Assessment of Microplastic Contamination in Upland Vegetable Cultivation System of Sri Lanka

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Microplastics are an emerging contaminant in the environment as it threatens the living creatures in aquatic as well as terrestrial environments. There are increasing number of evidence of accumulating microplastic contaminants in the world, especially in agricultural lands. However, evidence of microplastic pollution in agricultural soils of Sri Lanka are rare; therefore, this study was conducted to assess the microplastic contamination in five fields of upland vegetable cultivation systems of Sri Lanka. Soil samples were collected from five fields; two locations at Meewatura Experimental Station of University of Peradeniya, Gannoruwa Field Experimental Station, a farmland in Doragala, and a farmland in Nuwara Eliya, where there is a history of plastic mulch usage. The soil samples were taken from 0-5 cm and 5-10 cm depth layers and all general chemical and physical parameters were tested. Microplastic analysis was done by digesting the soil using H_2O_2 solution, and density separation with NaCl solution. The extracted microplastics were counted under a light microscope, pictures were taken to record shape factors, and weighted using analytical balance. The results revealed that the number of microplastic particles in fields were ranging from 2,550±70.8 to 5,800±424 particles kg^{-1} of soil and Nuwara Eliya strawberry cultivation field had significantly higher number though there was no significant difference between depth layers. The microscopic analysis showed that fragment particles were dominant in Meewatura field (50-70%) while filament particles were greater in other fields. Black, transparent and blue color microplastics were dominant over other colors such as red, yellow, purple, and white. The estimated plastic contamination levels were comparable to reported values in agricultural fields of other countries. In conclusion, the preliminary research revealed that the assessed fields of upland agricultural cultivation system of Sri Lanka are contaminated by microplastics that could have been originated from plastics utilities, agro-inputs and runoff flow into agricultural fields.

Keywords: Microplastic, Soil contamination, Upland vegetable system

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