



26th – 31st August 2019

**4th Africa International Biotechnology
& Biomedical Conference**
AIBBC 2019

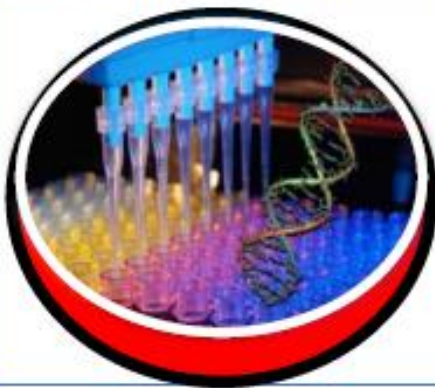


AIBBC

Advancing Science & Technology for Sustainable Development in Africa

26th-27th August: AIBBC Workshops, Institute of Primate Research, Nairobi

28th-30th August: AIBBC Conference, Pridelnn Paradise Beach Resort, Mombasa



www.aibbc-society.org

EFFECT OF ACETIC ANHYDRIDE, CITRIC ACID AND CELLULOSIC FIBERS ON THE PROPERTIES OF CASSAVA STARCH NANOCOMPOSITE FILM FOR EGG STORAGE

Tawakaltu AbdulRasheed-Adeleke¹, Evans Chidi Egwim¹, Stephen Shaibu Ochigbo²

¹Department of Biochemistry, Federal University of Technology P.M.B. 65, Minna, Niger State, Nigeria.

²Department of Chemistry, Federal University of Technology P.M.B. 65, Minna, Niger State, Nigeria.

ABSTRACT

The effect of cassava starch modifications on the properties of lignin-nanofiber-filled thermoplastic starch composite films was investigated for the extension of egg shelf-life. Starch was extracted from cassava and modified with acetic anhydride (AA), citric acid (CA) and dual modification with the two (AA/CA). Similarly, lignin and nanofibers were prepared from bamboo. Starch nanocomposite films were then produced by casting method from native and modified starch with lignin and nanofibers as fillers. The nanocomposite films were also optimized and characterized for water barrier, mechanical, thermal, and biodegradability properties. The packaging effect of starch nanocomposite films on egg quality parameters measured in terms of internal & external characteristics (egg weight, albumen height, yolk index, haugh height), biochemical changes, microbial studies and shelf life of the stored eggs were determined afterwards. The result showed that water absorption capacity of the modified starch films were significantly lowered ($p < 0.05$) compared to that of thermoplastic starch (TPS) and native starch films. Tensile strength, Percent elongation and Young's modulus values of 14 MPa, 30.08 % & 20.50 MPa respectively were recorded for TPS while 18 MPa, 45.24 % & 23.03 MPa were obtained for native starch film. The corresponding values of these parameters significantly increased ($p < 0.05$) to 21.50 MPa, 49.12 % & 26.53 MPa; 20.36 MPa, 48.60% & 25.25 MPa; and 21.51 MPa, 48.53% & 25.52 MPa for starch film modified with AA, CA and AA/CA respectively. TGA of the films showed that the modified films are more thermally stable than the TPS and native starch. Degradation was most rapid in native starch films especially pure TPS film and slower in modified starch nanocomposite films with starch mixture being the slowest. Results also showed that the starch nanocomposite films preserved the internal and external qualities of eggs up to 10wks at ambient temperature (AT) and 20 wks under refrigeration. Microbial growths were observed in the control samples at ambient temperature and under refrigeration. However, no growth was recorded for eggs stored with the starch nanocomposite films at ambient temperature and under refrigeration. It can thus be concluded that, modification with AA, CA and AA/CA improved the physicochemical properties of starch. Addition of fillers further improved the properties (water barrier, mechanical property and thermal stability) of the starch nanocomposite films. The modified films were also biodegradable and extended the shelf life of eggs beyond that of the controls. Therefore, the modified films are recommended for egg storage.

Keywords: Thermoplastic Starch, Lignin, Nanofiber, Nanocomposite, Egg, Shelf-life.

