The Centre for African Wetlands (CAW)

University of Ghana, Legon

Accra, Ghana
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SESSION: Aquatic and terrestrial toxicology and ecology

Final ID: A1
SESSION: Aquatic and terrestrial toxicology and ecology
TITLE: Environmental Risks Perception and Toxicological Evaluations of Paraquat and Dichlorvos against the Giant African Land Snail (Archachatina marginata, Swainson, 1821)
AUTHORS/INSTITUTIONS: Oluwakemi Emmanuel, University of Lagos Akoka Lagos Nigeria / Department of Zoology; Temitope Sogbanmu, UNIVERSITY OF LAGOS / Zoology
PRESENTER (E-MAIL ONLY): tsogbanmu@unilag.edu.ng SECTOR: Academia
MEMBERSHIP STATUS: Type 11 AF Dev2 Asso Exp: 2021-12-09
ABSTRACT BODY: Pesticides are priority pollutants in various environmental matrices due to their ubiquity and potential toxicological effects. In this study, environmental risk evaluations of pesticides commonly used by farmers in Tejuosho practicing farms in Yaba local government area of Lagos, Nigeria were investigated. Structured environmental questionnaires were administered to 200 stakeholders at the study site. Pesticides and other physico-chemical parameters were analysed in Giant African land snails (Archachatina marginata), soil and groundwater samples collected from the farm. Also, sublethal toxicity studies were conducted with Archachatina marginata exposed to selected pesticides (paraquat and dichlorvos) used in the farm for 56 days. Histological evaluations were carried out on the hepatopancreas and edible foot while genotoxic assessments (micronucleus and comet assays) were carried out in the haemolymph of A. marginata. Paraquat (32%) and dichlovors (39%) were the most commonly used pesticides, most respondents' drinking water source was sachet water and some form of groundwater treatment is carried out before use. Physico-chemical parameters such as oil and grease, chlorides, and pesticides analysed in groundwater, soil and snails from the farms were within WHO set limits. The 96 hLC50 results of paraquat and dichlorvos against A. marginata were 0.49 mL/L and 145.42 mL/L respectively. The sublethal studies revealed varying histological alterations such as wall glandular hypertrophy in the edible foot, cellular alteration, inflamed hepatic tubule and some clogged hepatocytes in the hepatopancreas of A. marginata exposed to the pesticides. There were no significant (p>0.05) changes in the haemolymph cells of A. marginata as observed in the micronuclei and comet assays. The study demonstrates the potential biological effects of paraquat and dichlorvos to non-target organisms like A. marginata. The possibility of bioaccumulation of the pesticides in snails and biomagnification along the food chain with the likelihood of human health risks is of concern and should be addressed by relevant regulatory agencies and stakeholders.
KEYWORDS: Chronic toxicity, Genotoxicity, Pesticide, Soil
OGBOZIGE, F. "MAPPING SURFACE WATER QUALITY: A TRIBUTARY OF RIVER NIGER" [47908]

Final ID: A2
SESSION: Aquatic and terrestrial toxicology and ecology
TITLE: MAPPING SURFACE WATER QUALITY: A TRIBUTARY OF RIVER NIGER
AUTHORS/INSTITUTIONS: Francis James OGBOZIGE, Adie DB, Igboro SB, Ahmadu Bello University Zaria / Department of Water Resources; Giwa A, Ahmadu Bello University Zaria / Department of Polymer and Textile Engineering
PRESENTER (E-MAIL ONLY): engr.ogbozige@gmail.com
SECTOR: Academia
MEMBERSHIP STATUS: Type 11 AF Dev2 Asso
ABSTRACT BODY: Water samples from 15 different locations were collected from River Kaduna for a period of 12 months. The samples were analyzed for 6 water quality parameters which are; temperature, dissolved oxygen (DO), 5-day biochemical oxygen demand (BOD₅), chemical oxygen demand (COD), total nitrogen (TN) and total phosphorus (TP). Laboratory results were used in mapping the water quality of the river in terms of the analyzed parameters for both dry season and rainy season. Results revealed that irrespective of season, the water temperature of the entire portion of the river monitored was within the permissible limit set by U.S EPA. Conversely, COD and TP were found to have concentrations above the permissible limits all through the sampling period regardless of the sampling location and season. This is because the minimum observed concentrations of COD and TP were respectively 35.34 mg/l and 0.10 9mg/l while their respective permissible limits for river protection are 20 mg/l and 0.1mg/l.
KEYWORDS: Biomonitoring, Ecological risk assessment, Ground water, Human health

Ezeji, E. "Effect of Corchorus olitorius on Permethrin Induced Changes ..." [47915]

Final ID: A3
SESSION: Aquatic and terrestrial toxicology and ecology
REQUESTED PRESENTATION TYPE: Platform
TITLE: Effect of Corchorus olitorius on Permethrin Induced Changes in Lipid Profile and Antioxidant Status of Female Rats
AUTHORS/INSTITUTIONS: Ethelbert Ezeji, Federal University of Technology / Biotechnology
PRESENTER (E-MAIL ONLY): ucheezeji@yahoo.com
SECTOR: Academia
MEMBERSHIP STATUS: Type 11 AF Dev2 Asso Exp: 2018-11-09
ABSTRACT BODY: This study was carried out to investigate the effect of aqueous leaf extract of Corchorus olitorius (AECO) on permethrin induced changes in lipid profile and antioxidant status of female albino rats. Twenty female wistar rats weighing 88-157g were divided into 4 groups of 5 rats each. Group I received 10g of permethrin insecticides (RAMBO) and 400mg/kg bodyweight of AECO while groups II and III received 10g of Rambo and 400mg/kgbw AECO respectively. Group IV served as the control. The rats were monitored for 28days and were given commercial feeds and water ad libitum. Rats were sacrificed after 28 days and blood was collected for analysis. There was a significant reduction (p < 0.05) in total cholesterol between control and treated samples. Total cholesterol increased significantly from 69.47 ±6.92 mg/dl in Group II to 80.26 ± 1.86 mg/dl in Group I. The level of triglyceride was significantly reduced in treated rats compared to the control. High density lipoprotein cholesterol (HDL-C) of the control group was significantly higher than others (p < 0.05). Liver protein content was slightly elevated in treated rats compared to the control. The
differences in level of glutathione were not significant (p > 0.05) while the activity of glutathione s-transferase was slightly lowered following the administration of AECO. There was no significant difference (p > 0.05) in lipid peroxidation of the rats following the introduction of Corchorus olitorius in the diet of the rats. Corchorus olitorius has the potential of reducing the effect of permethrin exposure on albino rats.

**KEYWORDS:** Insecticides, Pesticide
biota. Constant assessment of HM in water and sediment in Nigeria is a veritable tool for the management of aquatic pollution. Information on pollution status of Gbalegbe River (GR) is limited. Hence, HM Pollution impact on water and sediments of GR, were studied. Gbalegbe River was spatially stratified into eight stations (S1 – S8) based on anthropogenic activities. In each station, three sampling points were randomly selected. Seasonal stratification covered rainy (Early: March – April and Late: September – October) and dry (Early: November –December and Late: January –February) seasons. Water and sediments samples were collected from each station bi-weekly for 24 months following standard methods. The HM - Cu, Cr and Pb in water (mg/L) and sediment (mg/Kg) were analysed using Atomic Absorption Spectrophotometer. Data were analysed using descriptive statistics and ANOVA at \( p < 0.05 \). In water, significantly highest and least mean Cu were 0.19±0.03 and 0.11±0.02; Cr (0.78±0.13, 0.03±0.01) and Pb (0.25±0.12, 0.10±0.01) in S2 and S1, respectively. Seasonally, highest mean Cu was 0.12±0.10 in early rainy season, 0.26±0.07 in early dry season; Cr (0.13±0.04) in late rainy season, (0.27±0.06) in early dry season; Pb (0.23±0.12) in late rainy season, while 0.27±0.06 was recorded for both early and late dry seasons, respectively. Spatially, highest and least mean HM in sediment were: Cu (0.07±0.02, 0.19±0.04); Cr (0.06±0.02, 0.34±0.01) and Pb (0.03±0.01, 0.08±0.02) in S2 and S1, respectively. Highest seasonal mean of Cu in sediment was 0.13±0.02 in early rain, 0.16±0.11 in late dry season; Cr (0.13±0.03) in late rain, 0.14±0.10 in early dry season; Pb (0.06±0.02) in late rain, 0.08±0.03 in early dry seasons, respectively. Heavy metal contamination level in Gbalegbe River was low. Regular monitoring should be done, to ensure the conservation of biodiversity.

**KEYWORDS:** Aquatic toxicity, Biomonitoring, Sediment, Wetlands

2nd SETAC Central/West Africa Regional Conference

**Final ID:** A6

**SESSION:** Aquatic and terrestrial toxicology and ecology

**TITLE:** MERCURY AND HEAVY METAL POLLUTION OF THE BIRIM RIVER, GHANA

**AUTHORS/INSTITUTIONS:** EUGENE ANSAH, GODFRED DARKO, K. N. U. S. T. / Chemistry; EMMANUEL OBUOBIE, Council for Scientific and Industrial Research; JESPER BAK, Aarhus University / Agriculture Biology Environment and Natural Resources; OPOKU GYAMFI, Kwame Nkrumah University of Science and Technology / Analytical Environmental Chemistry

**PRESENTER (E-MAIL ONLY):** eeusah@gmail.com **SECTOR:** Academia

**MEMBERSHIP STATUS:** Student Guest

**ABSTRACT BODY:** Birim river is one of the main tributaries of the Pra River, which ranks among freshwater bodies of economic importance in Ghana. The Birim river serves as a source of water for domestic water supply, irrigation and commercial/industrial activities in south-eastern Ghana. Artisanal mining activities along river bodies promote continual introduction of wide range of contaminants (heavy metals) into these water bodies, and their toxicity poses great threat to the environment and human beings. Concentrations of As, Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, Sb, Sn, Hg, and Zn in the sediment of Birim river has been measured using XC Ray Fluorescence spectrophotometer for the metals and Cold Vapour Atomic Absorption Spectrophotometer (CVAAS) for Hg. The mean concentrations (mg/kg) recorded for the sediment samples taken at different locations on the river over a year were: Fe (42918.50) > Mn (427.55) > Cr (112.05) > Co (103.87) > Zn (62.52) > Cu (32.96) > Ni (25.80) > As (25.32) > Sb (6.86) > Cd (6.11) > Pb (6.00) > Sn (4.44) > Hg (0.07). The concentrations of some metals in the sediment samples were found to exceed recommended values in international environmental soil/sediment quality guidelines (mg/kg) of; As (12), Cd (10), Co (50), Cr (64), Cu (63), Ni (45), Pb (140), Hg (6.6) and Zn (200), indicating pollution of the sediment. Hazard indices were explored to determine the extent of pollution of the water body. Geo-accumulation index (Igeo) revealed that the area is moderately polluted with Cd and Zn and strongly polluted with As, while contamination factor shows that the area is strongly contaminated with As and Zn, moderately contaminated with Cd and Mn, and uncontaminated with the remaining metals. The Enrichment Factor (EF) indicated human influence - artisanal
mining activities on the sediment concentration of As, Cd and Zn for the river. The risk indices explored shows that there is the need for continuous monitoring of metal contamination of the river as well as the basin as they are used for domestic purposes to avoid future disaster. For the water samples, metal concentration measured were lower than WHO standards exception for Fe. However, the mean discharge of the river is 74.2 m$^3$/s, indicating a relatively swift flow of the river hence dissolved metals would not be localised. *Department of Chemistry Kwame Nkrumah University of Science and Technology Kumasi, Ghana. Email: eeusah@gmail.com Phone: +233 242 568 650 www.sheathe.org KEYWORDS: Ecotoxicology, Metals, Sediment

2nd SETAC Central/West Africa Regional Conference Ferdinand, P. "Effects of Dichlorvos pesticide on haematological and biochemical characteristics of male albino rats" [47926]

