

Evaluation of Biodegradability and Performance of Degradation Additive for Commercial Mulch Films in Korea

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Abstract

Recently, microplastics found in the environment are causing great social concern, and plastic mulch films are considered as a primary source of plastic pollution in agricultural field and groundwater. The fully biodegradable polymer, polybutylene adipate terephthalate (PBAT), could be a promising alternative to polyethylene mulch film. To date, there are diverse PBAT-based mulch films with various additives in the market to improve or modify the strength and function of mulch films. The PBAT is degraded into carbon dioxide, water and other small molecules through three mechanisms: 1) photo-oxidation by UV, 2) hydrolysis by water, and 3) biodegradation by soil microorganisms. The international biodegradability standard EN-17033 requires 90% degradation within 2 years in an aerobic incubation at constant temperature (20-28 °C). Thus, annual application of PBAT-based mulch films could cause the accumulation of microplastics in soils, due to non-biodegradable additives and remnant PBAT. To overcome the bottleneck, improving degradability is essentially required. In this research, each factors which affect the biodegradation of PBAT-based mulch film, such as UV types, strength, relative humidity, temperature, etc., would be evaluated. The behavior analysis of microplastics from mulch film in agricultural field



will be also investigated. Furthermore, capability of biological degradation additives (e.g., microorganism) would be tested.

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