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# Impact of Plastics in Agriculture

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Plastics are an integral part of crop cultivation, a practice often referred to as "plasticulture". Examples include mulch and silage films, bale wraps, row covers, landscape fabrics, high and low tunnel covers, irrigation piping, drip tape, and packaging materials. The global use of plastics in agriculture exceeded 6 million tonnes annually in 2019 and is projected to reach 9 million tonnes by 2030 [1]. Mulch films accounted for USD 11.5 billion of market value in 2021, with the latter estimated to reach USD 15.7 billion in 2026 (a compound annual growth rate of 5.6%) [2]. However, residual plastic fragments serve as a major threat to agricultural ecosystems and the food web, leading to the formation of micro- and nanoplastics (M/NPs) that can harm crops, microorganisms, earthworms, and other soil biota and can migrate into groundwater and nearby lakes and streams [3]. Even the replacement of conventional synthetic plastics such as polyethylene (PE) with biodegradable plastics in mulch films and other implements does not prevent the formation of M/NPs [3]. Agricultural plastics can also produce leachate containing minor components of concern, such as phthalate-based plasticizers [3]. Therefore, the impact of agricultural plastics across their life stages merits further study, with many research gaps remaining.

This Special Issue of *Agriculture* addresses several research gaps. Deng et al. contributed a review article that investigates MPs in agricultural soils: sources, dynamics, and ecotoxicological effects [4]. The microbial assimilation of MPs derived from biodegradable agricultural plastics is also reviewed. The article challenges farmers to strengthen farmland management practices, minimize their use of plastic films, and adopt biodegradable plastics in farming practices and the agricultural scientific community in order to develop new and improved plastic materials, increase interdisciplinary collaboration, and vocalize environmental awareness among all stakeholder groups.

Hao et al. performed a cost–benefit analysis of conventional PE and biodegradable mulch films for applications in northern China based on field surveys (primary data) and national statistics, industry reports, and literature reviews (secondary data) [5]. Their study concluded that conventional films can be cost-effective if their thickness is increased to improve recovery, recyclability, and reuse. In contrast, biodegradable mulch films (BDMs) were not found to be cost-effective unless government subsidies were in place.

Two studies included in the Special Issue focused upon the end-of-life performance of sprayable BDMs developed by Patti and co-workers, composed of polyester–urethane–urea (PEUU). In the first study [6], laboratory and field studies were conducted to investigate the effect of soil chemistry on biodegradation. An increase in soil temperature and decrease in soil pH produced the greatest degree of biodegradation, with the soil microbial community structure and the soil–mulch contact also being important factors. The second study focused on the impact of sprayable BDM on the soil microbial community [7]. The study found that sprayable BDMs increased the abundance of several beneficial microorganisms, i.e., *Azospirillum*, *Noviherbaspirillum*, *Exophiala*, *Phoma*, *Chaetomium* and *Clonostachys* species, and did not have any negative impacts.

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Zhou et al. investigated the environmental impacts of perfluoroalkyl acids (PFAAs) that are commonly used as defoggers in plastic greenhouses [8]. PFAAs are toxic to several animal species and to humans. Their study, employing LC-MS/MS, analyzed soils and water near plastic greenhouses used for vegetable production in the Shouguang region of China. Relatively high PFAA levels were detected near the corner areas of greenhouses, especially in greenhouses with longer service times, indicating a potential threat to the food web.

I hope that the reader enjoys this Special Issue and is motivated to further investigate this important topic.

**Conflicts of Interest:** The author declares no conflicts of interest.

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