Final ID: A7
SESSION: Aquatic and terrestrial toxicology and ecology
REQUESTED PRESENTATION TYPE: Platform
TITLE: Effects of Dichlorvos pesticide on haematological and biochemical characteristics of male albino rats
AUTHORS/INSTITUTIONS: Ethelbert Ezeji, Federal University of Technology / Biotechnology; Paschaline Ferdinand, Federal University of Technology Owerri / Biotechnology
PRESENTER (E-MAIL ONLY): pascysweet@gmail.com SECTOR: Academia
MEMBERSHIP STATUS: Type 11 AF Dev 2 Stu Exp: 2018-10-30
AGREE TO BE RECORDED: FALSE
ABSTRACT BODY: This study was carried out to investigate the effect of different concentrations of Dichlorvos pesticide on hematological and biochemical characteristics of male albino rats. Twenty mature male albino rats weighing between 300-350 g were exposed to different concentrations of dichlorvos (0.01%, 0.03% and 0.05%) respectively by adding the pesticide in their drinking water. The control group had no pesticide added. Results show an observable increase in the activities of liver function enzymes as alanine transaminase (ALT) values showed significant difference (p< 0.05) in the 0.01% contamination (57.5 ± 2.12 iu/l). Aspartate transaminase (AST) showed significant difference at all levels of contamination: 0.01% (497.0 ± 24.04 iu/l, 0.03% (482.5 ± 10.60 iu/l) and 0.05% (510.5 ± 13.43 iu/l). These differences showed significant level of toxicity in the liver. Urea also showed significant increase (p< 0.05) at all levels of contamination: 0.01% (65.5 ± 14.8 mg/dl), 0.03% (67.0 ± 2.82 mg/dl) and 0.05% (65.5 ± 14.84 mg/dl). Creatinine showed no significant difference (p> 0.05) between the control and the treated groups. All these biochemical indices showed that dichlorvos has deleterious effects on the rats and suggest similar effects to the tissues of other organisms. There were, however, no significant differences in all the haematological parameters tested between the rats exposed to dichlorvos and the control.
KEYWORDS: Chronic toxicity, Pesticide

2nd SETAC Central/West Africa Regional Conference Olaifa, F. "Biochemical changes in Clarias gariepinus juveniles exposed ..." [47941]

Control ID: 47941
Final ID: A8
SESSION: Aquatic and terrestrial toxicology and ecology
TITLE: Biochemical changes in Clarias gariepinus juveniles exposed to sublethal concentrations of lead and zinc chloride in water with and without bracken fern (Pteridium aquilinum)
AUTHORS/INSTITUTIONS: Flora Olaifa, University of Ibadan, Ibadan. Nigeria / Aquaculture &Fisheries Mgt.; Olubukola Akintayo, University of Ibadan Ibadan Nigeria / Aquaculture and Fisheries Management
Lead and zinc are heavy metals present in the environment naturally, and through anthropogenic activities. Lead is known for its high toxicity on living organisms, while zinc is an essential element, which could become toxic at high concentrations. Phytoremediation is a means of cleaning up heavy metals from the environment. Studies were carried out to investigate the effects of lead and zinc separately on the serum and enzymes of *Clarias gariepinus* exposed to sub lethal concentrations of both metals in chloride forms with or without *Pteridium aquilinum* (bracken fern). Four different experiments (two for lead and two for zinc) were carried out in a static, chronic bioassay for four weeks. The first two experiments contained separately the two metals at (0.0, 0.8, 1.6, 2.4 and 3.2mg/l), *C. gariepinus* and *P. aquilinum*. The other two experiments had similar concentrations of both metals and *C. gariepinus* without bracken fern. Each metal concentration represented a treatment and had two replicates. Results were subjected to descriptive statistics and ANOVA at 0.05 level of significance. The results showed that lead and zinc contamination caused variations in biochemical parameters and blood enzymes indicating that fish serum could reflect the environmental metal stress in a contaminated environment. Keywords: phytoremediation, *Clarias gariepinus*, *Pteridium aquilinum*, lead toxicity, biochemical parameters.

**KEYWORDS:** Bioaccumulation, Chronic toxicity, Metals, Remediation
and 6 orders were recorded. Among the orders, the most dominant was Diptera (44.94%), followed by Odonata (28.31%), Ephemeroptera (13.77%) and the least was Diplogasterida (0.26%). The families were dominated by Chironomidae (32.47%), followed by Baetidae (13.77%) and Libellulidae (12.73%) and the least was Diplogastridae (0.26%). Species richness was highest at station 1 (4.002) and lowest at station 3 (2.745) with the highest species evenness in the study (0.6924). The elevated levels of the heavy metals showed that anthropogenic activities may be affecting the water quality and benthic community of Oghan River. There is need for the regular assessment of the river to monitor the water quality and its implication for aquatic biodiversity, water management and public health. Keywords: water quality assessment, macrobenthic invertebrates, Oghan River, heavy metals, sediments, water pollution, KEYWORDS: Aquatic toxicity, Biomonitoring, Sediment, Water quality

2nd SETAC Central/West Africa Regional Conference AROJOJOYE, O. "IMPACT OF ENVIRONMENTAL POLLUTION ON OXIDATIVE STRESS INDICES IN AFRICAN CAT FISH (CLARIAS GARIPEPINUS) FROM ARAROMI RIVER IN ONDO STATE, NIGERIA

SESSION: Aquatic and terrestrial toxicology and ecology TITTLE: IMPACT OF ENVIRONMENTAL POLLUTION ON OXIDATIVE STRESS INDICES IN AFRICAN CAT FISH (CLARIAS GARIPEPINUS) FROM ARAROMI RIVER IN ONDO STATE, NIGERIA

AUTHORS/INSTITUTIONS: OLUWATOSIN AROJOJOYE, University / Biochemistry; Ademola Oyagbemi, University of Ibadan / Department of Veterinary Physiology; Jeremiah Afolabi, University of Ibadan / Faculty of Veterinary Medicine; OLAJUMOKE NWAECHEFU, RACHEAL ASAOLO, Lead City University / Biochemistry

PRESENTER (E-MAIL ONLY): tosyne568@yahoo.com SECTOR: Academia

ABSTRACT BODY: The effects of man's activities on the environment include depletion of natural resources alongside pollution of water bodies. In this study, we assessed the environmental safety of Araromi River, located in an oil producing area in Ondo State, Nigeria by determining the levels of heavy metals (copper, cadmium, chromium, nickel, lead) and some biomarkers of oxidative stress (malondialdehyde, glutathione-S-cysteinyltransferase, glutathione peroxidase, catalase, superoxide dismutase, myeloperoxidase and reduced glutathione) in Clarias gariepinus (350-400g) from the river using standard methods. Clarias gariepinus from a clean fish farm in the same geographical location as the reference site (Ilesannmi fishery) were used as control. Water samples from both sites were also analysed for some physicochemical parameters, heavy metals and bacterial contamination. Our findings show significant increase in malondialdehyde level (index of lipid peroxidation) as well as alterations in antioxidant status in the organs of Clarias gariepinus from Araromi River compared with control. Significant increase in bacterial contaminants, heavy metal pollutants and particulate matter deposits were also observed in water sample from Araromi River compared with control. In conclusion, high levels of indicators of environmental pollution observed in water sample from Araromi River coupled with induction of oxidative stress in Clarias gariepinus from the river show that Araromi River is polluted; therefore, consumption of fishes and other aquatic organisms from the River may be unsafe for the people in that community.

KEYWORDS: Aquatic toxicity, Ecotoxicology, Metals, Water quality

Final ID: A11 Assessment of Extended Spectrum beta-Lactamase and Carbapenemase Production in Escherichia coli strains Isolated from Irrigated Vegetable Farms Adebis O.O. and Gbala I.D.

Section of Integrative Bioenergetics Environmental and Ecotoxicological Systems, Department of Microbiology, Faculty of Life Sciences, University of Ilorin, P.M.B. 1515, Ilorin, Nigeria
ABSTRACT BODY: Irrigated farms serve as a major source from which people obtain fresh vegetables and fruits all the year. Resistance of *Escherichia coli* strains to antibiotics are of utmost public health concern. In this study, susceptibility of *E. coli* strains recovered from irrigation water, river sediment and leafy vegetables obtained from three irrigated farms near rivers Asa, Afon and Oyun, to seven classes of antibiotics was first evaluated. Then, the strains that demonstrated multiple drug resistance (MDR) were subjected to the last resort antibiotic, imipenem as well as assessed phenotypically for the production of extended spectrum β-lactamase (ESBL) and carbapenemase using the double-disc synergy and carba NP methods, respectively. Out of twenty-two (22) *E. coli* strains, thirteen (13) demonstrated MDR (≥3 antibiotics); with seven (7) of these showing resistance to imipenem. Five (5) of the 13 MDR strains were ESBL producers while three (3) of the seven (7) carbapenem-resistant strains were positive for carbapenemase. Identities of the 7 carbapenem-resistant isolates were confirmed by molecular analysis of their 16S rRNA sequences, with two of them identified as *E. coli* O157:H7. The production of ESBL and carbapenemase in these organisms could be the reason for their multidrug resistance to antibiotics. Although, none of these antibiotic-resistant isolates was recovered from the fresh vegetables, the high prevalence of ESBL- and carbapenem-resistant *E. coli* strains in the irrigated waters and river sediments may portend a risk of infection outbreak.

Keywords: Antibiotic resistance; Carbapenemase; *Escherichia coli*; *E. coli* O157:H7; Extended Spectrum βeta-Lactamase (ESBL); Irrigated vegetable farm

SESSION: Aquatic and terrestrial toxicology and ecology

2nd SETAC Central/West Africa Regional Conference

OGANA, J. "Determination of Selected Heavy Metals and Human Health Risk..."

Final ID: B1

SESSION: Aquatic and terrestrial toxicology and ecology

TITLE: Determination of Selected Heavy Metals and Human Health Risk Assessment in Papyrocranus afer from Banegbe River

AUTHORS/INSTITUTIONS: JOY OGANA, EZE SABINUS, UNIVERSITY OF NIGERIA, NSUKKA / Biochemistry; Chibuike Ubani, Ikechukwu Onwurah, University of Nigeria / Biochemistry

Ogana, Joy*, Eze, Sabinus Oscar O., Ubani, Chike S. and Onwurah N. E. Department of Biochemistry, University of Nigeria, Nsukka e-mail oganajoy2020@gmail.com

PRESENTER (E-MAIL ONLY): oganajoy2020@gmail.com SECTOR: Academia

MEMBERSHIP STATUS: Type 11 AF Dev2 Asso Exp: 2018-10-16

ABSTRACT BODY: Fish is an important part of diet for a large proportion of the people living in the developing world. It is a vital source of high-quality protein, providing approximately 16% of the animal protein consumed by the world's population. Heavy metals contamination is the excessive deposition of toxic heavy metals in the environment caused by human activities. *Papyrocranus afer* were sampled at three different location along Banegbe River (upstream, effluent discharge point of thermal power station and downstream). The heavy metals were digested using HNO3 acid digestion and determined with atomic absorption spectrophotometry. The human risk assessment of consumers from the intake of *papyrocranus afer*
from the rivers contaminated with heavy metals were evaluated by using Health Risk Index (HRI) calculation. The result showed that the concentration of metals bioaccumulated in the fish muscle were in the order of Fe > Zn > Cu > Mn > As > Hg > Cr > Cd. Mean concentration of some of these metals exceeded WHO safe limit. The HRI were higher in fish from effluent discharge point of thermal power station than the other locations along the river. The total HRI through consumption of fish calculated by adding the individual HRI were less than 1 in all the metals, indicating that there is no significant potential health risk associated with the consumption of fish from Banegbe River.

