

## Biobased Sustainable Films from the Algerian *Opuntia Ficus-Indica* Cladodes Powder: Effect of Plasticizer Content

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**Abstract :** Native to Mexico, *Opuntia ficus-indica* was introduced in southern Spain, and thereafter, it was spread throughout the Mediterranean Basin by the Spanish conquerors in the 16th and 17th centuries. *O. ficus-indica* is a tropical and subtropical plant able to grow in arid and semi-arid regions, such as the Mediterranean and Central America regions. The culture of *Opuntia* covers about 200,000 ha in North Africa. This tree is used against soil erosion and desertification for fruit production and is encouraged to promote the livestock sector. It has recently received ever-increasing attention from researchers worldwide for the multivalent pharmaceutical and cosmetical potential of its different compartments (fruits, seeds, cladodes). The present study investigated the elaboration by casting method and characterization of new biodegradable films composed of cladodes powder (CP) of the plant raw material mentioned above, and a marine seaweed derivative, namely agar (A). The effect of glycerol concentration on the properties of the films was evaluated at four different contents (30, 40, 50 and 60 wt.%). The films present UV-blocking properties, thermal stability as well as moderate mechanical performance and water vapor transmission rate (WVTR). The results point to an increase in thickness, elongation at break, moisture content, water solubility, and WVTR with increasing glycerol content. On the contrary, Young's modulus, tensile strength and contact angle decreased as glycerol concentration increased. The best combination is obtained for the film with 30% glycerol, based on an intermediate compromise between physical, mechanical, thermal and barrier properties. All these outcomes express the potentiality of the powder obtained from grinding the OFI cladodes as raw material to produce low-cost films for the development of sustainable packaging materials.

**Keywords :** *Opuntia ficus-indica* cladodes powder, agar, biobased films, effect of plasticizer, sustainable packaging

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