Quantification of Macroplastic Litter in Greenhouse Farmlands: Case Study in Southeastern Hungary

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Greenhouse farming has become widespread worldwide because of its contributions to various agricultural products. Extensive greenhouse farming generates plastic waste in large quantities and pollutes farmlands. Contrary to microplastics, few studies have quantified macroplastic contamination in agricultural farmlands despite its contribution in the production of microplastics because fragmentation. Thus, there is a paucity of knowledge on the level and characteristics of macroplastics in the greenhouse environment. This study quantified and examined the macroplastic litter contaminations on the soil surface under greenhouse farmlands. Systematic random sampling was used to select the sampling points. The collected macroplastics were cleaned using tap water. Subsequently, the macroplastics were separated, counted, and measured based on polymer composition, size, shape, and color. The polymer compositions were confirmed using the Raman spectroscopic analysis. The overall mean abundance was 431 pieces/ ha in terms of number and 6kg/ha in weight. However, the result showed that agricultural litter comprised 90% of the total contamination, while non-agricultural litter comprised of 10% of the total litter in the entire area. Polyethylene and polyvinyl chloride were the dominant plastic structures, and the dominant sizes were 1–5 and 0.5–1.0 cm, respectively. Film and fragment were the major structures found. Given that macroplastics were found in the greenhouse farmlands, we recommend the followings: Careful cleaning and disposal of plastics on greenhouse farmland; prevention of greenhouse farmands from external and non-agricultural contaminants; and further research to shed light on the level of macroplastic fragmentation in the greenhouse farmlands.

The Effect of Molasses Application on Soil Biological Activity and Plant Growth of Different Tillage Soil: A Pot Experiment

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Soil enzyme activity and labile carbon (LC) have long been used as soil health indicators. Soil health can be improved by molasses addition resulting in better plant growth and productivity. The effect of molasses on soil biological activity and plant growth under different tillage soil has not been widely discussed in many studies in

Hungary. We assessed two soil types under different long-term tillage practices, conservation tillage (CT) that leaves 30% more residue on the soil surface and conventional-ploughing tillage (PT). A pot experiment with maize as the crop was carried out using the composite soil (0-20 cm) of CT and PT; a randomized block design with four replications was employed. Three level of molasses concentration, 0 g L-1, 0.05 g L-1, and 0.2 g L-1, were applied. LC, dehydrogenase (DHA), β-glucosidase activity, plant height, and dry weight biomass were measured in the end of experiment (after eight weeks). The results indicated that LC in CT increased by 7.61-21.23% over the increase in molasses concentration. LC concentration was significantly higher in the CT than in the PT soil. β-glucosidase activity increased along with the increase of molasses concentration by 11.42-30.43% in CT and 16.03-34.76% in PT, however, the significantly different has appeared only in PT soil. Molasses application affected the DHA as well. The activity of dehydrogenase increases by 39.49-80.76% and 12.44-16.00%, respectively, in CT and PT. Nevertheless, no significance occurred in the tillage system or the molasses concentration. In our study, we also found that the different molasses concentrations did not affect the plant height and dry weight biomass in CT and PT. However, applying each molasses concentration in CT markedly escalated the plant height and dry weight biomass compared to PT. The enhancement of soil biological activity and plant growth by the Molasses application allows a promising strategy for maintaining the soil health of agricultural land.

Environmental geochemical study on urban soils of Salgótarján, Hungary

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Strontium is a large ionic lithophile element, moderately incompatible in solid phases, and is considered mobile during fluid transports. Its stable isotopes used in soil sciences for decades demonstrating their potential as significant tracers to describe chemical weathering and other pedogenic processes on both short- and long-term scales. Physicochemical and biological processes have no significant effect on Sr isotopic fractionation since it can be a useful tool to monitor contamination in the soil. In the natural environment, the $^{87}Sr/^{86}Sr$ ratio depends on the amount of radiogenic