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“Can agroecological farming feed the world?  
Farmers’ and academia’s views”

## Eco-design of biodegradable food packaging from corn husk for the preservation of local foods in Benin

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### Abstract

The ever-increasing development of industrial activities has led to a proliferation of various types of packaging used in the food and drink sector. Over the last ten decades, there has been a proliferation of plastic packaging worldwide, mainly in the food and beverage industries, which absorb about 65 % of it, compared to about 35 % for other sectors. However, due to its non-biodegradable nature, plastic packaging poses an environmental pollution problem. The environmental and health hazards caused by plastic packaging are increasing and have been proven by scientific studies. Moreover, the government of Benin has adopted Law N°2017–39 of 26 December 2017 on the prohibition of the use of non-biodegradable plastic bags. In an international context where sustainable development is a major priority, the development of biodegradable materials is a major challenge that offers an alternative to synthetic polymers produced by petrochemicals. To this end, the objective of the study was to design biodegradable food packaging from corn husk. A field survey was conducted to investigate the availability of corn husk. The functional analysis method was used to produce prototype packaging. Parameters such as opacity, heat resistance, water absorption, and tensile strength at break were the main characteristics evaluated. Thus, the physical, mechanical and economic parameters of the eco-designed packaging show that it is opaque, especially to ultraviolet radiation ( $OP = 262.10 \pm 1.71$ ); has a heat resistance  $150\text{ }^{\circ}\text{C}$  with a breaking stress of  $4.45 \pm 0.35\text{ Mpa}$ . Pale yellow in colour, it has a water absorption capacity of  $200\text{ g/m}^2$ . The developed packaging is economically profitable since the Net Present Value = 6,672,160 FCFA is positive for 5.3 tonnes of maize spathe valorized and the Internal Rate of Return’s 31.13 %. The Profitability Index’s 1.71. This results in a gain of 0.71 FCFA after 1 FCFA invested. The study provides a sustainable and ecological solution to the problems of businesses by providing them with biodegradable food packaging from agricultural residues, which is simple to use and adapted to the local context, at an affordable price and environmentally friendly, contributing to Sustainable Development Goals 8, 12, 13 and 15.

**Keywords:** Biodegradable packaging, corn husk, eco-design, environment, foods, sustainable development

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