BOOK OF ABSTRACTS

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ADDENDUM

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"Microbial Bio-Heritage and the Post-COVID Dynamics of Global Relevance"

BOOK OF ABSTRACT FOR THE 44th ANNUAL CONFERENCE OF THE NIGERIAN SOCIETY FOR MICROBIOLOGY

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"Microbial Bio-Heritage and the Post-COVID Dynamics of Global Relevance"

BOOK OF ABSTRACT FOR THE 44th ANNUAL CONFERENCE OF THE NIGERIAN SOCIETY FOR MICROBIOLOGY

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Paper ID *(HE108.)*

Antimicrobial Evaluation of *Salvadora persica* Methanolic Stem Extract and *in silico* Modelling of its selected Phytochemical Constituent for Dental Plaque Treatment

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Abstract

Background: The rise of antimicrobial resistance has spurred interest in natural products as alternative therapeutic agents. This study focuses on the antimicrobial potential of *Salvadora persica*, commonly known as the chewing stick, which is traditionally used for oral health maintenance. **Materials and Methods**: Samples were purchased at Sheik Gumi Market, Kaduna State from local Yoruba and Hausa herb sellers. Sixty 60 g of the pulverized dried stem was soaked in 180ml of 95% methanol and kept in the dark for 7 days, filtered using Whatman No. 1 filter paper, and evaporated to dryness at 40C. The antimicrobial activities of *Salvadora persica* methanolic stem extract were evaluated against three clinical strains: *Escherichia coli, Staphylococcus aureus, and Aspergillus niger*. The isolates were obtained from the Microbiology Laboratory of Kaduna Polytechnic. Organisms were authenticated with several biochemical tests. The antibacterial and antifungal effects were assessed using the agar well diffusion method. Minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) values were determined *invitro*. **Results and Conclusion**: *Salvadora persica* extract exhibited significant antimicrobial activity against all tested isolates, particularly against bacteria. At 100mg/ml, the zone of inhibitions were 22.1, 15.4, and 18.6 while at 12.5 mg/ml it was recorded at 11.0, 8.4, and 6.2 for *Staphylococcus aureus, Escherichia coli*, and *Aspergillus niger*. The MIC and MBC values for bacteria were determined to be 12.5 mg/mL and 25 mg/mL, respectively. Phytochemical screening of the extract revealed the presence of alkaloids, tannins, flavonoids, saponins, and traces of terpenoids. *In silico* modeling of the compounds identified in the *Salvadora persica* chewing stick extract highlighted the potential role of an aromatic nitrogen-rich compound (PubChem ID: 135580681) in the observed antibacterial effects against dental plaque. This compound holds promise as a potential therapeutic agent for dental plaque treatment.

Keywords: Antimicrobial, antibacterial, antifungal, phytochemical and *Salvadora persica*.

SUBTHEME: CLIMATE CHANGE TRANSITIONS AND EVOLUTION OF MICROORGANISMS (ENVIRONMENT)

Paper ID *(CCE025.)*

Bioleaching of Metals from Printed Circuit Board of Computer Using *Pseudomonas aeruginosa* and *Bacillus subtilis*

