

## ABSTRACT

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Edible gelatin-based films were prepared from fish gelatin with direct addition of oxidized linoleic acid (OLA) at various levels (10-30%, w/w, of gelatin) and hydroxyapatite (HAp) powder derived from salmon bone waste at various levels (1-3%, w/w, of gelatin). Samples were characterized, in comparison to control film (without the addition of OLA and HAp). Films with direct addition of OLA had lower tensile strength (TS), elastic modulus (EM) but higher elongation, water vapor permeability (WVP), and yellowness ( $b^*$ -value), as compared to the control film ( $p < 0.05$ ). Meanwhile, the addition of HAp powder had lower elongation but higher TS, EM, WVP, and whiteness ( $L^*$ -value) of the films compared to the control ( $p < 0.05$ ). The direct addition of OLA help to spread HAp particles evenly and HAp particles would disturb the agglomeration of OLA droplets. Both additions of OLA and HAp powder increased viscosity of film casting solution and hence the casted film thickness. Shelf-life extension of seedless grapes were investigated. The grapes were dip-coated by 1-3 layers of the control (gelatin only) and the gelatin with 20% OLA 5% HAp solutions in comparison to the uncoated samples. Weight loss and appearance of the samples were monitored under regular atmosphere and refrigerated storages for 14 days. Grapes coated with gelatin+20% OLA 5% HAp solution had better appearance than control and uncoated grapes. However, multiple coating of the control solution resulted in better weight loss inhibition than those coated with gelatin+20% OLA 5% HAp solution and uncoated grapes, respectively.

**Keyword:** *Edible film, Gelatin, Hydroxyapatite, Oxidized Linoleic Acid*

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*Edible* film berbahan dasar gelatin dipersiapkan dari gelatin ikan dengan penambahan langsung asam linoleat teroksidasi (OLA) dengan perbedaan konsentrasi (10-30%, w/w gelatin) dan bubuk hydroxyapatite (HAp) yang diolah dari *waste* tulang ikan salmon dengan berbagai variasi (1-3%, w/w gelatin). Sampel dikarakterisasi lewat perbandingannya dengan film kontrol (tanpa penambahan OLA dan HAp). Film dengan penambahan langsung OLA mempunyai nilai *tensile strength* (TS), *elastic modulus* (EM) lebih rendah tetapi *elongation*, *water vapor permeability* (WVP), dan *yellowness* (b\*-value) yang lebih tinggi dibandingkan kontrol ( $p < 0.05$ ). Sementara, penambahan bubuk HAp menurunkan nilai *elongation* tetapi TS, EM, WVP, dan *whiteness* (L\*-value) lebih tinggi daripada film kontrol ( $p < 0.05$ ). Penambahan langsung OLA membantu penyebaran merata dari partikel HAp dan partikel HAp dapat mengganggu aglomerasi dari OLA. Baik penambahan OLA maupun bubuk HAp dapat meningkatkan viskositas larutan film dan ketebalan film. Perpanjangan umur simpan dari anggur diuji. Anggur di-*dip-coated* hingga 1-3 lapis dengan larutan kontrol (hanya gelatin) dan gelatin dengan 20%OLA 5%HAp dibandingkan dengan sampel tanpa *coating*. Pengurangan berat dan penampakan dari sampel dimonitor dalam kondisi normal dan penyimpanan dingin selama 14 hari. Anggur yang dilapisi dengan larutan gelatin+20% OLA 5% HAp memiliki penampakan yang lebih baik daripada kontrol dan tanpa *coating*. Namun, *coating* dengan beberapa lapis larutan kontrol lebih menghambat penurunan bobot daripada *coating* dengan larutan gelatin+20% OLA 5%HAp dan sampel tanpa *coating*.

**Kata kunci:** *Edible film, Gelatin, Hydroxyapatite, Oxidized Linoleic Acid*