

DEVELOPMENT AND CHARACTERIZATION OF ZEIN-PECTIN-BASED FILMS INCORPORATING AGAVE ANGUSTIFOLIA HAW RESIDUE EXTRACT AND THEIR POTENTIAL USE AS AN ACTIVE PACKAGING

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The growing demand for sustainable packaging is driven by the dual challenge of plastic pollution and food waste, encouraging the development of biodegradable active films. In this study, zein–pectin films incorporated with *Agave angustifolia* Haw. leaf extracts, an abundant residue from bacanora production in Sonora, were developed and characterized. films were prepared with 1% pectin and zein, supplemented with 1% and 3% of the extract, and evaluated for physicochemical, mechanical, thermal, and structural properties (FT-IR, SEM, DSC), as well as antioxidant and antibacterial activities. The films showed thicknesses of 0.095–0.164 mm, yellowish–reddish coloration, elongation values of 15–25%, and thermal stability between 25–200 °C; FT-IR confirmed hydrogen-bonding interactions, while SEM revealed irregular surfaces. Antioxidant activity was demonstrated with values of 15–16 µmol TE/g (DPPH), 10.5–14.5 µmol TE/g (ABTS), and 29.7 µmol TE/g (FRAP), and antibacterial tests confirmed inhibition of *Listeria monocytogenes*. These results highlight that zein–pectin films enriched with *A. angustifolia* Haw. extracts not only contribute to the valorization of agro-industrial residues but also represent a promising biodegradable alternative for active food packaging.

Keywords: agro-industrial residues, films, active food packaging

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