

**Title** Effects of ingredient composition on optical and mechanical properties of pullulan film for food-packaging applications

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### **Abstract**

In the present research, the effects of pullulan (*Pul*), glycerin (*Gly*), xanthan gum (*Xa*) and locust bean (*Lb*) concentrations on pullulan film properties were investigated using a Central Composite Rotatable Design. Optimal ingredient combination was determined and antimicrobial activity of films combined with sakacin A was confirmed against *Listeria monocytogenes*. Using predictive models, contour plots and the characteristics of commercial LDPE films as constraints, the following combination within the optimal region was selected: *Pul* 100 g/l, *Gly* 10 g/l, *Xa* 1 g/l and *Lb* 1 g/l. Statistical analysis demonstrated that *Pul* and *Gly* significantly influenced the properties of pullulan films. Strong interactions were observed between *Pul-Gly* and *Xa-Gly*. When sakacin A was added to the film mixture, no significant influence on films optical properties was reported, while an increase in flexibility was observed. Results obtained indicate the potential application of pullulan film developed in this study as an effective antimicrobial biopolymer in food-packaging systems.