**KEYWORDS:** Bioaccumulation, Ecological risk assessment, Human health, Persistent

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**Final ID: B2**

**SESSION:** Aquatic and terrestrial toxicology and ecology  
**TITLE:** ThermoChemical Effects of Heat and Mass Transfer in unsteady Magnetohydrodynamics Viscoelastic Fluid Flow in Porous Media  
**AUTHORS/INSTITUTIONS:** Sikiru Amoo, Federal University Wukari, Wukari, Nigeria / Department of Mathematics and Statistics; Daniel IM, federal University Wukari / Department of Mathematics and Statistics  
**PRESENTER (E-MAIL ONLY):** drsikiruamoo@gmail.com  
**SECTOR:** Academia  
**ABSTRACT BODY:** The study investigated thermochemical reaction effects of heat and mass transfer in unsteady magnetohydrodynamic (MHD) viscoelastic fluid flow in porous media the present of heat generation and chemical reaction. The governing boundary layer equations of the model were transformed to a system of ordinary differential equations. The coupled system of equations were then solved numerically by a fourth order Runge-Kutta method along with shooting technique. A parametric study on the effect of variations in the fluid parameters on velocity, temperature and concentration were conducted and presented graphically. Also, the effects of radiation and chemical reaction on heat and mass transfer in unsteady MHD viscoelastic were verified as well as effects on skin friction, Nusselt and Sherwood number on some physical parameters were discussed in detail. The findings included the numerical results of variation in Skin friction, Nusselt and Sherwood numbers at the surface as a result of the variations of the independent parameters explaining the fluid flows and transfers. The implications for agriculture, mining and environmental sustainability were discussed.  
**KEYWORDS:** Adsorption, Decision analysis, Landscape, Toxicokinetics

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**Final ID: B3**

**SESSION:** Environmental pollution and waste management  
**TITLE:** DERIVATION OF A RATE EQUATION FOR THE SCRUBBING TIME OF BIO-METHANE PRODUCED FROM MIXTURE OF COW DUNG AND VEGETABLE WASTES FOR HOUSEHOLD APPLICATION  
**AUTHORS/INSTITUTIONS:** NGOZI ALUTU, Nnamdi Azikiwe University, Awka. / Chemical Engineering; IFEOMA NNUBIA, UNIVERSITY OF NIGERIA NSUKKA, ENUGU STATE / Department of Home Science and Management  
**PRESENTER (E-MAIL ONLY):** cherishchy@yahoo.com  
**SECTOR:** Other  
**ABSTRACT BODY:** Organic wastes constitute the major percentage of solid wastes generated globally especially in urban homes. When these organic wastes are left to decompose on their own, they release a blend of gases, primarily methane and carbon dioxide (CO₂) which are green house gases. The green house gases...
have contributed to climatic changes. However, the controlled conversion of these gases into purified bio-
methane solves both the problem of environmental pollution and source of alternative cooking fuel for
households, thereby achieving bioremediation. Many technologies of purifying or scrubbing CO₂ from raw bio-
methane have high operational costs, making them unsuitable for household applications. In this work, biomethane was produced from a mixture of cow dung and vegetable wastes at prevalent temperature of 30°C and pressure of 1 bar. The raw gas was scrubbed with 1 mole/lit of aqueous sodium hydroxide (NaOH) to achieve bio-methane purity of 98.96% which is up to natural gas standard for corrosion-free cooking. The suitable order of reaction tested for the scrubbing of bio-methane was the pseudo second order rate of reaction with rate constant of k = 0.0057mol⁻¹s⁻¹. The rate equation derived predicts the service life of the scrubbing solvent to inform the user when to recharge the scrubber with a fresh solvent. Hence the development and sustainability of the findings of this work is highly advocated for, because it is affordable and technologically easy and safe to install and operate.

KEYWORDS: Bioremediation, Development, Sustainability, Urban

Final ID: B4
SESSION: Environmental pollution and waste management
TITLE: Assessing oral bioaccessibility of potentially toxic elements in polluted soils from selected dumpsites in Lagos, Nigeria
AUTHORS/INSTITUTIONS: Fausat Odujebe, KolaDaisi University, Ibadan, Nigeria / Chemistry; Aderonke Oeyiola, University of Lagos Nigeria / Chemistry; Christine Davidson, University of Strathclyde / pure and applied chemistry; Kehinde Olayinka, UNIVERSITY OF LAGOS / Chemistry
PRESENTER (E-MAIL ONLY): faosiyatjebe@gmail.com SECTOR: Academia
MEMBERSHIP STATUS: Type 11 AF Dev 2 Stu Exp: 2019-08-05
ABSTRACT BODY: In order to assess the potential health risk from direct / unintentional oral ingestion of potentially toxic elements on human, measurement of the bioaccessibility of the element is very crucial. The simplified bioaccessibility extraction test (SBET) which mimics the acid environment of human gastrointestinal tract was employed to evaluate the oral bioaccessibility of PTEs (As, Cd, Cr, Cu, Mn, Ni, Pb and Zn) in soils from selected dumpsites (Iwaya, Orile, Abule egba, Owode Ikorodu, Ibafo and Akoka) with high human exposure in Lagos, Nigeria. The soil samples were acid digested using a CEM MARSXpress microwave digestion system. The total concentration as well as the bioaccessible concentrations of the PTEs were determined with an Agilent model 7700s ICP-MS. The result of bioaccessibility test showed varying concentrations for PTEs studied, with values obtained ranging from 0.10 – 1.91 mg/kg for As, 0.10 – 7.88 mg/kg for Cd, 0.12 – 4.4 mg/kg for Cr, 4.50 – 2990 mg/kg for Cu, 32.4 – 193 mg/kg for Mn, 0.0 – 24.9 mg/kg for Ni, 3.30 – 874 mg/kg for Pb and 68.2 – 1960 mg/kg for Zn. Amongst the PTEs, Cd and Zn showed higher percent bioaccessibility (up to 90%) , Pb and Mn had moderate bioaccessibility level whilst As, Cr and Ni had the lowest percent bioaccessibility (< 20%). Comparison of bioaccessible PTE levels with toxicological data indicated that Cd, Pb and Zn were PTEs of greatest concern. Pearson correlation analysis indicate that linear relationship existed between the total and SBET bioaccessible concentrations with strong positive correlations observed for Cd, Cu, Pb and Zn whereas for Cr, Ni and Mn limited correlation were observed. The findings of the study revealed that the level of risk associated with oral ingestion of PTEs from soil samples investigated was relatively low except for PTEs in soils from Abule-egba. Keywords: Bioaccessibility, Gastrointestinal tract, Pollution, Potentially toxic elements, Soil
KEYWORDS: Metals, Risk assessment, Soil, Toxicity
**Final ID: B5**

**SESSION:** Environmental pollution and waste management  
**TITLE:** Metal accumulations and liver dysfunction in rats (Rattus norvegicus) exposed in-situ to groundwater and air emissions from a Municipal Waste Landfill  
**AUTHORS/INSTITUTIONS:** Adeyinka Gbadebo, University of Ibadan, Ibadan / Ecology and Environmental Biology Unit, Department of Zoology; Okunola Alabi, Federal University of Technology, Akure / Department of Biology; Chibuisi Alimba, University of Ibadan, Nigeria / Department of Zoology; Adekunle Bakare, University of Ibadan Ibadan Nigeria / Department of Zoology  
**PRESENTER (E-MAIL ONLY):** adeyinka.gbadebo@yahoo.com  
**SECTOR:** Academia

**ABSTRACT BODY:** Organ damage, cancer and birth defects have been associated with human exposure to chemical contaminants from landfills. In developing countries, these adverse effects are aggravated with high rate of poverty, unsanitary landfills cum unplanned settlements which are the leading causes of both occupational and residential exposure to toxic chemicals emanating from landfills. This study was designed to investigate metal accumulations and potential damage in the liver of rats exposed *in-situ* to underground water and ambient air emissions from Olusosun landfill in Lagos, Nigeria. Male Wistar rats (5 rats/point/duration) were exposed at three different points to air emissions and underground water (via drinking) from the landfill for 4, 8, 12, 16, 20 and 24 weeks. Rats concurrently sited at 17 km from the landfill site served as control. Liver-body ratios, metal (Pb, Cd, Cr, Cu and Zn) concentrations, liver function, oxidative stress parameters and histopathology were analysed. There was significant (*p* < 0.05) period-dependent increase in percentage (%) body weight change except at the 4-week exposure period. Absolute and relative liver weights, metal (Pb, Cd, Cr, Cu and Zn) concentrations (mg/L) in liver of exposed rats increased significantly (*p* < 0.05) at all exposure points and periods compared with the corresponding control. Levels of AST, ALT, CAT, GSH and MDA significantly (*p* < 0.05) increased, with concurrent decreases in albumin and SOD (*p* < 0.05) in the exposed rats throughout the exposure periods. Histological lesions observed in the liver of exposed rats include mild to severe focal areas of periportal inflammation, necrosis, fibrosis, centrilobular steatosis, sinusoidal dilation, congestion and infiltration of inflammatory cells into the portal triad. The observed metal accumulations and damage to the liver may be due to the high levels of metals and other unanalysed toxic contaminants in the landfill underground water and air emissions. Oxidative stress and/or direct metal disruption of the hepatic cells are possibly the mechanisms of hepatic toxicity. These findings show the potential risk of liver dysfunction in animal and human populations occupationally and residentially exposed to contaminants from waste landfills.

**KEYWORDS:** Accumulation, Ground water, Metals, Toxicity

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**Final ID: B6**  
**SESSION:** Environmental pollution and waste management  
**TITLE:** Heavy metals accumulation in tissues of Zenaida macroura (mourning dove) from three locations in Lagos state, Nigeria.  
**AUTHORS/INSTITUTIONS:** Ibiyemi Omoyajowo, University of Lagos Akoka Yaba Lagos / Department of Zoology; Esther Olaniran, UNIVERSITY OF LAGOS / Department of Zoology; Winifred Ahme, University of Lagos Akoka Lagos Nigeria
Heavy metals have high density and are poisonous at low concentration; they are introduced into the environment through anthropogenic sources and natural sources. This study aims to evaluate the activities of anti-oxidative enzymes and to determine the histology alteration on the liver and kidney of mourning dove (Zenaida macroura) which is prone to environmental exposure to lead, chromium, zinc, and magnesium. A total of 12 juvenile mourning doves were collected at random at Olusosun (dumpsite), Amuwo Odofin (control site) and Ikorodu (industrial area). The birds were sacrificed and dissected. Blood samples, kidneys, livers, and intestinal tract biopsy were collected. Liver and kidney were examined for histopathological alterations: level of metal was determined in the blood and intestinal tract samples using AAS. The levels of antioxidant enzymes were analyzed in the liver and blood samples. Results showed a significant difference in the value of lead in the three locations (P<0.05). Manganese and zinc had no significance (P>0.05) and there was a significant difference between the value of chromium found in mourning dove and the locations (P<0.05). Therefore, the results show that these birds can be used as indicators of environmental pollution.

**KEYWORDS:** Accumulation, Bioaccumulation, Metals

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**Final ID: B7**

**SESSION:** Environmental pollution and waste management

**TITLE:** Mercury levels at Dagomba Line, an e-waste recycling site in Kumasi, Ghana.

**AUTHORS/INSTITUTIONS:** Godfred Darko, Kwame Nkrumah University of Science and Technology / Department of Chemistry; Peter Sørensen, Aarhus University; Lydia Amponsah, Kwame Nkrumah University of Science and Technology

**PRESENTER (E-MAIL ONLY):** lydiaotoo34@gmail.com **SECTOR:** Academia

**MEMBERSHIP STATUS:** Student Guest

**ABSTRACT BODY:** Due to the informal nature of the activities at waste electronic and electric (WEEE) recycling sites, many harmful substances can contaminate the site and may be distributed into the environment. It is well known in Ghana that mercury is released from artisanal mining, however the contribution from WEEE sites may also be important in some areas. In order to investigate this issue, mercury concentration was measured in top soils, river water and sediment in a WEEE site of Kumasi using the Lumex Mercury Analyzer and compared with measured background urban soil concentrations from an extended area around the WEEE site. Concentration levels at the WEEE site were measured in the range of 0.11 - 7.57 mg/kg with a mean of (1.09 ± 0.32) mg/kg in soil. The river water concentration levels ranged from (0.12 – 7.69) ng/l with an average of (2.20 ± 0.35) ng/l and sediment concentration levels ranged from 0.02 – 0.28 mg/kg with an average of (0.07 ±0.02) mg/kg. The mean background level was (0.04±0.01) mg/kg with variations ranging from 0.008 – 0.17 mg/kg. The higher values from the recycling site as compared to the background suggest that emission of mercury in this area is from anthropogenic sources. The contamination of the WEEE site can manifest as a general elevated level for the whole WEEE area or on the contrary, as local hotspots around specific activities inside the area. This is investigated statistically to test whether all measurements belong to the same distribution.

