CHEMICAL COMPOSITION, ANTIMICROBIAL, ANTIOXIDANT ACTIVITIES AND ADSORPTION STUDIES OF MUSA ACUMINATA AND MUSA BALBISIANA BRACTS.

BY

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CHE/10/3691

This research project is submitted to the postgraduate studies through the department of Chemistry, Federal University of Technology, Akure in partial fulfillment for the award of Master of Technology Degree in Industrial Chemistry.

JUNE 2014
ABSTRACT

The purpose of this study was to establish and evaluate the usefulness of banana and plantain bracts. The bract of banana (Musa acuminata) and plantain (Musa balbisiana) was investigated for its chemical composition, antibacterial, antioxidant and adsorption capacity. The result of proximate analysis and mineral composition of the bracts showed that moisture content of the samples ranged between 7.83-8.39%, crude protein, crude fibre, crude fat, total ash contents and carbohydrate ranged between: 1.53-1.57, 16.5-21.2, 2.01-2.25, 14.6-15.10 and 52.6-56.8% dry matter (DM) respectively. Mineral content ranges as follows (mg/100g) calcium, 390-520, potassium, 127.3-169, sodium 91.2-103, chlorine 26.3-21.4, iodine 15.4-18.6, and low levels of potassium 2.92-4.31, magnesium 0.68-0.90, manganese 0.42-0.38, zinc 0.33-0.39, iron 0.09-0.1, aluminum 0.07-0.08 and copper 0.03-0.03 respectively. The cellulose and lignin content of the samples ranges between 34.61-35.68 and 11.0-11.68 respectively. The phytochemical analysis showed that it contained (g/100g) tannins 29.01-24.21, flavonoids 6.33-8.34, saponin 25.08-26.02, phenol 0.34-0.56 and alkaloids 3.37-3.75.

Antimicrobial activity of crude methanolic, ethylacetate and n-Hexane extracts against the bracts showed a wide spectrum of inhibition against bacteria such as Bacillus cereus, P. syringe, C. albica B. subtilis, Pv. Vignicola, Pv. manihoti and E. coli. Methanolic and ethylacetate extracts exhibited appreciable activity against most of the bacterial species investigated. The zones of inhibition exhibited by the extracts against the test bacteria species ranged from 2 to 10, 2 to 7, 0 and 13.5 to 15mm for methanol, ethylacetate, n-Hexane extracts and standard respectively.

Ethanolic extract of Musa acuminata bract have the strongest antioxidant activities. The 1.5 mg ml$^{-1}$ of the ethanolic extracts and aqueous extracts were able to scavenge 1,1-diphenyl-2-picryl-
hydrazyl (DPPH) radical up to 47-43% and 35-32%, chelate 47-45% and 34-30% of Fe$^{2+}$ at 5 fold dilution and reduced 0.43-0.41mgml$^{-1}$Fe$^{2+}$$^{-1}$ and 0.35-0.32mgml$^{-1}$Fe$^{2+}$$^{-1}$ of Fe$^{3+}$ to Fe$^{2+}$ at 5 fold dilution respectively.

The activated carbon obtained from the bractshas high removal capacities of inorganic waste such as lead.

The adsorption of Lead (II) ion was investigated. Lead II ion exhibited excellent adsorption at pH 6. The optimum pH for this study was pH 6 where all carbon produced had metal uptake of 99.38%, 99.43%, 99.98% and 99.72% for POA-C, BOA-C, PCA-C and BCA-C respectively. Essential nutrients and minerals were present in the bracts of *M. acuminata and M. balbisiana*have potential to be utilized as a source of feed supplement, antimicrobial agent and protective agent against oxidative stress.
CHAPTER ONE

1. INTRODUCTION

The medicinal plants find application in pharmaceutical, cosmetic, agricultural and food industry. The use of the medicinal herbs for curing disease has been documented in history of all civilizations. Man in the pre-historic era was probably not aware about the health hazards associated with irrational therapy. With the onset of research in medicine, it was concluded that plants contain active principles, which are responsible, for curative action of the herbs. (Phytotherapy Research, 1996). Higher plant species which is about 2,50,000 on earth, more than 80,000 species are reported to have at least some medicinal value and around 5000 species have specific therapeutic value. (Dey, 1984). Plant secondary metabolites are well known for their bioactive properties and have been used for centuries as drugs and preservatives (Duru and Onyedineke, 2010; Tiwari et al., 2009). These metabolites are produced within the plants for many reasons and some known metabolites have been found to play a very important role in the plants defense against various types of stress, which includes climatic stress (Munne-Bosch et al., 2001), microbial infestations (Huang et al., 2006) and attack by herbivores (Sa et al., 2008). Recently, many plants have been identified to be containing antibacterial and antioxidant constituents, indicating the potential to be exploited in the field of crop bio-control (Oyelana et al., 2011) pharmaceutical, medicine food and beverage as well as food and beverage industry (Chye and Sim, 2009; Tiwari et al., 2009). The synthesis of large numbers of antibiotics over the past decades has caused complacency about the threat of bacterial resistance to both humans and animals (Adeleke and Omafuvbe, 2011; Frederick, 2011; Ynalvez et al., 2012). Bacteria become resistant to antimicrobial agents due to chromosomal changes or the exchange of genetic materials via
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