

## **Physicochemical, total phenolic content, antioxidant and biodegradability study of overripe papaya flesh-chitosan biodegradable film**

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### **Structured Abstract**

**Background:** Chitosan biofilm is popularly used as it offers a promising solution for reducing the environmental impact of conventional plastic packaging. Chitosan, despite its poor mechanical properties such as brittleness and lack of flexibility, can be enhanced for food packaging by blending it with agro waste. The objective of this study are to investigate the antioxidant activity of chitosan-papaya puree film and to determine the optical, physical, microstructural and chemical properties of film overripe papaya flesh-chitosan film.

**Methods:** The Chitosan-papaya film was made by dissolving 2.0g of chitosan in 100 ml of 1% acetic acid for 30 minutes at 50°C. Tween 20 was then added, and it was agitated for 5 minutes. After incorporating overripe papaya powder or extract into the mixture, 5g of glycerol which served as a plasticizer was added. To create a homogenous solution, the mixture was agitated for 30 minutes at 85°C using a magnetic stirrer. The solution was then formed into films and allowed to dry for an entire day at 60°C.

**Results:** This study of papaya powder film (PPF) showed good physical properties such as high thickness, opacity but lower film swelling degree, moisture content compared to papaya extract film (PEF). For biodegradability, the PEF degraded faster compared to control and PPF. Besides that, the microstructure of PPF also showed good mechanical properties compared PEF since it not consist pores. Film PEF exhibited the highest total phenolic content (TPC) and antioxidant activity with values  $27.90 \pm 0.058$  mg GAE/ g and  $76.43 \pm 0.952\%$ , respectively. The best films showed by PPF which had thickness of 0.014mm, opacity of 8.45%, swelling degree of 8.60%, moisture content of 16.21% accelerated soil biodegradation (9 days) and microstructure properties that not have pores. Besides that, its total phenolic content of 27.90 mg GAE/g and antioxidant of 76.43%.

**Conclusion:** In conclusion, the incorporation of overripe papaya into chitosan films offers a sustainable packaging option with improved performance in addition to a value-added application for agricultural waste. This is compatible with broader environmental objectives to lessen plastic pollution and encourage the use of biodegradable materials in packaging.

**Keywords:** chitosan; papaya; agro-waste, edible film, food packaging

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