



Measuring Pattern and Material Identification of General Plastic Particle in Soil By Sieving-Deposition Method

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Abstract

The pollution of microplastics (MPs) has been threatening both of soil ecological sustainability and crop food safety in Taiwan. It is an urgent issue to delineate the pollution of MPs in Taiwan farmland and to propose the monitoring practices and regulation controls. The objectives of the proposal are (1) to develop a quantitative analysis process for measurement of soil MPs, (2) to investigate the variations in particle size fractions of MPs in different soils, and (3) to investigate the distribution of MPs in Taiwan farmlands. In this year, two agricultural soils of Taiwan were spiked with PP and LDPE MPs in three particle size levels (5-2 、 2-0.15 、 0.15-0.053 mm), respectively. Soil incubation was carried out for two weeks to engage with MPs. One used a sequential process of flotation, separation, and sieving to extract MPs, stereo and fluorescence microscopies and ATR-FTIR to identify MPs, and weighting to measure extractable MPs. Then assessments of efficiency and restriction for the sequential process used to measure different particle sizes microplastics in soil have been conducted. The results showed that the recoveries of MPs extracted from soil were dependent on the particle size levels. Higher than 97% of the MPs in the particle size levels of 5-2 and 2-0.15 mm were extractable, but in the particle level of 0.15-0.053 mm, more than 90% of PP MPs and less than 70% of LDPE MPs were extractable. Moreover, according to the identify by using stereo and fluorescence microscopies, the low recovery of MPs in the particle level of 0.15-0.053 mm would be due to that soil materials (i.e. clay or organic matter) are coating on particle surfaces of MPs. That is, the MPs particles would precipitate with soil in the flotation and then were unextractable.

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