**KEYWORDS:** Accumulation, Risk assessment, Toxicity
Final ID: B8
SESSION: Environmental pollution and waste management
TITLE: Concentration profiles of perfluoroalkyl substances (PFASs) in source and treated drinking water within a South African distribution network
AUTHORS/INSTITUTIONS: Adegbenro Daso, Tshwane University of Technology / Department of Environmental, Water & Earth Sciences; Jonathan Okonkwo, Tshwane University of Technology / Environmental, Water and Earth Sciences
PRESENTER (E-MAIL ONLY): adegbenrop@yahoo.com  SECTOR: Academia
MEMBERSHIP STATUS: Student Guest Exp: 2014-06-30
ABSTRACT BODY: In this study, twenty perfluoroalkyl substances (PFASs) consisting of thirteen (13) perfluoroalkyl carboxylates (PFCAs) and seven (7) perfluoroalkyl sulfonates (PFSAs) were monitored in source and treated drinking water using solid-phase extraction technique followed by liquid chromatography tandem mass spectrometry. The sum of the PFCs in the analysed water samples generally ranged from 6.20 to 42.3 ng/L, and was mainly dominated by PFOS, PFHxS and PFOA across the sampling points. The relative percent contributions of these dominant PFCs to the sum PFCs across the sampling points are 31-84%, 6-30% and 2-12%, respectively. Overall, a considerably high detection frequency of the PFCAs than the PFSAs, particularly for those with carbon chain length greater than 8 was observed. Compared with the USEPA’s established health advisory guideline limits of 200 and 400 ng/L for PFOS and PFOA, respectively, the observed levels in the present study were significantly lower than these bench mark values. Consequently, the consumption of drinking water from the entire distribution may seem not pose any detrimental health effects associated with exposure to PFASs to the consumers. Nonetheless, efforts to ensure periodic monitoring of these contaminants must be sustained since the quality of the source water with respect to the influx of potentially harmful chemicals may change from time to time. Given the similar pattern observed in the concentration profiles of the source and treated water samples, it appeared that the current purification processes within the treatment plants do lack the capacity to efficiently remove PFASs during the water purification process. Therefore, a complimentary technology that can preferentially address this challenge must be sought.
KEYWORDS: Monitoring, Persistent, Surface water, Water quality

Final ID: B9
SESSION: Environmental pollution and waste management
TITLE: Soil Enzymes as Indicators of Contamination of the Environment with Petroleum Products
AUTHORS/INSTITUTIONS: Chigoziri Osuji, Chioma Anosike, University of Nigeria Nsukka / Biochemistry; Chibuike Ubani, Ikechukwu Onwurah, University of Nigeria / Biochemistry
PRESENTER (E-MAIL ONLY): chike.ubani@unn.edu.ng  SECTOR: Academia
MEMBERSHIP STATUS: Type 11 AF Dev2 Asso Exp: 2018-10-16
ABSTRACT BODY: *OSUJI, C. A., UBANI, C. S., ANOSIKE, C. A., AND ONWURAH, I. N. E Corresponding author: E-mail kudosmartins@gmail.com. Tel: 08038634389 Department of Biochemistry, University of Nigeria Nsukka, Enugu State, Nigeria. 
In Abstract: Petroleum products cause great devastation in soil ecosystem. Preservation of the biological equilibrium in the soil depends on numerous factors, which may be divided into chemical, physical and biological factors. Enzymatic activity of the soil and proliferation of soil microorganisms are the best indicators of the stability and fertility of soil ecosystems. The impact of
spent engine oil, a petroleum product derivatives on soil enzymes (dehydrogenases and lipases) and soil microbial abundance was investigated. A constant amount of soil (1kg) was spiked with spent lubricating oil (SLO) at different concentrations (0.0, 1.0, 5.0, 10.0, 15.0, 20.0, 25.0, 30.0 and 50.0g) and assayed for soil enzymes and microbial abundance. These biological activities were monitored for 28days with sample collections as follows; day 0 (immediately after contamination), days 7, 14, 21 and 28. The result of the soil dehydrogenase activity (DHA) showed a concentration dependent increase in the DHA activity, though not significant when compared with the control in the range of 0.113–0.163mg/g/soil/hr for 0g and 50g oil contamination respectively. DHA was time dependent as the activity rose to 0.256mg/g/soil/hr after 28days of contamination. For the soil lipase activity, increase in spent oil contamination, caused an increase in the enzyme activity. The lipase activity rose to its peak on day 14 with the highest concentration recording 790.187pNP/(gx10min). There was a significant decline in soil lipase activity after day 14, to 506.75 pNP/(gx10min) for 50g on day 28. The soil microbial count showed bacteria to be more in abundance 44.0x10^7 cfu/ml than fungi 18.1x10^7 cfu/ml in control soil which increased to 70 x10^7 cfu/ml and 19x10^7 cfu/ml in the contaminated soil respectively after 2 weeks of contamination. Subsequently, the population of the microorganisms declined drastically over time. As a result of the high potential of petroleum hydrocarbons to accumulate in the soil environment, together with their resistance to biodegradation, as evidenced in this study, these compounds may cause substantial changes in the biological parameters investigated. **Keywords:** Biodegradation, Petroleum products, Environment, Contamination, Soil, Dehydrogenase, **KEYWORDS:** Accumulation, Biodegradation, Ecotoxicology, Soil

**Final ID:** B10

**SESSION:** Environmental pollution and waste management

**TITLE:** NANOMATERIALS AND ENVIRONMENTAL REMEDIATION; CONCERNS FOR SAFETY AND TOXICITY IMPLICATIONS

**AUTHORS/INSTITUTIONS:** Chukwuka Ogbonna, University of Nigeria / Biochemistry Dept.; Okpashi Eshu, UNIVERSITY OF NIGERIA, NSUKKA / Biochemistry; Oluchi Aniche, University of Nigeria Nsukka / Department of Microbiology; Ikechukwu Onwurah, University of Nigeria / Biochemistry

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**MEMBERSHIP STATUS:** Type 11 AF Dev 2 Stu Exp: 2018-10-16

**ABSTRACT BODY:** The challenge of environmental pollution and the degradation of environmental resources upon which man depends has become a persistently worrying menace. Research has continued to search for a more dependable and effective method for the remediation of these resources to realize a fit-for-use status. Nanotechnology has suddenly become the new bride, for continually aiding the development of possible methods for successful remediation of organic contaminants, chlorinated compounds heavy metal microbial contaminated sites, both in the laboratory and in situ. Nanosorbents, nanoscale particles made from inorganic or organic materials capable of absorbing other substances owing to their large surface area and a high substance specificity have been applied in this area. Polymeric-nanocomposites (PNC) with nanoparticles and nanofillers in their matrix have shown great promise. Nanomaterials like the nano Zero Valent Iron (nZVI), nano Calcium Peroxide, silver and gold nanoparticles have proven effective in remediation of soil and water. However, the tendency of most nanomaterials to form aggregates and to agglomerate limits the overall success of these nanomaterials in remediation. Nevertheless, a more worrying challenge is what becomes of the nanomaterials after remediation in terms of effects on natural biodiversity and public health since these materials are mostly heavy metals owing to their biochemodynamics. These nanomaterials referred to as Engineered Nanomaterials (ENM) pass through
processes which increase their chemical stability but release toxic by-products. This is so because life cycle of a nano-enabled product exacerbates different circumstances which can lead to ENM release, which may impact ecosystems in a way difficult to predict. These nanomaterials together with ENM produced for other functions are found in different environmental compartments in toxic measurements and this underscores the need for impact assessment processes. Gold and silver nanoparticles used for environmental remediation may be found in toxic concentrations. Studies have shown the toxicity implications of these ENM while future research is needed into the best response to impact assessment data towards a more balanced friendly environment.

KEYWORDS: Cytotoxicity, Nanomaterials, Remediation, Toxicity

2nd SETAC Central/West Africa Regional Conference Otitoju, O. "Regulatory Policies and Environmental Compromise In Developing Nation: The Nigerian Experience" Final ID: B11

SESSION: Agriculture, mining and the environment TITLE: Regulatory Policies and Environmental Compromise In Developing Nation: The Nigerian Experience AUTHORS/INSTITUTIONS: Olawale Otitoju, federal University Wukari / Biochemistry Department PRESENTER (E-MAIL ONLY): otitoju.olawale@gmail.com SECTOR: Academia

MEMBERSHIP STATUS: Type 11 AF Dev2 Asso Exp: 2020-10-17

ABSTRACT BODY: The role of various regulatory bodies in the control of food, drugs and other consumables is a vital component of safeguarding the health of the populace. However, a review of these activities shows that there is a strong negative impact on the environment. This work therefore evaluates the activities of some regulatory bodies in Nigeria between the years 2000-2017. Some of the activities examined include policy implementation and methods. Three major bodies were examined; Standard organization of Nigeria (SON), National agency for food administration and drug control (NAFDAC) and Nigerian Drug and law enforcement agency (NDLEA). Over 4000 reported cases were randomly selected from online sources and print media. The result shows that open incineration (75%) and shallow landfills (25%) are the common methods used in disposing seized commodities. These activities increased from year 2000 to 2017 but in 2017 we had the most significant amount of destroyed products both in volume and in cost of about 1.3 trillion naira. However, a total of 43 billion naira goods were either burnt or buried in the soil. Similarly, it was also observed that seized items were not sorted out neither were any laboratory analysis carried out on these items before incinerating them to ascertain the specific elements present for guided disposal action. Although the rate of boarder smuggling is on the increase, continuous open burning and burying of seized items may lead to future public health issues. We therefore conclude that regulatory bodies in developing nation should balance policies, activities and environmental safety.

KEYWORDS: Biomonitoring, Policy analysis, Regulation, Risk assessment
Final ID: C1

SESSION: Environmental pollution and waste management

TITLE: A cell-based bioassay system for dioxin and dioxin like compounds determination and toxicity evaluation in environmental and biological media

AUTHORS/INSTITUTIONS: Bin Zhao, Songyan Zhang, RCEES, CAS

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ABSTRACT BODY: Persistent organic pollutants (POPs) are a worldwide problem and a strict control in Stockholm Convention. Among these POPs, dioxin and those structurally dioxin-like chemical compounds with highly toxic are present in environmental media all over the world and accumulated through the food chain. The large scale of dioxins detection and toxicity assessment are necessary for human health risk assessment. Therefore, a low-cost but high-throughput efficient detection method is needed to use as supplemental tools for pre-screening of dioxins instead of the traditional detection method. Here, we developed a new and sensitive bioassay system, CBG2.8D which is a recombinant mouse hepatoma cell line and based on mechanism of binding to and activating aryl hydrocarbon receptor (AhR). In this system, a novel luciferase reporter plasmid containing 2 copies of a newly designed dioxin-responsive domain which has a highly transcriptional activity and an endogenous promoter was integrated. The minimal detection limit for 2,3,7,8-tetrachlorodibenzo-p-dioxin was 0.1 pM. We have employed the CBG2.8D bioassay to determine the dioxin in several kinds of environmental samples and some food samples. The system fits all the tested samples and shows a good correlation with HRGC-HRMS analysis, especially for environmental samples. We employed the CBG2.8D bioassay to determine the dioxin levels in 30 soil samples collected in China. The measured bioanalytical equivalent values (BEQs) were closely correlated with the toxic equivalent values (TEQs) obtained from HRGC-HRMS analysis ($r^2 = 0.93$). Also a total activation of AhR (TAA) can be used to potentially predict the toxic effect potency of a mixture crude sample. In the process of application of CBG2.8D cell line.

