using saturated NaCl solution and sieved from 1 mm mesh size and wet peroxide digestion was carried out to remove organic matter. Microplastics were characterized based on shape, size, color, and the polymer identified using Fourier Transformation Infrared spectroscopy (FTIR). Associated trace metals were analyzed using Microwave plasma atomic emission spectrometer (MP-AES), subsequent to acid digestion procedures. The most abundant microplastics fraction in compost was polyethylene fragments in size range of 2-5 mm formed due to the breakdown of plastic materials present in the

municipal solid waste. The abundance of microplastics in compost was 400, 360 and 410 particles kg^{-1} in Karadiyana, Kalutara, and Muthurajawela, respectively. Compared to other locations, Muthurajawela microplastics had significantly higher levels of heavy metal at concentrations of 1856, 238, 194, 406, 24 and 60 $\mu\text{g g}^{-1}$ for Zn, Cd, Cu, Ni, Pb and Cr, respectively. Heavy metal concentration of microplastics in Karadiyana compost samples were in the range of 32, 20, 4 $\mu\text{g g}^{-1}$ for Zn, Cu, Pb and Cr and for Kalutara samples 17, 4 and 8 $\mu\text{g g}^{-1}$ for Cu, Pb and Cr respectively. Muthurajawela soil is acidic due to the saline peat bog and therefore heavy metal leaching is very high. Municipal solid waste compost is vulnerable to terrestrial and aquatic -microplastics upon their application in agricultural purposes. The associated heavy metals in microplastics pose a greater risk as vectors for transferring trace elements along the food chain and bioaccumulating them in higher trophic levels.

Keywords: Plastic, Marine pollution, Solid waste management, Landfill, Leach

Bio-assay Guided Screening of Antioxidant Activity and Acetylcholinesterase Inhibitory Activity of fruit pulp of *Musa balbisiana* ABB

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A non-communicable disease, Alzheimer's disease (AD) is the most prevailing progressive and irreversible neurological brain disorder among the elderly community. Although the precise cause for AD is still uncertain, acetylcholinesterase (AChE) inhibitors

and antioxidants have been used to treat Alzheimer's patients. A recent study on evaluation of antioxidant activity and AChE inhibitory activity of aqueous, ethanol, ethyl acetate and hexane extracts of nearly three month old fruit pulps of three most abundant banana species

commonly name as sour banana, sugar banana and 'anamalu' grown in Sri Lanka demonstrated that the ethanol extract of sour banana, *Musa balbisiana* ABB (Family: Musaceae) had the highest AChE inhibitory activity. Therefore, this study was focused on the bio-assay guided screening of potent antioxidants and AChE inhibitors from the ethanol extract of the fruit pulp of *Musa balbisiana* ABB with the intension to eventually isolate potential antioxidants and AChE inhibitors. Nearly three month old chopped fruit pulp of *Musa balbisiana* ABB were subjected to Soxhlet extraction using methanol as a solvent. Excess solvent was distilled off and the resulted ethanol extract was subjected to flash column chromatography using silica as the stationary phase with wet loading and a 1:1 mixture of ethyl acetate and methanol as the mobile phase. After carrying out thin layer chromatographic analysis for each eluate, fractions with similar retention factor was combined to obtain seven samples. The antioxidant activities and AChE inhibitory activities of seven major fractions and the crude ethanol extract were evaluated using 2, 2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay and Ellman's colorimetric assay, respectively. Ascorbic acid

and donepezil were used as the standard compounds in DPPH assay and Ellman's assay, respectively. Among the seven combined fractions analysed, the fourth fraction exhibits the lowest IC_{50} value of $176.90 \pm 0.66 \text{ mg L}^{-1}$ representing the highest antioxidant activity for DPPH assay and the fifth fraction demonstrates the lowest IC_{50} value of $26.53 \pm 0.59 \text{ mg L}^{-1}$ signifying the highest AChE inhibitory activity for Ellman's assay. The highest IC_{50} values that demonstrates the lowest activities belongs to the first fraction and the fourth fraction for DPPH assay and Ellman's assay, respectively. In conclusion, the ethanol extract of *Musa balbisiana* ABB constitutes of potential AChE inhibitors as well as antioxidants. Therefore, *Musa balbisiana* ABB can be used as an edible source of promising antioxidants and AChE inhibitors. Bio-assay guided isolation of potential natural AChE inhibitors and antioxidants is currently underway with an intension of developing a nutraceutical/pharmaceutical agent targeting the management of AD.

Keywords: Bio-assay guided screening, Antioxidant activity, Acetylcholinesterase inhibitory activity, *Musa balbisiana* ABB

Abstract No: TO 4

Effect of Cooking on Antioxidant Properties of Selected Traditional Rice Varieties

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Rice (*Oryza sativa* L.) is the staple food for Sri Lankans. Currently over 300 different Sri Lankan traditional rice varieties are grown under all agro-climatic conditions in Yala and Maha seasons. Recent researches conducted have shown that traditional rice varieties contain naturally occurring antioxidant compounds. Present study evaluates the antioxidant properties of selected raw and cooked traditional rice varieties namely Suduheenati, Masuran, Rathdel and Kahawanu and the effect of cooking on the antioxidant properties of rice. Total phenolic content (TPC) was determined by the Folin-Ciocalteu method using gallic

acid as the standard. The antioxidant potential was evaluated using 1,1-diphenyl-2-picryl-hydrazyl (DPPH) radical scavenging and ferric reducing antioxidant power (FRAP) assays using ascorbic acid as the standard. Mean TPC, DPPH and FRAP of raw rice flour were in the range of 3.9-6.8 mg Gallic Acid Equivalents (GAE) /g, 4.7-6.9 mg Ascorbic acid Equivalents (AE) /100g and 11.3-13.3 mg AE /100g respectively. Mean TPC, DPPH and FRAP of cooked rice flour were in the range of 3.3-6.3 mg GAE /g, 4.5-6.7 mg AE /100g and 10.9-12.9 mg AE /100g respectively. Mean TPC, DPPH and FRAP of freshly cooked rice were in the range of 1.1- 2.0