

## **The Short-Term Response of Soil Microorganisms for Input of Microplastics**

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Using plastic mulches in agriculture has a number of advantages. However, plastic mulching has become a major contributor of microplastics to agricultural lands. This study was conducted to assess short-term effects of adding microplastics originating from two types of plastic mulching materials on soil biological properties. The effect of previous exposure of a soil to plastic mulching on microbial response to microplastics was also assessed. Two soils, one with previous exposure to plastic mulching (WH) and one without previous exposure to plastic mulching (NH), collected from Mahalluppallama, were used for the study. Each soil was mixed with microplastics from a biodegradable and a conventional mulch at a rate of 0.1%(w/w) separately in triplicates. Unamended soils served as controls. Soils were incubated in dark for nine weeks after applying treatments. Soil microbial respiration, microbial biomass carbon, catalase and urease enzyme activities, soil pH and electrical conductivity (EC) were measured periodically. Surface properties of microplastics before adding to soil and after incubating with soil were analyzed with FTIR technique. Soil pH and EC increased significantly ( $P < 0.05$ ) in the microplastic added treatments compared to control at the end of 9<sup>th</sup> week of incubation. Microplastic treated soils showed a significantly ( $P < 0.05$ ) lesser degree of enzyme activity than controls at the end of 9<sup>th</sup> week. Microplastics from biodegradable mulch reduced catalase activity more than the conventional mulch. Microbial biomass carbon and microbial respiration were significantly ( $P < 0.05$ ) changed by microplastic application. Soils with previous exposure to microplastics significantly affect the changes in pH, EC, urease activity and soil respiration responding to new input of microplastics. The study confirmed that addition of microplastics changed soil microbiological properties. Previous exposure of soil for plastic mulching and the type of mulches influenced the nature of response of soil microbial communities to new inputs of microplastics.

**Keywords:** Biodegradable mulch, Conventional mulch, Enzyme activity, Microorganisms, Microplastics

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