KEYWORDS: Dioxins, Persistent, Toxicity

Final ID: C2

SESSION: Environmental pollution and waste management

TITLE: Green synthesis of iron nanoparticles using aqueous plantain peel and "prekese" extracts and their application in the remediation of environmental pollutants

AUTHORS/INSTITUTIONS: Peter Osei, Enock Dankyi, University of Ghana / Department of Chemistry; Vitus Apalangya, University of Ghana / Food Process Engineering; Samuel Darko, Benedict College / Department of Physics and Engineering

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ABSTRACT BODY: The increasing concern for the sustainability and quality of the environment has necessitated the adoption of benign remediation techniques. Green synthesis and application of zero valent iron nanoparticles (nZVI) using plant materials including agricultural waste presents a promising route in this regard. In this study, we report the synthesis of nZVI at room temperature using aqueous extracts of plantain...
Musa paradisiaca) peel and “prekese” (Tetrapleura tetraptera). These extracts served as sources of reducing and capping agents without the need for toxic and expensive synthetic chemicals. In both cases, stable colloidal solutions were formed and characterized using microstructural and spectroscopic techniques including Ultraviolet–Visible (UV), Fourier Transform infrared (FT–IR), X-ray diffraction (XRD), Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM). The synthesized iron nanoparticles showed uniform morphologies and sizes. The nanoparticles exhibited high degradation of locally used dyes and present an efficient, affordable and eco-friendly alternative to conventional technologies used in the treatment of dye waste.

**KEYWORDS:** Degradation, Nanomaterials, Remediation, Waste water

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2nd SETAC Central/West Africa Regional Conference | Jiri, Z. "Macrophytes as bio indicators of metal pollution in an Acid ..." [47964]

**Final ID:** C3

**SESSION:** Environmental pollution and waste management

**TITLE:** Macrophytes as bio indicators of metal pollution in an Acid Mine Drainage impacted subtropical river

**AUTHORS/INSTITUTIONS:** Zviregei Jiri, Bindura University of Science Education / Biological Sciences; Richard Greenfield, University of Johannesburg APK campus / Zoology; Johan van Vuren, University of Johannesburg / Zoology

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**MEMBERSHIP STATUS:** Type 10 AF Dev1 Asso Exp: 2018-10-31

**ABSTRACT BODY:** This study investigated the use of selected macrophyte roots as bio indicators of metal pollution from acid mine drainage and their possible use in phytoremediation. Concentrations of zinc, cadmium, chromium, nickel, lead, copper, manganese, arsenic and iron were measured in water, sediments, Phragmites mauritianus and Schoenoplectus corymbosus roots from Yellow Jacket and Mazowe Rivers, Zimbabwe, receiving AMD and agricultural runoff respectively. Samples were collected from effluent contaminated sections of the rivers during two low flow (dry periods, October 2013 and October 2014) and two high flow (wet periods, April 2014 and April 2015) periods. Metals were determined using a Thermo Inductive Coupled Plasma Mass Spectrophotometer (ICP-MS). Concentrations were expressed as µg/g of sediment or macrophyte and µg/l water. Key water quality parameters clearly showed a pollution gradient from Iron Duke Mine. The general order of metal concentrations was macrophytes > sediments > water. Both plant species showed a general trend in spatial metal concentrations indicating that the genus Phragmites and Schoenoplectus can be useful for rehabilitation and remediation in AMD impacted areas and could be used in biotechnical purification of water that is contaminated with metals. Elevated metal levels in P. mauritianus and S. corymbosus roots during low flow, indicated that contaminants were more concentrated during the season. The higher levels of As and Fe in P. mauritianus, compared S. corymbosus, indicates that the species is a better bio indicator for these metals and this species could be proposed for Fe, Mn and As phytoremediation. The general trend in metal concentrations shown by both plant species indicates that they are useful indicators of metal pollution in aquatic ecosystems with potential to improve the self-purification capacity of the rivers.

**KEYWORDS:** Metals, Remediation, Sediment, Water quality

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2nd SETAC Central/West Africa Regional Conference | MA, F. "Evaluation of heavy Metals from Roadside Soils of major High..." [47962]

**Final ID:** C4

**SESSION:** Environmental pollution and waste management

**TITLE:** Evaluation of heavy Metals from Roadside Soils of major Highways in Lokoja, Kogi state-Nigeria

**AUTHORS/INSTITUTIONS:** Funtua MA, Federal University BirninKebbi / 1Department of Pure &applied
The level of heavy metals from the major roadsides of Lokoja town was evaluated using Atomic Absorption Spectrophotometer (AAS). Soil samples were taken from five different sites along the major highways Nataco, Ganaja, Adankolo, Kpata, and Zenith respectively. Soil samples at each sampling site were taken at the depth of 2cm, 4cm, and 7cm beneath the soil. These were then mixed to give a representative sample per site. Samples were digested using aqua regia in the ratio 3:1, HCl:HNO$_3$, followed by addition of 10cm $H_2O_2$. The volume of the digest was made up to 100cm$^3$ using distilled water. Portion of this solution was used for the determination of Cd, Fe, Pb, and Zn. Mean levels of the analysed metals ranged between 3.31±0.01mg/kg Pb at Ganaja, to 1.56±0.01mg/kg at Kpata. Cadmium was observed to be highest (0.06±0.02mg/kg) at Kpata, with a least value (0.01±0.00mg/kg) at Ganaja. Zinc was highest (3.21±1.23mg/kg) at Nataco, and least (0.94±0.05mg/kg) at Kpata. Iron was highest (627.11±10.38mg/kg) at Nataco, with a least value (339.78±6.23mg/kg) at Kpata. Mean pH of the soil ranged from 8.39±0.47 Adankolo, to 7.11±0.20 at Kpata. Mean Organic carbon (OC) was observed to be highest (0.76±0.32) at Ganaja, and least at Nataco (0.34±0.02). Mean moisture content was observed to be highest (1.82±0.09%) at Nataco, with the least (0.86±0.02%) at site Zenith.

KEYWORDS: Accumulation, Biomonitoring, Metals, Risk assessment

In the bid to reduce the littering of our environment of condemned tyres, they are now highly used as a regular practice for roasting/processing of slaughtered animals such as goats, sheep, and cows, especially their edible skin popularly known as “kanda” in the local parlance. Burning tyres release particulate matter, volatile organic compounds (VOCs) and hazardous air pollutants (HAPs) especially polycyclic aromatic hydrocarbons (PAHs) into the environment. PAHs are reported to cause chest pain, respiratory irritation, cough, dermatitis, depressed immune system, a decrease in lung function, and also carcinogenic, following chronic exposures. This study was aimed at evaluating the risk of exposure of abattoir workers (butchers) to emissions from burning tyres during roasting/de-furring of cows and goats within the abattoir premises. Specifically the study sought to determine the: (i) concentrations of some selected EPA priority PAHs in ambient air in and around the abattoir, (ii) concentrations of particulate matter in ambient air in and around the abattoir, (iii) concentrations of some PAH metabolites and some heavy metals in post-shift urine of butchers and control subjects, (iv) spirometric evaluation of lung function, (v) concentration of urinary phenol and (vi) cytogenetic evaluation of DNA damage in buccal exfoliates of butchers. Some of the results show that the concentration of 1-Hydroxypyrene (1-OHPyr) (µg/molCre t), a PAH metabolite, in the post-shift urine samples of the butchers was significantly higher, (P < 0.05) with mean concentration ±SD value of (0.52±0.13µg/molCre t vs 0.20±0.07µg/molCre t); urinary phenol concentration, (14.26 ± 1.19 mg/L vs. 4.44 ± 1.12 mg/L); and concentrations of the heavy metals zinc and nickel (0.91±0.19 vs 0.31±0.28 mg/l and 0.11±0.06 vs 0.06±0.02 mg/l, respectively) in exposed butchers when compared with the control which were unexposed administrative staff working in the abattoir respectively. The buccal epithelial exfoliates showed that
karyorrhexis and condensed chromatin bodies were significantly higher in the exposed butchers than in the unexposed control.

**KEYWORDS:** Climate, Ecological risk assessment, Human health, Risk assessment

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**Final ID:** C6  
**SESSION:** Environmental pollution and waste management  
**TITLE:** HEAVY METAL ANALYSIS IN INDOOR DUST PARTICLES IN WUKARI, TARABA STATE, NIGERIA  
**AUTHORS/INSTITUTIONS:** Olawale Otitoju, federal University Wukari / Biochemistry Department; Ayantse Martins, federal University Wukari / Biochemistry  
**PRESENTER (E-MAIL ONLY):** drblaze94@gmail.com  
**SECTOR:** Other  
**MEMBERSHIP STATUS:** Type 11 AF Dev 2 Stu Exp: 2018-10-17

**ABSTRACT BODY:** This study investigated the concentrations of heavy metals in dust associated with households in Wukari, Taraba State, Nigeria. The concentrations of the selected heavy metals in the dust samples selected from Puje ward, Hospital ward and Ayvi ward were analyzed with the use of Atomic Absorption Spectrophotometer (AAS). Heavy metals determined include Pb, As, Cr, Cd, and Hg. The level of lead was highest in sample 7 (42.500 ± 1.91 mg/kg) from Hospital ward and lowest in sample1 (22.450 ± 0.49 mg/kg) from Puje ward. Statistical difference exists only between the concentration of lead in sample 1 and 7. There was no statistical difference between the level of lead in sample 1 and other samples and also between sample 7 and the other samples. There was no statistical difference in the concentrations of Cr among all the samples. The level of chromium was highest in sample 1 (2.250 ± 0.13 mg/kg) from Puje ward and lowest in sample 7 (1.300 ± 0.19 mg/kg) and 8 (1.300 ± 0.25 mg/kg) from Hospital ward and Ayvi ward respectively. Cadmium was highest in sample 3 (0.890 ± 0.09 mg/kg) from Puje ward and lowest in sample 4 (0.390 ± 0.13 mg/kg) from Hospital ward. There was a statistical difference between sample 3 and samples 1, 2, 4, 6, 7, 9 and 10. Arsenic and mercury was not detected in all the dust samples. The estimated potential carcinogenic risk to the public from inhalation of dust shows the THQ30 and THQ5 for Cd to be highest in Ayvi ward than in Hospital and Puje ward, while THQ30 and THQ5 for Cr was highest in Hospital ward. The THQ30 and THQ5 for Pb was highest in Puje ward than in Hospital and Ayvi ward. The result therefore shows that Hospital ward is more predisposed to Pb toxicity, while Puje ward is more predisposed to Cr and Cd toxicity.

**KEYWORDS:** Bioaccumulation, Climate, Ecological risk assessment, Metals

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**Final ID:** C7  
**SESSION:** Environmental pollution and waste management  
**TITLE:** RISK OF CHRONIC KIDNEY DISEASE AMONG ROADSIDE TRADERS IN KANO, NORTHERN WESTERN- NIGERIA  
**AUTHORS/INSTITUTIONS:** Mahdi Dissi Gambo, Bayero University, Kano, Nigeria and Ahmadu Bello University, Zaria, Kaduna State, Nigeria.; Zafar Salim, Bayero University, Kano, Nigeria / Endocrinology and Reproduction Unit, Department of Human Physiology, Faculty of Basic Medical Sciences, College of Health Sciences  
**PRESENTER (E-MAIL ONLY):** dissigambomahdi@yahoo.com  
**SECTOR:** Academia  
**MEMBERSHIP STATUS:** Student Guest
Chronic kidney disease (CKD) is a major health problem in developed countries and is becoming so in developing nations like Nigeria due to increasing prevalence of hypertension and diabetes mellitus. There are few well-established risk factors of CKD, but both human and animal studies implicate exposure to chemicals including polluted air. Automobile exhaust emissions especially from poorly serviced and old vehicles may in part, account for the dangerously high level of ambient roadside pollution in Kano. Roadside traders are therefore continuously exposed to both respirable and non respirable roadside air pollutants which cause adverse health effects. Information regarding the renal implications of roadside trading is grossly scarce. This study therefore aimed to assess serum levels of urea, creatinine, electrolytes, proteinuria and some putative risk factors for renal disease among roadside traders in Kano metropolis. Fifty six (56) roadside traders were selected and matched for age and sex with 59 controls. Serum urea and creatinine were estimated using auto analyzer based method while serum potassium (K$^+$), sodium (Na$^+$), chloride (Cl$^-$) and bicarbonate (HCO$_3^-$) ions were determined as described in their respective kits. Haematuria and proteinuria were assessed using urinary dipstix. Weighing scale and stadiometer were used to obtain weights and heights from which BMI was computed. Pulse pressure and mean arterial pressure were calculated from systolic and diastolic blood pressures obtained by Auscultatory method while fasting blood sugar (FBS) was estimated using Glucometer. Data was analyzed using SPSS V$^{20.0}$. Independent samples t-test was used to compare the means of quantitative data between the groups while categorical variables were compared using person's Chi square, in all cases, $P < 0.05$ was considered as significant. The mean SBP, DBP, PP, MAP and PR between the groups are not significantly different. However, serum levels of urea, creatinine and potassium were significantly higher, while those of Na$^+$, Cl$^-$ and HCO$_3^-$ were significantly lower among the study group than in controls. Similarly, proteinuria was found higher among traders than the controls ($p=0.003$). These findings indicate that roadside traders in Kano have a predisposition to renal impairments and hence might be a risk group for CKD.

