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## Toward greener polyolefins: Antioxidant effect of Phytic acid from cereal waste

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### Abstract

Phytic acid is a major by-product of the cereal industry. The present work reports the use for the first time of phytic acid as a natural antioxidant in polyolefins. Our purpose is to respond to the key concern of replacing petroleum-based polymer stabilizers with bio-based stabilizers, paying attention to the use of biomass. Advances in bio-based thermo-stabilizers are intensifying, such as proposing original compounds from plants; however, the development of photo-stabilizers has not evolved since the 1970s. In this study, the antioxidant efficiency of phytic acid is measured against thermo- and photo-oxidation conditions in polyolefins. Its activity is compared to natural  $\alpha$ -tocopherol, and to synthetic Irganox 1010. Variations in the molecular structure of polypropylene PP–phytic acid films, artificially exposed to oxidation at 80°C, are monitored by rheology. The efficiency of phytic acid as a photo-stabilizer is assessed using accelerated artificial light conditions. The results are promising, phytic acid showing spectacular natural antioxidant potential.

**Keywords:** Phytic acid, natural antioxidant, polypropylene, rheology, photo-oxidation,

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