**Trans-2-hexenal as a heterobifunctional crosslinker to improve functional properties of gliadin films**

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Gliadins are considered promising vegetal proteins for the design of biomaterials due to their abundance as a agro-industrial by-product of wheat industry. They present several properties such as biodegradability, low cost, film-forming capacity, solubility in ethanol aqueous solutions, control-release, viscoelastic and adhesive properties, which makes gliadins attractive proteins to be used with different non-edible purposes1. Several studies have developed transparent and flexible films from gliadins, but they have poor mechanical properties and lack of stability in water which makes films difficult to be used for packaging purposes. In that sense, chemical crosslinking provides a way to improve the aforementioned properties. Commonly, glutaraldehyde and formaldehyde have been widely used as crosslinkers of proteins; however, these compound have some toxicity and more natural alternatives need to be explored2.

# In this work, the potential of trans-2-hexenal as a covalent crosslinking agent for gliadins has been explored. Trans-2-hexenal is classified as safe for human consumption by the FAO/WHO Expert Committee on [Food Additives](https://www.sciencedirect.com/topics/chemistry/food-additive) (JECFA)3. The proposed crosslinking mechanism of this α,β-unsaturated aldehyde is based on its ability to react by Schiff base and Michael addition with side-chain groups (-NH2, -SH, -OH) found in the amino acids of gliadin backbone.

The mechanical properties and water resistance of gliadin films modified with trans-2-hexenal were evaluated. The results showed that films treated with trans-2-hexenal maintained their integrity after immersion in aqueous solution. In addition, the molecular weight profile of treated gliadins was analysed by SDS-PAGE, which corroborated that gliadins were cross-linked with trans-2-hexenal. These results showed the possible formation of intermolecular covalent bonds between gliadins, leading to a crosslinked network. Therefore, this aldehyde could be a natural alternative to improve properties of gliadin films for its use in different applications.

*References:*

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