**KEYWORDS:** Risk assessment

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**2nd SETAC Central/West Africa Regional Conference**

**Olajumoke, F.** "Assessment of Organochlorine pesticide residues in stored ya..."

**Final ID:** C8

**SESSION:** Food safety, nutrition and environmental sustainability

**TITLE:** Assessment of Organochlorine pesticide residues in stored yam chips in Saki, South western, Nigeria

**AUTHORS/INSTITUTIONS:** Fayinminnu Oke Olajumoke, University of Ibadan, Nigeria / Department of Crop Protection and Environmental Biology, University of Ibadan; Adebola Adeyi, University of Ibadan Ibadan Nigeria / Department of Chemistry; Oluwatayo Oloyede, University of Ibadan, Nigeria / Department of Crop Protection and Environmental Biology, University of Ibadan

**PRESENTER (E-MAIL ONLY):** olorijkb2008@gmail.com **SECTOR:** Academia

**MEMBERSHIP STATUS:** Guest

**ABSTRACT BODY:** Organochlorines (OCs) were the first synthetic organic pesticides used in agriculture and food has been the major source of human exposure to their residues. This study therefore, assessed the Organochlorine pesticides residue levels in stored yam chips collected in Saki, Oyo State, Nigeria. Samples were randomly collected during storage of yam chips in April, 2018. Ground yam chips samples were subjected to Ultrasonic extraction with Acetone and Hexane (1:1 v/v) mixture and clean-up on silica gel adsorbents. Determination of Organochlorine pesticide residues was by a gas chromatography with electron capture detector (GC-ECD). The OCs compounds analysed for were: ?, ?, and ? HCHs; Heptachlor, Aldrin, Dieldrin, Endrin, Endosulfan, p,p'-DDE, m,p'-DDD, p,p'-DDT (DDTs) and Methoxychlor. Data collected were analysed using descriptive statistics. Results revealed that, the HCHs and DDTs mean residues were within the EU (2005) maximum residue statistics limits of 0.01 and 0.05 mg/kg, respectively. Although ?-HCH (0.0073
mg/kg) and p,p'-DDE (0.0138 mg/kg) were the most abundant. Heptachlor, Dieldrin and Methoxychlor had the values of 0.011, 0.013 and 0.055 mg/kg, respectively which were above the EU maximum residue limit. This result is an indication of human exposure to these toxic and persistent organic compounds with chronic health effects. A regular monitoring of organochlorine pesticide residues in food by the Food Agency is therefore imperative in ensuring food quality and safety in Nigeria to safeguard public health. **Keywords:** Stored yam chips, Heptachlor, Dieldrin, Methoxychlor, Pesticide residue

**KEYWORDS:** Chemical signalling, Insecticides, Pesticide

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Final ID: C9

**SESSION:** Food safety, nutrition and environmental sustainability

**TITLE:** Evaluation of Heavy metal concentrations in leafy vegetables grown on-farms within University of Ibadan, Ibadan, Nigeria

**AUTHORS/INSTITUTIONS:** Fayinminnu Oke Olajumoke, Subomi Ojemuyide, University of Ibadan, Nigeria / Department of Crop Protection and Environmental Biology, University of Ibadan; Olubunmi Fadina, University of Ibadan, Nigeria / crop protection and environmental biology

**PRESENTER (E-MAIL ONLY):** olorijkb2008@gmail.com  **SECTOR:** Academia

**MEMBERSHIP STATUS:** Guest

**ABSTRACT BODY:** This study assessed the heavy metals: Pb, Cd, Cr and Health Risk associated with the consumption of leafy vegetables (*Amaranthus hybridus*, *Corchorus olitorius*, *Celosia argentea* and *Telfairia occidentalis*) grown on-farms within University of Ibadan, Nigeria. The study was conducted during the planting seasons (September, 2017 and January, 2018) for rainy and dry, respectively in four selected vegetable farms: University of Ibadan Bakery farm site (UIBF), Awba Dam farm (ADF), Organic Farm (OF) and Teaching and Research Farm (TRF). Randomised complete block design was used; samples of irrigation water, soil and vegetables were replicated three times each. The Cd, Cr and Pb levels were determined in both seasons using standard procedures. Data collected were analysed using ANOVA at (p< 0.05). The Cd was within permissible value (0.01 mg/kg) in water, soil and vegetables in both seasons. The Cr had the highest value (22.2 mg/kg) from ADF, the least value (7.2 mg/kg) was from UIBF, Pb level was highest (30.03 mg/kg) from ADF and the least (0.1 mg/kg) from TRF in water for both seasons, respectively. In soil, highest value of Cr (19.2 mg/kg) and least (3.1 mg/kg) were from ADF and UIBF, respectively, while Pb had the high value (20.7 mg/kg) and least (0.1 mg/kg) from OF and TRF for both seasons, respectively. Chromium in the edible shoots of vegetables revealed highest value (28.5 mg/kg) in *C. argentea* from TRF and lowest (16.4 mg/kg) in *C. olitorius* from UIBF, while Pb highest value (83.7 mg/kg) was in *C. olitorius* from UIBF, 0.01mg/kg least value in*A. hybridus* from TRF for both seasons. Roots of vegetables showed highest value of Cr (19.2 mg/kg) in *A. hybridus* from OF, the lowest (12.5 mg/kg) in *C. olitorius* from UIBF; Pb had highest value (33.6 mg/kg) in *T. occidentalis* from ADF and the least (5.01 mg/kg) in *A. hybridus* from TRF. The Cd and Cr had Health Risk Index (HRI) less than one (1), while Pb had HRI >1 (1.76-14.42) in all vegetables on- farms in both seasons. Heavy metals in irrigation water, shoots and roots of vegetables were more than the FAO/WHO (0.01 and 5.0 mg/kg) for Cr and Pb in water, 2.3 and 3.0 mg/kg for vegetables, respectively. Contamination of leafy vegetables and a high risk of Pb toxicity which can biomagnify in the bodies of consumers over time. The farmers should be enlightened on good practices in vegetable production to ensure food quality and safety.

**Keywords:** Leafy vegetables, Heavy metals, Health Risk Index, Farm sites

**KEYWORDS:** Human health, Metals, Risk assessment
Fluted pumpkin, Telfairia occidentalis and Amaranths, Amaranthus spp. are common leafy vegetables produced and consumed in South-western Nigeria. The production of these vegetables are constrained by high incidence of insect pests which are controlled by indiscriminate use of insecticides that have adverse impacts on human health. The aim of the study was to evaluate the levels of DDT and HCH insecticide residues in the two leafy vegetables and the potential health risks associated with their consumption assessed. The insecticide residues levels were quantitatively and qualitatively determined using a Gas Chromatograph coupled with Electron Capture Detector (GC-ECD). Health risk estimates were analysed using Estimated Average Daily Intake (EADI) and Hazard Index (HI) for two weight categories: 16.7 kg for children and 60 kg was used for adult. The results showed that ?-HCH and methoxychlor were predominantly detected in the two vegetables from both farms and markets. In farm samples of amaranths, the mean concentration of methoxychlor, p, p' DDT and ?-HCH were 8.536 ± 4.428 mg kg⁻¹, 1.251 ± 0.737 mg kg⁻¹ and 0.986 ± 0.448 mg kg⁻¹ respectively while the market samples concentration were 0.643 ± 0.365 mg kg⁻¹ (methoxychlor), 0.263 ± 0.263 mg kg⁻¹ (p, p' DDT) and 0.168 ± 0.068 mg kg⁻¹ (?-HCH). The farm samples of fluted pumpkin levels were 6.458 ± 1.821 mg kg⁻¹ (methoxychlor), 0.254 ± 0.174 mg kg⁻¹ (p, p' DDT) and 0.542 ± 0.080 mg kg⁻¹ (?-HCH) while the residue levels from market samples were 5.988 ± 2.533 mg kg⁻¹ (methoxychlor), 0.718 ± 0.203 mg kg⁻¹ (p, p' DDT) and 0.467 ± 0.147 mg kg⁻¹ (?-HCH). The levels of DDT and HCH residues detected were generally above the UK/EC-MRL which ranged between 6-81% in amaranths 12.5 -100% in fluted pumpkin. The analysis of health risk estimates revealed that the only the HI values for methoxychlor, 3.848 and 5.217 in amaranths and fluted pumpkin respectively, were >1 for the children category suggesting a great potential for systemic toxicity in children via vegetable consumption. The results obtained from this study suggest that the vegetables may be considered safe for adult and children with exception to methoxychlor. Nonetheless, there is need for regular monitoring of pesticide residues in vegetables, fruits and other food products in Nigeria to ensure higher food quality and safety.

**KEYWORDS:** Human health, Insecticides, Monitoring, Risk assessment
Final ID: C11
SESSION: Agriculture, mining and the environment
TITLE: West African Sahelian Cities as Source of Carbon Stocks: Evidence from Niger
AUTHORS/INSTITUTIONS: Moussa Soule, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. Boateng Kyereh, Shem Kuyah, Abasse Tougiani, Saadou Mahaman
PRESENTER (E-MAIL ONLY): smoussa@st.knust.edu.gh SECTOR: Academia
MEMBERSHIP STATUS: Student Guest
ABSTRACT BODY:
Urbanization has a huge impact on global carbon balance. Nevertheless, much attention has been focused on the natural vegetation role in carbon offset. Specifically, in Niger, the estimation of carbon stock of urban forests remains unexplored areas for climate change mitigation. This study estimated the carbon stocks and carbon emission factors in Niamey and Maradi in Niger. Woody species were inventoried in 328 plots located across six-land use and land cover type in the two cities. Focusing on trees and shrubs with diameter at breast height (DBH > 5 cm), 2026 stems were measured in Niamey whilst in Maradi 2454 stems were documented in Maradi. Urban forest biomass were estimated using generalized model. Large urban trees with (DBH) > 40 cm formed 28.04% of the total trees inventoried in Niamey, but held over 75.18% of the above ground biomass (AGB). While large trees formed only 18.91 % of the total trees measured in Maradi, they held over 53.71 % of the AGB. Medium trees (DBH [10-40]) dominated all the two cities, representing 68.77% of all the stems measured. The corresponding values of the mean diameter and mean height and its standard deviation (SD) were 31.18 ± 3.48 cm for Niamey and 28.54 ± 3.32 cm for Maradi, 8.87±1.18 m for Niamey and 7.80 ± 10 m for Maradi. The corresponding values of the mean above ground biomass and its confidence interval (CI) at 95% were 43.78(26.59, 60.97) t/ha for Niamey and 56.9 (27.0, 86.8) t/ha for Maradi. The three most dominant species in terms of AGB were *Azadirachta indica* (45.06%), *Faidherbia albida* (16.78%) and *Khaya senegalensis* (11.51%) in Niamey city. The urban exotic tree specie represented 57.40 % of the total AGB and 42.60 % were native tree species in Niamey. While the three most
KEYWORDS: Biomonitoring, Climate, Human health, Soil
SESSION: Food safety, nutrition and environmental sustainability

