

Accepted Manuscript

Obtaining antimicrobial bilayer starch and polyester-blend films with carvacrol

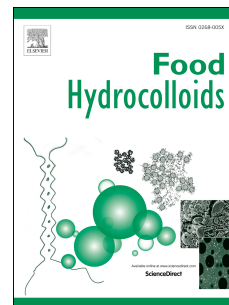
Raquel Requena, María Vargas, Amparo Chiralt

PII: S0268-005X(18)30581-2

DOI: [10.1016/j.foodhyd.2018.04.045](https://doi.org/10.1016/j.foodhyd.2018.04.045)

Reference: FOOHYD 4412

To appear in: *Food Hydrocolloids*



Please cite this article as: Raquel Requena, María Vargas, Amparo Chiralt, Obtaining antimicrobial bilayer starch and polyester-blend films with carvacrol, *Food Hydrocolloids* (2018), doi: 10.1016/j.foodhyd.2018.04.045

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

1 Obtaining antimicrobial bilayer starch and polyester-blend films with carvacrol.

2
3 Raquel Requena¹; María Vargas¹; Amparo Chiralt¹

4 ¹ *Institute of Food Engineering for Development, Universitat Politècnica de València, Valencia, Spain.*

6 Abstract

7 Bilayer films using polyester blends (P) and starch (S) were obtained and characterized,
8 incorporating carvacrol as active compound. Carvacrol was incorporated by spraying it
9 between melt blended and compression moulded sheets or through its incorporation into the
10 chloroform P solution used to obtain P cast films. Different PLA-PHBV ratios (75:25 and 65:35)
11 were tested, with and without 15 wt.% of PEG1000, whereas the 75:25 ratio with PEG was only
12 used for cast sheets, based on its better overall properties. Mono and bilayers were
13 characterised as to their tensile and water vapour barrier properties and thermal behaviour.
14 Release kinetics of carvacrol in different food simulants and in *in vitro* antibacterial activity
15 against *Listeria innocua* and *Escherichia coli* were also analysed. Incorporating carvacrol by
16 spraying it between the polyester and starch sheets was not effective at retaining the
17 compound in the bilayers. However, the incorporation of carvacrol into cast P films, and the
18 subsequent formation of bilayers with the S sheets, was highly effective at providing practically
19 total carvacrol retention. These active bilayers exhibited highly improved tensile and water
20 vapour barrier capacity with respect to the S monolayer (87% reduction in WVP, 840% increase
21 in elastic modulus) and inhibited the growth of *L. innocua* and *E. coli* from both P or S contact
22 sides of bilayers, depending on the internal diffusion of carvacrol through the bilayer and its
23 adequate release of the compound into the culture medium.

24
25 **Keywords:** starch; polylactic acid, polyhydroxybutyrate-co-hydroxyvalerate, carvacrol,
26 packaging properties, antibacterial properties.

28 1. Introduction

29 With society's growing concern for the environment and the great dependence on fossil fuels
30 for plastic production, there is a need to find suitable environmentally-friendly solutions to the
31 outbreak of plastic-based packaging. In this context, bio-based and biodegradable polymers
32 such as polylactic acid (PLA) and polyhydroxyalkanoates (PHAs) have emerged as suitable

Download English Version:

<https://daneshyari.com/en/article/6985483>

Download Persian Version:

<https://daneshyari.com/article/6985483>

[Daneshyari.com](https://daneshyari.com)