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ORIGINAL PAPER

## Critical Review of Norms and Standards for Biodegradable Agricultural Plastics Part I. Biodegradation in Soil

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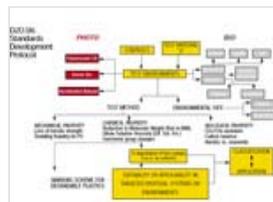
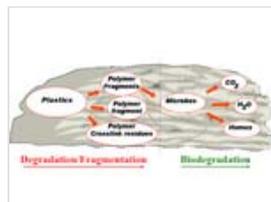
### *Abstract*

A critical review of norms and standards and corresponding tests to determine the biodegradability in soil for biodegradable plastics, possibly applicable also to biodegradable agricultural plastics, is presented. There are only a few norms available at the international level about biodegradable plastics in soil. The criteria, parameters and testing methodologies for the characterization, labelling and validation of the agricultural plastic waste streams with respect to possible biodegradation in soil according to existing international standards are analysed while the relevant controversies are identified. To derive the best suited for agricultural plastics specs and testing methods, the possible developments or adaptation of available specs, is investigated. Considering the existing types of biodegradable plastic products in agriculture and their effective life management at the agricultural field, only a few norms appear to provide suitable tests that could be adapted, following appropriate research work, for testing biodegradability in soil under real field conditions. It is shown that some major revisions are needed, with the support of systematic research work, before a new universal norm and standard testing methods become available for testing agricultural plastics for biodegradation under real, and highly variable, soil conditions. Based on the analysis of the different norms and their content it appears necessary to incorporate provisions for transferability of results to different soils and climates, validation of tests through a positive reference and also, set prerequisites for soil media. Long term biodegradation in soil prediction is another open issue.

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**Keywords** Biodegradable agricultural plastics - Biodegradability in soil - Testing methods - Norms - Labelling

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## Critical Review of Norms and Standards for Biodegradable Agricultural Plastics Part I. Biodegradation in Soil

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**Abstract** A critical review of norms and standards and corresponding tests to determine the biodegradability in soil for biodegradable plastics, possibly applicable also to biodegradable agricultural plastics, is presented. There are only a few norms available at the international level about biodegradable plastics in soil. The criteria, parameters and testing methodologies for the characterization, labelling and validation of the agricultural plastic waste streams with respect to possible biodegradation in soil according to existing international standards are analysed while the relevant controversies are identified. To derive the best suited for agricultural plastics specs and testing methods, the possible developments or adaptation of available specs, is investigated. Considering the existing types of biodegradable plastic products in agriculture and their effective life management at the agricultural field, only a few norms appear to provide suitable tests that could be adapted, following appropriate research work, for testing biodegradability in soil under real field conditions. It is shown that some major revisions are needed, with the support of systematic research work, before a new universal norm and standard testing methods become available for testing agricultural plastics for biodegradation under real, and highly variable, soil conditions. Based on the analysis of the different norms and their content it appears necessary to incorporate provisions for transferability of results to

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### Introduction

Current intensive and semi-intensive agricultural practices used throughout Europe require the use of large quantities of plastics. In 2004, the consumption of plastic materials for agricultural applications reached 61,500 t/year [1]. Most recent data suggest that agriculture and horticulture is responsible for a consumption of some 150,000 t/year of all polymers in Europe [2, 3]. Concerning the category of thin films, more than 130,000 t/year mulching films are consumed per year in Europe and 260,000 t/year worldwide (2003–2005 data [4]). The corresponding consumption of direct cover and low tunnel films in Europe are 72,000 and 75,000 t/year, respectively.

The extensive and expanding use of plastics in agriculture results in increased accumulation of plastic waste in rural areas. Part of this plastic waste may be recycled, especially the greenhouse films, silage films and fertiliser sacks, pipes and other plastic products. Another part of the agricultural plastic waste is difficult to recycle for technical and/or financial reasons. A major agricultural plastic wastes category of low-recyclability (in general) are the thin mulching films and in some cases, thin low tunnel and direct cover films. These films are too thin and usually heavily contaminated by soil and foreign materials.

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