Final ID: D1
SESSION: Food safety, nutrition and environmental sustainability
TITLE: Pesticide Use and Toxicity: A Food Safety, Human and Environmental Concern
AUTHORS/INSTITUTIONS: O.C. Nduka, E.C. Umego, University of Nigeria; C.A. Okolo, Nnamdi Azikiwe University
PRESENTER (E-MAIL ONLY): onyeka.nduka@unn.edu.ng SECTOR: Academia
MEMBERSHIP STATUS: Student Guest
ABSTRACT BODY:
Pesticides are used widely to control insects, weeds and fungi that might otherwise destroy a large part of the world's food crops and raw agricultural products in fields, at harvest and during storage. Pesticides, among other uses are beneficial in that they increase productivity, protection of crop losses, and thus the conservation of ecological biodiversity and utilization. Consequently, modern pesticides use and applications seem to be relatively safe, but risk assessment studies, ecological and environmental safety
assessment, and also exposure assessment studies, investigations and findings suggested that the risk associated with the use of pesticides were not only limited to human health risks such as hormonal disruptors, respiratory diseases and disorders, and of course resultant cancer cases. Concerns were also discovered in raw foods, and processed food products as residual contaminants, and thus the negative impact on the environment where they are found to contaminate the surface water, ground water, soil, air, non-target vegetation and the ecosystem due to its bioaccumulation and biomagnifications, thus making the use and application of pesticides a potential hazard and a big health and environmental challenge in modern day agriculture. In the control of these, information from the chemical risk assessment studies suggests that the right dosage applications, the Maximum Residual Levels (MRLs), and the health implications when misused or abused against standard specifications is of great importance as a means of alleviating these effects on foods, humans and thus, promoting environmental sustainability. Keywords: Pesticide, Risk, Health. **KEYWORDS:** Pesticide

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**Final ID: D2**

**SESSION:** Food safety, nutrition and environmental sustainability

**TITLE:** Cellulose nanocrystals: An environmentally friendly alternative to fossil-based materials

**AUTHORS/INSTITUTIONS:** Faith Zanu, Enock Dankyi, University of Ghana / Department of Chemistry; Vitus Apalangya, University of Ghana / Department of Food Process Engineering

**PRESENTER (E-MAIL ONLY):** fnzanu@gmail.com  **SECTOR:** MEMBERSHIP STATUS:

**ABSTRACT BODY:** The growing concern for the environmental persistence of non-biodegradable petrochemical plastics calls for eco-friendly and biodegradable alternatives. Materials from agricultural waste biomass such as cellulose could be excellent sustainable alternatives as they are widely available, cheap and biodegradable. In this study, cellulose nanocrystals were extracted from “sawie” (*Acasia sp.*), “keteku” (*Palmae sp.*), and “ela” (*Raphia sp.*) plant biomass through a series of acid and base hydrolysis to remove lignin, hemicellulose and other amorphous domains leaving a crystalline domain of cellulose nanocrystals. Cellulose nanocrystals were characterized using optical microscopy, scanning electron microscopy (SEM), Fourier Transform Infra-red (FT-IR) spectroscopy, X-Ray Diffraction (X-RD). The extracted cellulose nanocrystals were rod-like with approximately 50 nm diameter and of varying lengths. They were found to be highly crystalline and sulphonated, enabling uniform dispersion in aqueous solution. The excellent properties of the extracted cellulose nanocrystals coupled with their wide availability in nature hold huge promise as a source for the next generation of green packaging materials and a more sustainable alternative to fossil-based packaging materials. **KEYWORDS:** Nanomaterials, Persistent, Sustainability

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**Final ID: D3**

**SESSION:** Food safety, nutrition and environmental sustainability

**REQUESTED PRESENTATION TYPE:** Platform

**TITLE:** Heavy metal quantification in noodle products commonly consumed in Nigeria

**AUTHORS/INSTITUTIONS:** Grace Otitoju, University of Nigeria Nsukka / human nutrition and dietetics; Olawale Otitoju, federal University Wukari / Biochemistry Department; Chidinma Ezenwa, University of Nigeria Nsukka / Nutrition and Dietetics

**PRESENTER (E-MAIL ONLY):** grace.otitoju@unn.edu.ng  **SECTOR:** Academia  **MEMBERSHIP STATUS:** Student Guest
ABSTRACT BODY: Technological advancement in the food industry in the last five decades has resulted in the production of ready meals and convenience food. Instant noodles are some of the most common convenience foods in Nigeria. Noodles' production in Nigeria is estimated to be the 12th biggest convenience food in the world. However, with the rate of its demand there is the need to know the safety of its consumption by consumers. This study investigated the levels of some heavy metals [arsenic (As), cadmium (Cd), chromium (Cr), lead (Pb) and mercury (Hg)] in eleven brands of noodles sold in Nigerian markets. The results shows that the levels of As, Cd, Cr and Pb in the noodles ranged from (0.13±0.04 to 0.34±0.05), (0.55±0.12 to 0.77±0.04), (0.18±0.05 to 0.46±0.21) and (0.55±0.08 to 1.46±0.17) respectively and they were relatively higher than the tolerable limit set by WHO. Although these noodles are above the tolerable limit, awareness among the consumers, industries and regulatory agencies will go a long way to reduce possible risk associated with its consumption. Noodles contamination with heavy metals is of public health importance because consumers are at higher risk of heavy metal toxicity which predisposes them to diseases such as nervous, cardiovascular, circulatory system disorders, liver and kidney damage as well as cancer. Therefore, regulatory bodies like NAFDAC, SON should monitor the processes involved in the production of these noodles to ensure that only wholesome products are given to consumers.

KEYWORDS: Bioaccumulation, Metals, Risk assessment, Toxicity
Final ID: D5
SESSION: Food safety, nutrition and environmental sustainability
TITLE: Haemolytic activity and UV-Vis spectral analysis of aqueous extract of Cucumis melo L. var. inodorus (sweet melon) mesocarp.
AUTHORS/INSTITUTIONS: Richard-Harris Boyi, Federal University Wukari Wukari Nigeria / Biochemistry Department; Olawale Otitoju, Mayel Midah, federal University Wukari / Biochemistry Department; Parker Elijah, Henry Onwubiko, University of Nigeria Nsukka / Biochemistry Department
PRESENTER (E-MAIL ONLY): b.richardharris@gmail.com
SECTOR:
MEMBERSHIP STATUS:
ABSTRACT BODY: Haemolytic activity of any compound is an indicator of general cytotoxicity towards normal healthy cells; also, toxicity of bioactive molecules is a key factor in drug design. *Cucumis melo* is one of the most widely cultivated and consumed fruit in the world due to its nutritional and medicinal value. In this study, the haemolytic activity of the aqueous extract of *C. melo* var. *inodorus* mesocarp was screened against normal human erythrocytes. The haemolytic activity, expressed in percentage haemolysis was carried out by a modified spectroscopic method at four different concentrations (125, 250, 500, 1000?g/ml) and was found to be: 0.119%, 0.123%, 0.064% and 0.087% respectively and these values were not statistically significant (at p > 0.05). UV-Vis spectral analysis of the samples at 250?g/ml showed similar spectra pattern between the wavelength of 400 – 700nm, revealing soret band at 415nm and two other bands at 537nm and 577nm. Maximum absorption for ? and ?oxyhaemoglobin was comparable to normal erythrocytes. Therefore, *C. melo* var. *inodorus* mesocarp aqueous extract can be considered non-cytotoxic and safe on human erythrocytes.
KEYWORDS: Cytotoxicity, Human health, Nutrients, Toxicity

Final ID: D6
SESSION: Food safety, nutrition and environmental sustainability
TITLE: Biomarker responses in wild African sharptooth catfish (Clarias gariepinus) inhabiting polluted streams in Ibadan.
AUTHORS/INSTITUTIONS: Oluwafikemi Iji, Federal College of Animal Health & Produccion Technology, Moor Plantation, Apata, Ibadan / Department of Paraclinical Science,
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SECTOR: Academia
MEMBERSHIP STATUS: Type 11 AF Dev2 Asso Exp: 2019-01-16
ABSTRACT BODY: Iji OT, Oyagbemi A.A, Azeez O.I, Ola-Davies O. Department of Veterinary Physiology and Biochemistr, University of Ibadan Since biomarkers are effective monitoring tools that have successfully been used in environmental monitoring and assessment to detect exposure to and effects of chemicals, we examined its use in monitoring fish inhabiting polluted streams using condition indices, histopathology, heamatology and osmotic fragility test, serum biochemistry, and genotoxicity assays in wild African sharptooth catfish (Clarias gariepinus). A total number of 55 African catfish obtained from FOL-Hope farms (reference site), Eleyele, Dandaru and Oluyole streams (polluted streams) were assayed. Histopathologic changes were observed in the gills, liver and the kidneys of fish from the polluted sites; ranging from intralamella hyperplasia of the gills, marked disseminated congestion involving the vessels and sinusoids, as well as steatosis in the liver. Lesions in the kidney showed desquamation of tubules with atresia and multifocal patches as well as severe distortion of the tubular architecture characterised by outright loss of tubular
structure. No significant lesion was observed in the muscle of all the fish examined from both the polluted and the reference sites. With regards to serum biochemistry, Alanine Amino Transferase (ALT) was significantly higher in the two (2) most polluted sites (Dandaru and Oluvole) ($p<0.01$) compared to others two sites (Eleyele and Hope), there was no significant difference in Aspartate Amino Transferase (AST) and Alkaline Phosphatase (ALP) across the groups ($p<0.05$). Increased incidence of micronuclei formation (MN) was observed in the polluted sites when compared to the control. The frequencies of micronuclei formation were significantly higher ($p<0.05$) in the polluted sites compared to the control. Values showed MN formation 20.42±2.07 (Oluvole), 14.17±0.50 (Eleyele), 8.33±0.77 (Dandaru) and 1.30±0.50 for the reference site at $P<0.05$. Water physicochemical properties revealed that Cd, Mn and Fe were significantly higher at the polluted streams compared to reference sites. Although water chemical analysis only identified heavy metals as contaminants in the polluted stream, the application of a suite of biomarkers in C. gariepinus demonstrated that pollutants of possible public health concern were present in all polluted streams.

**KEYWORDS:** Bioaccumulation, Cytotoxicity, Ecological risk assessment, Metals

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Final ID: D7

**SESSION:** Agriculture, mining and the environment

**TITLE:** POTENTIAL HUMAN HEALTH RISKS BASED ON IN VITRO BIOACCESSIBILITY OF TOXIC METALS IN TOPSOILS FROM GBANI-A MINING COMMUNITY IN GHANA

**AUTHORS/INSTITUTIONS:** Kwadwo Owusu Boakye, Ghana Education Service; Godfred Darko, Kwame Nkrumah University of Science and Technology / Department of Chemistry; Matt Dodd, Royal Roads University / School of Environment & Sustainability

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**MEMBERSHIP STATUS:** Guest

**ABSTRACT BODY:** The distribution and pollution patterns of toxic metals (arsenic, iron, nickel, cobalt, chromium, manganese, copper and zinc) in the topsoils of a predominantly mining community in Ghana as well as their potential human health risks and in vitro bioaccessibility were determined. Concentrations of metals initially determined using X-ray fluorescence techniques were validated using inductively coupled plasma-mass spectrometer. The mean concentrations of metals in the topsoil were in the order; Cu (31.38 mg/kg) < Ni (45.39 mg/kg) < As (59.66 mg/kg) < Cr (92.87 mg/kg) < Zn (106.98 mg/kg) < Mn (1195.49 mg/kg) < Fe (30061.02 mg/kg). Geo-statistical and multivariate analyses exploring various hazard indices such as contamination, geo-accumulation, ecological risks and pollution load all suggested contamination of the topsoils. The potential ecological risk index showed high ecological risk effects (PERI=269.09) whereas the hazard index ($1\times10^{37}$) and carcinogenic risk index ($1\times10^{35}$) indicated no human health risk associated with exposure to the metals at the current concentrations. Contaminations due to As, Cr, Ni, and Zn was found to emanate from anthropogenic origins whereas, Fe, Mn, and Cu contaminations were attributed mainly to geological and atmospheric depositions. Physicochemical parameters (pH, electrical conductivity and total organic carbon) and the metal concentrations showed weak positive correlations. Elemental bioaccessibility was variable; decreasing in the order Mn (35±2.9%) > Cu (29±2.6%) > Ni (22±1.3%) > As (9±0.5%) > Cr (4±0.6%) > Fe (2±0.4%). Incorporation of the *in-vitro* bioaccessibility data into the risk characterization models resulted in hazard index less than 1; indicating low human health risks except for contaminated hotspots. However, due to accumulation effects of the metals, regular monitoring is required.