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ABSTRACT

Background: Advance in technology and quest for latest gadget has resulted in huge amount of electronic waste (e-waste) that end up in landfills. Bioleaching is a reliable, ecofriendly and cost-effective method of handling the hazardous nature of electronic waste. Therefore, the aim of this study was to utilize *Pseudomonas aeruginosa* and *Bacillus subtilis* in the bioleaching of metals from printed circuit board of computer. **Material and Method:** This research was carried out in Jos North Local Government area of Plateau State, Nigeria. Two (2) printed circuit board (PCB) of computer was obtained from a Shop in Ahmadu Bello Way where computers are repaired. Capacitors and batteries were removed from the PCB and further crushed into powder for use. Pure isolates of *Bacillus subtilis* and *Pseudomonas aeruginosa* were obtained from Bacteriological Laboratory of the National Veterinary and Research institute, Vom (NVRI). The metal content of the computer crushed samples were analyzed, followed by two-step bioleaching studies which were carried out for seven days at 37^{o}C to increase the mobilization of metals from 1g and 5g of e- waste. The pH, protein content and percentage of bioleached metals were analyzed quantitatively. **Result and Conclusion:** The pH of the sample increased as the period of incubation increases from day1 to day 7. *Pseudomonas aeruginosa* was capable of leaching Cu (95% w/w) , Zn (3% w/w), Fe (25% w/w) and Ni (42% w/w) at an electronic waste concentration of 1% w/v. *Bacillus subtilis* was able to leach out Cu (87%), Zn (5%), Fe (49%) and Ni (35%) at an electronic waste concentration of 1%. Bioleaching is a promising tool that can be used to extract valuable metals from electronic waste.

Key words: E- waste, Bioleaching, Environment, *Pseudomonas aeruginosa*, *Bacillus subtilis*

Paper ID *(CCE026)*

Screening of Metabolites by *Enterococcus* spp Isolated from Cassava mill and Abattoir.

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ABSTRACT

Background: *Enterococcus* species are lactic acid bacteria and can survive in many environment due to its diverse metabolic activity. The study aimed to identify the beneficial metabolites produced by *Enterococcus* species isolated from wastewaters. **Material and Methods:** A total number of 8 samples were collected from abattoir (4) and cassava mill (4) wastewaters in Lafia and screened for *Enterococcus* species using cultural and biochemical characteristics. Extraction of metabolites was done using chloroform, ethanol, and acetonitrile (3:3:1) prior to gas chromatography mass spectroscopy analysis (GC-MS). GC-MS identified 128 metabolites based on their relative retention time and abundance in percentage. The predominant metabolites identified in isolates from abattoir were Cyclotrisiloxane, hexamethyl- (32.94%), 9-Octadecenoic acid (Z) -, 2 hydroxyethyl ester (25.81%), Succinic acid, 4-chloro-3-methylphenyl 2-methoxyphenyl ester (19.02%), 6-octadecenoic acid, (Z)- (17.78%), 1,2-Benzisothiazol-3-amine TBDMS derivative (17.43%), while the predominant metabolites identified in isolates from cassava mill were Tetrasiloxane, decamethyl (23.77%), Benzene, 1,3,5-tris (2,2-dimethyl propyl)-2-iodo-4-nitro (21.78%), n-Hexadecanoic acid (23.43%), 6-octadecenoic acid (17.78%), Cyclotrisiloxane, hexamethyl- (17.69%) and Methyl dihydroisosteviol (15.39%). The results revealed the presence of steroid hormones Ergosterol and 16-Pregnenolone from cassava mill isolates. Ergosterol is commonly known as fungal hormone and 16-Pregnenolone were first isolated in meconium and a medicinal plant. Majority of the metabolites identified in *Enterococcus* species are like the bioactive compounds identified in some medicinal and higher plants with therapeutic activities.

Keywords: Metabolites, Wastewater, *Enterococcus* species, Cassava, Abattoir, GC-MS

SUBTHEME: POST-COVID DYNAMICS OF AGRICULTURAL SUFFICIENCY AND FOOD SECURITY (AGRICULTURE)

Paper ID *(PAFF026.)*

Efficacy of Various Preservation Methods on Bacterial Load of West African Soft Cheese "Wara"

