

Title Potential for bioplastics in food packaging
Author Guilbert S., Morel MH and Gontard N.
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Abstract

Recently, due to a large demand for packaging materials with better environmental balance and /or new original properties such as biodegradability (“bio-plastics”), the food packaging industry is looking for new solutions based on bio-plastics. Materials based on “Extractible” agro-polymers such as starch, cellulose or proteins are inexpensive and some of them are commercially available. Their water and temperature sensitivity can be built on to fresh food physiology and or to trigger responses adapted to environmental change. They provide interesting properties related to mass transport characteristics. They generally showed high CO₂/O₂ selectivity ratio associated with high gases permeability. The ability of such bio-plastics, combined with paper or bio-polyesters for the mechanical resistance, to create unique modified atmosphere favorable to fresh fruits and vegetables (e.g. mushroom, parsley, etc.) qualities preservation was successfully modeled and demonstrated. Bio-plastics based of proteins were also used as inclusion matrix for a controlled release of volatile antimicrobial agents and successfully used for the shelf life improvement of various foods. Release kinetic and thus antimicrobial efficiency as a function of use conditions was modulated thanks to the use of physically induced crosslinking treatments or though the introduction of nanoparticles. Apart from “extractible” polymers, bio-polyesters, bio-polyolefines, bio-elastomers, etc. are now proposed for the formulation of packaging materials. Their properties are identical or close to conventional material properties and their renewability (and for some of them, their biodegradability) is an additional functional and commercial advantage. Their combination together with starch or protein based materials have given good test results and could be used to optimize their price and to modulate mechanical and transport properties thus paving the way for potential applications in the field of respiring, gas selective or active materials. The environmental performance of packaging materials based on renewable resources are compared to conventional polymers and discussed following the life cycle analysis methods of the ISO 14040 family. Some materials, given as “green” provide vary critical environmental/ properties benefit balance.