



Performance and Adoptability Biodegradable Mulch

biodegradablenmulch.org

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Summary

Oxo-degradable plastic is not biodegradable in field conditions; fragments will remain in the soil or surrounding environment for decades, where they become micro or nano particles that are pollutants in soil and water systems. There is a call to ban oxo-degradable plastic packaging in the U.S. and EU because it poses risk to our environment.

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Oxo-degradable Plastics Risk Environmental Pollution

Three types of agricultural mulch films are commercially available: (1) conventional plastic mulch film composed largely of polyethylene (PE) and designed to be removed from the field, (2) biodegradable plastic mulch made of starch and/or synthetic inputs and designed to be tilled in and biodegrade in the soil, and (3) oxo-degradable plastic. Oxo-degradable plastic is made with conventional plastic: high density PE (HDPE), low density PE (LDPE), polypropylene (PP), polystyrene (PS), polyethyleneterephthalate (PET), or polyvinylchloride (PVC). Oxo-degradable plastic includes additives that cause the material to become brittle and break apart into fragments when exposed to UV light, heat and/or oxygen. Several studies show oxo-degradable plastics fragment in field conditions (EU Commission 2017; Steinmetz et al. 2016).

Oxo-degradable Plastic Not Biodegradable in the Field

Certification tests for oxo-degradable plastics degradation do not require that a certain percent of degradation occurs within a specified time frame. These tests provide methods, but they do not provide pass/fail criteria. However, companies cite these tests to imply that their product has met international standards, which is misleading (FTC, 2015). Independent, third party data using standard ASTM & ISO biodegradation tests show only a small percentage or no plastic fragments of oxo-degradable plastic are utilized by soil microorganisms when oxo-degradable plastics are assessed in field tests (European Commission, 2017; Steinmetz et al., 2016). Even in laboratory environments with carefully controlled temperature and light conditions, oxo-degradable plastics biodegrade very slowly. No laboratory test has shown more than 91% degradation in soil during two years, and some show that degradation stops completely when 13 – 65% degradation has occurred (European Commission, 2017; Steinmetz et al., 2016). In the United States, the Federal Trade Commission (FTC) has concluded that an oxo-degradable plastics manufacturer made false, misleading and unsubstantiated claims regarding the biodegradation of its oxo-degradable plastics (FTC, 2015).



Macro and micro oxo-degradable plastic fragments accumulate in soil (Fig. 1) and ocean environments, where they can absorb toxins, and can be transported up the food chain (European Commission, 2017). Further, studies demonstrate that oxo-degradable plastic is not compostable, and is not suitable for anaerobic digestion (European Commission, 2017). Oxo-degradable plastic also reduces the quality of plastics recycle, but oxo-degradable plastic cannot be identified and separated in the plastic waste stream (European Commission, 2017).



Figure 1. Three years after oxo-degradable mulch field application, Everett, WA. (Photo by A. Bary)

Ban Called for Oxo-degradable Plastic

In the European Union (EU), the use of oxo-degradable plastics have been found to pose a risk of significant environmental damage (European Commission, 2017). Thus, the EU is considering a ban on oxo-degradable products, namely bags and other packaging, aimed for markets where composting or anaerobic digestion would be possible fates. In the United States, the Ellen MacArthur Foundation, along with 150+ organizations, also is calling for a ban of oxo-degradable plastic packaging (New Plastics Economy, 2017).

Farmers Be Aware

Farmers and agricultural suppliers must be aware that oxo-degradable plastic companies are selling oxo-degradable plastic mulch in North America. Manufacturers of oxo-degradable mulches have not provided any further evidence to demonstrate that these products meet standards and tests that are used to determine biodegradability of plastic products in open environments. Until third party evaluations have shown otherwise, farmers and agricultural suppliers should consider that oxo-degradable mulches are not biodegradable, compostable, or recyclable, and cannot be placed in anaerobic digesters.

References and Further Reading

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