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Abstract

Background: West African soft cheese, commonly known as *wara*, is prone to microbial spoilage due to its high nutritional profile. **Materials and Methods**: In this study, the effects of canning in mason jars at 115 ^{o}C for 75 minutes, treatment with aqueous extracts of *Ocimum gratissimum* (OG) obtained by boiling and *Curcuma longa* (CL) obtained by rotary extraction, and refrigeration at 4 ^{o}C on the proximate and microbial properties of cheese were investigated for 30, 14 and 14 days respectively. The proximate compositions of the samples were determined using Association of Official Analytical Chemists' methods, while the bacterial and fungal isolates were identified using ABIS online software and reference texts, respectively. **Results and Conclusion**: Proximate analysis showed no significant changes in the moisture, lipid and dry matter contents between fresh (control) and preserved "wara" samples ($P < 0.05$). Treatment with OG and CL, refrigeration, and canning significantly increased ($P < 0.05$) the ash, crude fiber and carbohydrate contents of control sample from 1.28 ± 0.00%, 0.04 ± 0.00% and 6.70 % ± 0.01 to 1.99 ± 0.01%, 0.47 ± 0.02% and 7.12 ± 0.00% respectively. Furthermore, refrigeration, and OG and CL treatment reduced the protein content of the *wara* from 7.96 ± % to 5.37 ± 0.00% and 5.34 ± 0.00% respectively, while refrigeration and canning decreased ($P < 0.05$) the carbohydrate content and pH of *wara* from 6.70 %± 0.10 and 7.00± 0.14 % to 4.87 ± 0.00% and 5.65 ± 0.07% respectively. Canning, refrigeration, and treatment with OG and CL reduced the total viable bacteria count of control. While all methods inhibited fungi, treatment with aqueous extracts of OG and CL, and refrigeration were the most effective in inhibiting bacteria associated with the spoilage of *wara* as only *B. pumilus* and *B. subtilis* and other *Bacillus* sp., were not inhibited.

Keywords: Canning, *Ocimum gratissimum*, *Curcuma longa*, refrigeration, proximate composition, Wara

Paper ID (*PAFF027*.)

Biochemical Composition and Fungal Species Associated with Irish Potato Flour Produced from Four Varieties Potato Cultivated in Jos.

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ABSTRACT

Background: Potato is susceptible to microbial deterioration, therefore the need to process. The acceptability of processed flours depends on its Microbial and biochemical composition. This work determined the biochemical and microbial quality of potato flour.**Materials and Methods**: Four varieties of identified potato tubers obtained from National Root Crop Research Institute, Vom which include Marabel, Caruso, Diamante and Nicola. One kilogram of washed tubers used were either in their peeled or unpeeled forms. Tubers were sliced, portions were dried both using oven at 65 ^{o}C for 13 h and the sundried at ambient temperature (27±2 ^{o}C), and thereafter pulverized into fine flour. Biochemical composition was determined by (AOAC,2000) for the moisture, crude protein, crude fiber, lipid, ash, carbohydrate, calcium (Titrimetry) and phosphorus (Colorimetry). Microbiological quality was determined on Potato Dextrose Agar, MacConkey Agar and Nutrient Agar and microbes were identified by standard protocols using microscopy and biochemical tests. Two-way Analysis of variance (ANOVA) was used to analyze data.**Results and Conclusion**: Flour colours ranged from cream to brownish cream. There was significant difference for the findings at ($p \geq 0.05$). For the unpeeled oven dried potato flour, moisture, protein, fiber, fat, carbohydrate, calcium, phosphorus content ranged from 5.77±0.06-0.02±0.00. For the unpeeled sundried moisture, protein, fiber, fat, carbohydrate, calcium, phosphorus ranged from 13.11±0.11-0.02±0.01. For the peeled oven dried, moisture, protein, fiber, fat, carbohydrate, calcium, phosphorus content ranged from 10.25±0.05-0.02±0.00. For the peeled sundried, moisture, protein, fiber, fat, carbohydrate, calcium, phosphorus content ranged from 10.27±0.21-0.02±0.00. The fungal and bacterial genera isolated were *Cladosporium*, *Aspergillus*, *Penicillium*, *Fusarium*, *Rhizopus*, *Bacillus*, *Staphylococcus*, *Serratia*, *Citrobacter* and *Enterobacter* . Flours had microbial contamination but regarded as safe. The biochemical composition showed flours contained nutrients.

Keywords: Irish potato flour, Biochemical composition, Fungal species, Microbial quality

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