

Antioxidant activity of alginate edible films containing plant extracts

Ana Isabel Lopes¹, Sara Silva¹, Lillian Barros², Cristina Caleja², Eliana Pereira², Freni Tavarria¹, Manuela Pintado¹

¹ Universidade Católica Portuguesa, CBQF- Centro de Biotecnologia e Química Fina - Laboratório Associado, Escola Superior de Biotecnologia, Rua Diogo Botelho 1327, 4169-005 Porto, Portugal

² Centro de Investigação de Montanha (CIMO), Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253, Bragança, Portugal
Email: mpintado@ucp.pt

Nowadays, food packaging has been the target of increasing attention. Traditional food packaging is usually made of plastic and accounts for 36.9% of the plastics' demand, being considered the largest market for plastic industry. Additionally, plastics are mostly produced with polymers from non-renewable sources and so, they contribute to environmental pollution. A way to circumvent this problem is the development of edible films. Edible films can act as complements to traditional plastics because their functional properties are able to extend food's shelf-life¹.

Plant extracts are obtained by plants and possess antioxidant activity because of their high concentrations of phenolic compounds. They can be effective at low concentrations, are cost-effective and easy to apply, presenting low toxicity levels and high stability during processing and may not affect the sensory characteristics of food products².

The addition of plant extracts to edible films confers them the ability to act as food preservatives because they present antimicrobial activity against a broad spectrum of food poisoning microorganisms and antioxidant properties that helps to avoid the deterioration of fats and other food constituents³.

So, the main objective of this work was to evaluate the antioxidant activity of alginate edible films containing extracts of licorice (*Glycyrrhiza glabra* L.), eucalyptus (*Eucalyptus globulus* Labill.) and sage (*Salvia officinalis* L.). The 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) and 2,2-difenil-1-picrilhidrazil (DPPH) scavenging tests were performed on the films and the results show that the films incorporated with plant extracts present antioxidant activity when compared to the control (alginate film without plant extract).

The film incorporated with sage extract was the one that presented the best antioxidant activity by both ABTS (4024,169 Trolox equivalents (μM)/mg film) and DPPH (3954,813 Trolox equivalents (μM)/mg film), followed by the film with eucalyptus extract (ABTS: 3706,291 Trolox equivalents (μM)/mg film; DPPH: 3706,291 Trolox equivalents (μM)/mg film). On the other hand, the film incorporated with licorice extract (ABTS: 942,5195 Trolox equivalents (μM)/mg film; DPPH: 1040,669 Trolox equivalents (μM)/mg film) was the one with least antioxidant activity.

Funding: This work was financially supported by project BIOma - Soluções integradas de BIOeconomia para a Mobilização da cadeia Agroalimentar (POCI-01-0247-FEDER-046112) co-financed by Fundo Europeu de Desenvolvimento Regional (FEDER) through Programa Operacional Competitividade de Internacionalização (POCI). Author Ana Isabel Lopes would like to acknowledge the individual grant.

References:

1. D. Campos, C. Piccirillo, R. C. Pullar, P. M. Castro, M. M. Pintado, J. Sci. Food Agric. 94 (10) (2014) 2097-103.
2. T. Liu, L. Liu, X. Gong, F. Chi, Z. Ma. LWT. 135 (2021) 110181.
3. I.R. Freitas and M.G. Cattelan. Microbial Contamination and Food Degradation. Academic Press. USA. 2018.