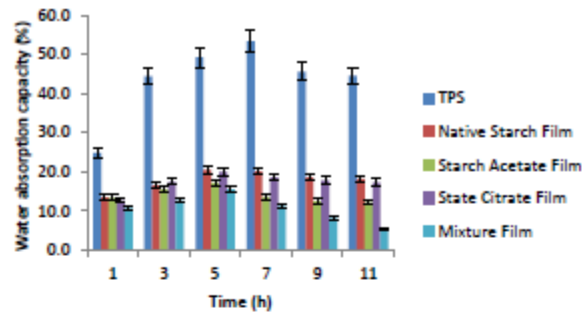


Figure 1: Water absorption capacity of TPS, modified and native starch films

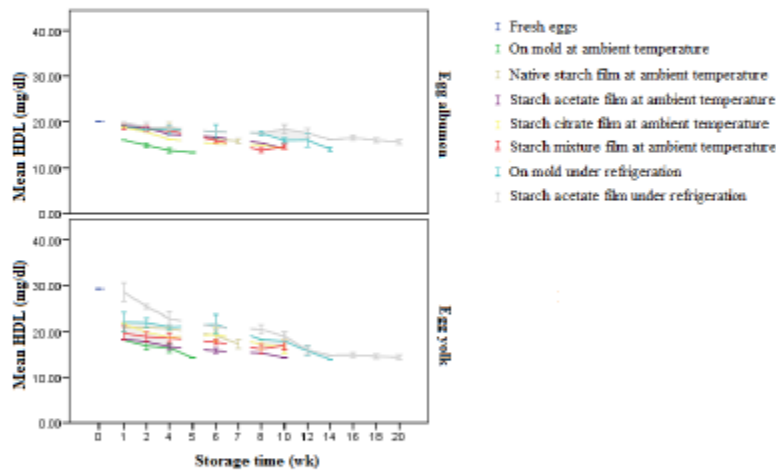


Figure 2: Effect of packaging material on the HDL content in eggs stored for 20 weeks

REFERENCES

- Khan, K.H., Ali, T.M., & Hasnain, A. (2014). Effect of chemical modifications on the functional and rheological properties of potato (*solanum tuberosum*) starches. *Journal of Animal & Plant Sciences*, 24(2), 550 – 555. ISSN: 1018-7081.
- Yeasmin, A., Azhar, K., Hishamuddin, O., & Awis-Qumi, S. (2014). Effect of storage time and temperature on the quality characteristics of chicken eggs. *Journal of Food, Agriculture & Environment*, 12 (3 & 4), 87 - 92 .

**INVITRO AND INVIVO ANTIOXIDANT ACTIVITY OF AQUEOUS EXTRACT OF
CARICA PAPAYA SEED**

*Funmilola Sherifat Adefolalu, Darius Ojigi and Tawakaltu AbdulRasheed-Adeleke

Department of Biochemistry, Federal University of Technology P.M.B. 65, Minna, Niger State, Nigeria

*Corresponding Author.

Abstract

High concentrations of free radicals are hazardous to cells triggering damage to cells and cellular constituents in living organisms. Antioxidant molecules play a major role in controlling the free radicals produced during the metabolic processes in the body scavenging excess free radicals, thereby maintaining the redox balance. The invitro and invitro antioxidant activity of the aqueous extract of *Carica papaya* seed was and the invitro antioxidant activity was determined using 1,1-diphenyl-2-picrylhydrazyl (DPPH) and lipid peroxidation inhibition assay. These were carried out using standard analytical methods. The invitro study was carried out using paracetamol to induce oxidative stress in mice. The phytochemicals present in *Carica papaya* seed were quantified.

The invitro antioxidant capacity was evaluated from the enzyme activities of superoxide dismutase (SOD) and catalase in the acute liver damage induced with paracetamol in mice. The median effective dose (EC50) was $402.1 \pm 3.0 \mu\text{g/ml}$, the total phenolic content was $74.1 \pm 1.1 \text{ mg/100g}$ and the total flavonoid was $117.56 \pm 2.1 \text{ mg/100 g}$. The highest DPPH scavenging activity of the aqueous extract was $86.6 \pm 1.1 \%$, the highest lipid peroxidation inhibition capacity of the extract was demonstrated at the concentration of $250 \mu\text{g/ml}$ to be $74.23 \pm 2.3 \%$. The DPPH scavenging capacity and lipid peroxidation inhibition increased with an increase in extract concentration. *Carica papaya* seed extract as compared to the negative control, showed an increase in the activity of SOD and catalase in the acute liver damage induced with paracetamol in mice. These results were significantly different compared to the group treated with standard drug sylimarin. The best dose for the invitro study was shown to be 400 mg/kg body weight. This study indicates that *Carica papaya* seed extract possess antioxidant activity.

Keywords: *Carica papaya*, free radicals, antioxidant, lipid peroxidation, SOD, catalase.

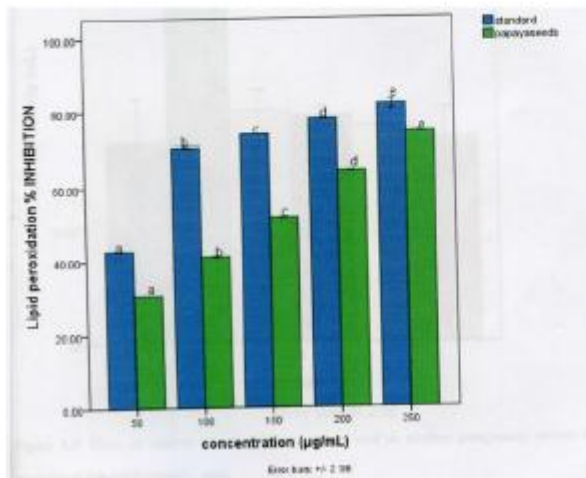


Figure 1: Inhibition of lipid peroxidation of aqueous extracts of *Carica papaya* seed

REFERENCE

Vertuani, S., Angusti, A. & Manfredini, S. (2014). "The antioxidants and pro-antioxidants network : an overview". *Current Pharmaceutical Design*. 10 (14): 1677-1694.