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MULTIFUNCTIONAL ECO-FRIENDLY PRODUCT BASED ON NATURAL EXTRACT FROM CALOTROPIS PROCERA FOR AGRICULTURE, BIOFOULING AND CANCER THERAPY APPLICATIONS

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PURPOSE OF THE ABSTRACT

The proliferation of diseases in plantations, control of fruit ripening, and damages in fruits during transportation are significant agricultural concerns. In addition, in cancer treatment research, understanding the relationship between the materials properties and cancer cellular responses is imperative. Thus, this research is based on the production of product based on natural extracts from Calotropis procera seeds for agricultural, anti-corrosive and cancer therapy applications. The material was characterized by XPS, FTIR, NMR, Surface Contact Angle, Bradford, and SDS-page. In addition, in vitro, and in vivo tests were performed to determine the antifungal activity and control of fruit ripening. As, the cytotoxicity against liver cancer cells (HEPG2) and normal cells (HEK 293T) was evaluated. Moreover, the anti-corrosive property was also analysed. The results showed that the product based on natural extract presented proteins in its composition, which may contribute to the antifungal and anti-corrosive characteristics. Furthermore, the chemical compounds presented in the extracts demonstrated anti-cancer properties, especially some proteins, i.e. serine/threonine-protein kinase, calactin and calotoxin. Furthermore, the difference in toxicity between HEPG2 and HEK 293T shows that these colloidal materials might be a key potential for liver cancer therapy (less 60 % for HEPG2 and over 80 % for HEK293T in viability of cells). The in vivo analysis in banana showed that the extract concentration of 50 µL.mL-1 presented the best results, controlling the fruit ripening and protecting against diseases. Thus, for the first time, these products based on natural extract from Calotropis procera seeds presented great potential for applications in preventing/fighting tumoral cells, as a versatile action towards agriculture and anti-corrosive applications.

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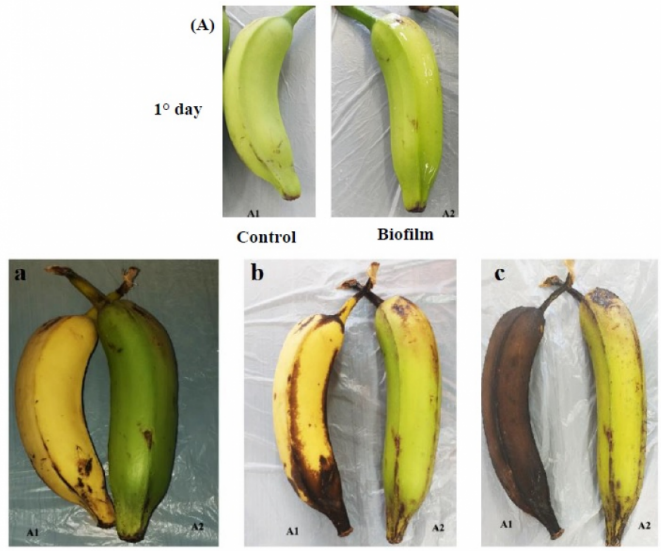
FIGURES



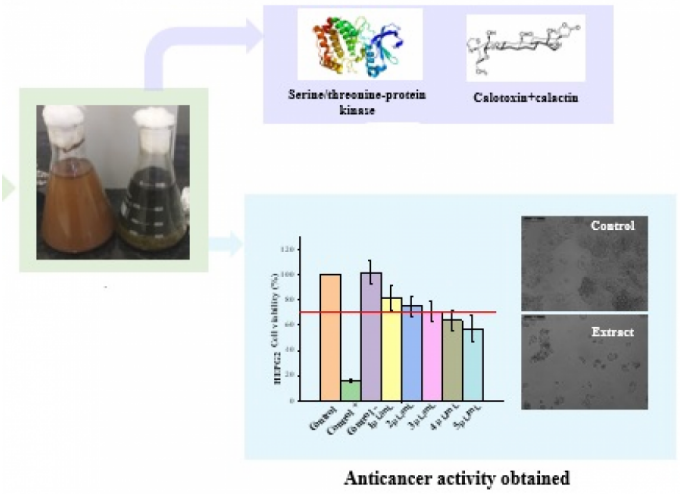


FIGURE 1

Fig.1

FIGURE 2

Fig.2

Green material from Calotropis procera seeds a sustainable and potential key for cancer therapy

KEYWORDS

Anti-cancer property | Biomolecules | Anti-fungicide | Sustainable Agriculture

BIBLIOGRAPHY

[1] A.S. Dukare, S. Paul, V.E. Nambi, R.K. Gupta, R. Singh, K. Sharma, R.K. Vishwakarma, Exploitation of microbial antagonists for the control of postharvest diseases of fruits: a review, Crit. Rev. Food Sci. Nutr. 59 (9) (2019) 1498–1513.

[2] E.Yasunaga, S. Fukuda, M. Nagles, W. Spreer. Effect of Storage Conditions on the Postharvest Quality Changes of Fresh Mango Fruits for Export during Transportation. Environ. Control Biol., 56 (2018) 39-44. Doi: 10.2525/ecb.56.39

[3] R.L. Siegel, K.D. Miller, A. Jemal, Cancer statistics, 2018, CA Cancer J. Clin. 68 (2018) 7–30.

[4] M.S. Sobrinho, G.M. Tabatinga, I.C. Machado, A.V. Lopes. Reproductive phenological pattern of Calotropis procera (Apocynaceae), an invasive species in Brazil: annual in native areas; continuous in invaded areas of caatinga. Acta Bot Brasil, 27 (2013) 456-459.

[5] N.H. Mohamed, M. Liu, W.M. Abdel-Mageed, L.H. Alwahibi, H. Dai, M.A. Ismail, G. Badr, R.J. Quinn, X. Liu, L. Zhang, A.A.M. Shoreit. Cytotoxic cardenolides from the latex of Calotropis procera. Bioorganic & Medicinal Chemistry Letters 25 (2015) 4615–4620.