**Keywords:** Soil contamination; Environmental pollution; Small-scale artisanal mining; bioaccessibility.

**KEYWORDS:** Risk assessment
Final ID: D8

SESSION: Agriculture, mining and the environment

TITLE: Visible risks, do they care? A theoretical perspective of why miners engage in small-scale mining

AUTHORS/INSTITUTIONS: Rejoice Wireko-Gyebi, Kwame Nkrumah University of Science and Technology / Planning; Rudith King, Kwame Nkrumah University of Science and Technology / Department of Planning

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MEMBERSHIP STATUS: Student Guest

ABSTRACT BODY: Artisanal small scale mining is a major source of livelihood to many people, but also poses enormous risks to miners and their communities at large. Considering the numerous hazards miners are exposed to, it appears that the sector is growing in intensity in most communities in Ghana. Based on an extensive review of relevant literature, the paper examines the motivation for intensity in growth of the sector amidst the numerous health, injury, social, economic and environmental risks. Synthesis of available literature reveals that miners are exposed to four major hazards - physical, chemical, ergonomic and psycho-social hazards. Six key reasons were identified to influence the continuous engagement of miners in mining activities; poverty, higher returns, unequal benefits from local resource, environmental effects not borne by only miners, limited knowledge on the severity of ASM risks, and weak policy formulation and implementation. The study recommends that inasmuch as miners perceive that there is motivation to undertake the activity, there is the need for effective collaboration between the government and miners to develop simplified participatory framework for the management of artisanal small scale mining in Ghana. This, among others, could help minimise exposure to risks and improve benefits from the sector.

KEYWORDS: Development, Policy analysis, Risk management

Final ID: D9

SESSION: Environmental pollution and waste management

TITLE: Impact of Urban Runoff as Non-Point Source Pollution: Carbapenem-Resistant Enterobacteriaceae in Ouseburn River

AUTHORS/INSTITUTIONS: Yvonne Marvellous Akpudo, Nigeria Maritime University / MARINE ENVIRONMENT AND POLLUTION CONTROL

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MEMBERSHIP STATUS: Guest

ABSTRACT BODY: Point source pollution which negatively implicates public health is mostly the basis for studying antibiotics resistance (AR) in the environment. However, evidence suggests that urbanisation can cause similar effect through run-off. To examine this concept, Ouseburn Valley was explored due to regeneration of the location and record of flood events. Six sites capturing creeping urbanisation: less urbanised area, built areas and green areas close to major paved roads were sampled thrice from spring to summer. Culture-based method was used to screen for Carbapenem-Resistant Enterobacteriaceae (CRE); targeting enteric biomarkers E.coli, Klebsiella, Enterobacter, Serratia and Citrobacter (KESC) group from non-CRE organisms with enumeration in water column and sediment samples. Physicochemical parameters such as Dissolved Organic Carbon (DOC), Total Nitrogen, Turbidity and Water Temperature, reflecting surface water quality were also assayed through standard methods to assess correlation with detected AR level. In water samples, a maximum of 400 CFU ml⁻¹ was detected during spring sampling and 67 CFU ml⁻¹ at summer. Notably, peak enumeration was consistent in sites linked to combined sewer overflow or close proximity to green areas and
major roads. Similar occurrence was observed in sediment samples but of higher magnitude with a maximum of $443000 \text{ CFU ml}^{-1}$ at spring and $807 \text{ CFU ml}^{-1}$ at summer. Therefore the potential for re-suspension and dissemination of CRE during heavy downpour and flooding exits. Microbial source tracking revealed the probability of horizontal gene transfer because enumeration of Non-CRE organisms indicated higher amount compared to CRE. A maximum of $10^3 \text{ CFU ml}^{-1}$ and $10^6 \text{ CFU ml}^{-1}$ were detected in water and sediment samples respectively. Similarly, the trend in decline of enumerated CRE at summer due to reduced run-off was also observed for non-CRE. Using Spearman’s correlation, CRE level in water samples positively correlated with DOC ($r = 0.30$), and negatively correlated with water temperature CRE level ($r = -0.17$), although both associations were low. Results confirm that run-off influences the proliferation of CRE which threatens therapeutic choices for treatment of nosocomial and community-acquired infections such as urinary tract infections, sepsis and lower respiratory tract infections.

**KEYWORDS:** Surface water, Urban, Water quality

Final ID: D10
SESSION: Agriculture, mining and the environment
TITLE: A Survey of Heavy Metals Concentration in the Topsoil of Volta Region in Ghana.
AUTHORS/INSTITUTIONS: Lily Lisa Yevugah, Edward Matthew Osei Jnr, Kwame Nkrumah University of Science and Technology / Geomatic Engineering Department; Godfred Darko, Kwame Nkrumah University of Science and Technology / Analytical Environmental Chemistry
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MEMBERSHIP STATUS: Student Guest
ABSTRACT BODY: The establishment of baseline values of heavy metals in soils have served as a tool for environmental agencies to improve upon soil environment management plans. This study is an ongoing research to obtain baseline values of heavy metals in Ghana. To address the concerns of environmental pollution, there is the need to find the level of concentration of heavy metals in the soil. This will give an idea of the toxicity levels and also help find the potential affected communities that will need future health studies aimed at reducing exposure to inorganic substances. The study was conducted in the Volta Region to determine concentration of heavy metals; Mn, Cr, Ni, Zn, As, Cu, Cd, Pd and Hg in the topsoil. Soil samples were collected from the study area at 25 km interval and were analyzed using an X-Ray Fluorescent (XRF) instrument to determine the concentration of heavy metal. Spatial distribution of heavy metals was realized by means of interpolation using Empirical Bayesian Kriging (EBK) method. Results indicated that, there are high concentration levels of Cd and Cr in some areas of the region. Concentrations of Cd were greater than the permissible limits of 1.4 mg/kg in agricultural soils but lesser than that for industrial soils, 22mg/kg. Cr concentrations were higher than permissible limits of 0.4 mg/kg for agricultural soil and 1.4mg/kg in industrial soil. Maps created indicate relatively low concentrations of all other metals as compared to their permissible limits. The presence of Cd and Cr present a major concern for sustainable agriculture and health implications which need to be further investigated, and the impact closely monitored to address environmental threats.

**KEYWORDS:** Metals, Soil, Spatial

Final ID: D11
SESSION: Agriculture, mining and the environment
TITLE: Indiscriminate use and release of herbicide for weed control
AUTHORS/INSTITUTIONS: Tessy Oyemike, NIGERIA
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MEMBERSHIP STATUS:
ABSTRACT BODY: This study was borne out if the indiscriminate use and release of herbicide for weed control. The effect of the leachate on the germination and growth characteristics of the onions (allium cepa) was examined. It was found that the leachates markedly reduced the rate of germination and that the reduction of germination rate was leachate concentration dependent. The growth measured in terms of the length of the radicle and plumule of the 4-day old onion seedling was deleteriously imparted by the leachates. It found that a 50% (w/v) of the leachates completely inhibited the growth of the radicle and plumule of the onion roots with the total (complete) inhibition of root growth at the relatively low concentration (1.56mg/L) of the leachate and since safety merging are built around 10% of the effective concentration, the safe limit was estimated at 0.156mg/L. The radical cautions from the leachate which gives rise to oxygen containing free radicals are thought to be responsible for the observed phytotoxic effects.

KEYWORDS: Bioaccumulation, Biomonitoring, Chronic toxicity, Herbicides

Final ID: D12
Ecological Risk Assessment of Heavy Metals from Different Anthropogenic Dump-sites in Owerri Southeastern Nigeria.
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ABSTRACT BODY: The ecological risk assessment of heavy metals associated with different anthropogenic dump-site in an urban city center was investigated using physicochemical parameters and ecological risk model. Results obtained from physical properties showed increase in soil moisture (4.32%) and sandy fractions in spent engine oil dump-sites. However, porosity (26.3 ± 0.16mg/kg) and bulky density (1.50 ± 0.05mg/kg) were high in electronic waste dump site compared to other dump-sites. Chemical properties showed decrease in soil pH (0.5) in crude oil polluted site compared to electronic waste dump site (8.3) and welding waste dump site (7.3). Magnesium (3.31 ± 0.007mg/kg) and phosphorous (13.03 ± 0.07mg/kg) were high in spent engine oil dump site compared to the other dumped sites. However, organic carbon (5.21 ± 0.004mg/kg) was high in welding waste polluted site compared to other sites. Heavy metals in soil from spent engine oil dump-sites increased in the order Mn>Fe>Zn>Pb>Cu>Ni>Cd>Cr. Electronic waste dump site increased in the order Pb>Fe>Zn>Mn>Cu>Ni>Cd>Cr and welding dump site increased in the order, Zn>Cu>Fe>Mn>Pb>Cr>Ni>Cd. Ecological risk assessment results showed that cadmium had heavily ecological risk in the soil from the three sampled areas (Welding dump sites, Electronic waste dumped sites and spent engine oil dump site). However, ecological risk of manganese and iron pollution were high in electronic waste and welding dump sites compared to that obtained from spent engine oil dump-site, while copper and zinc were moderately high in the three sampled area, lead and nickel were considerably high and chromium was low in Spent engine oil and electronic dump sites. There is therefore need to monitor the way people dispose of their anthropogenic waste and for a sound technology, to help mitigate these heavy metals causing risk to the environment.

Keywords: Heavy metal, ecological risk, anthropogenic waste, Spent engine oil, electronic dump site, welding dump site
SESSION: Environmental pollution and waste management

TITRE: The Use of Bioavailability in Risk Assessment

AUTHORS/INSTITUTIONS: Matt Dodd, Royal Roads University / School of Environment & Sustainability; Godfried Darko, Kwame Nkrumah University of Science and Technology / Analytical Environmental Chemistry; Marian Nkansah, Kwame Nkrumah University of Science and Technology, Kumasi / Department of Chemistry

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ABSTRACT BODY: The key question in cleaning up a contaminated site is "how clean is clean". Generally the site is cleaned up to a level that is based on environmental soil quality standards derived from the total concentration of the contaminants in the soil. In the risk assessment approach the answer to “how clean is clean” includes an assessment of what portion of the contaminants at the site can become biologically available (bioavailable) to humans and other organisms that are exposed to the contaminated soil. Bioavailability refers to the portion of the contaminant that is actually absorbed by the target organism after exposure. This talk will provide a brief overview of the use of bioavailability in risk assessment followed by a synopsis of some of the investigations conducted in our laboratory to assist with the advancement of bioaccessibility as a surrogate for bioavailability research. It will conclude with a brief look at some of the activities conducted in furthering the development and implementation of bioavailability in Ghana.

KEYWORDS: Bioavailability, Human health, Metals, Remediation

SESSION: Environmental pollution and waste management

TITRE: Harnessing the Use of Biogas System to reduce Air Pollution on food waste generated in Africa

AUTHORS/INSTITUTIONS: Akinleye Oyegbami, Federal University of Agriculture, Abeokuta / Environmental Management and Toxicology; Moses Oyatogun, Federal University of Agriculture Abeokuta / Forestry and Wildlife Management; Gakii Mugendi, Food Smart Africa, Kenya; Thierry Odou, Abdou Moumouni University, Niger

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ABSTRACT BODY: The ever increasing carbon and other factors causing climate change needs a serious attention with a global solutions. Agricultural systems account for about 10% of global greenhouse gas emissions which significantly contribute to air pollution and ozone layer depletion which result in climate change. In addition to examining emerging consumer trends and their contribution to food wastage, this study aimed to determine the sources of food waste, the rate of biogas users and examine the barriers to and opportunities for reducing the consequent gas emissions within the residential areas in Kenya and Nigeria. Data was obtained from selected residential areas within Nairobi city, Kenya and also at Abeokuta city, Nigeria by focus group discussions, interviews and direct observations. The research discovered that majority of the occupants at the selected study area doesn't managed there waste properly with very few biogas user in the area. The study recommends education and training of the occupants in order to create awareness among consumers on reduction and management of food waste. Nigeria and Kenya to survive her current energy crisis, if the waste are used properly and biogas is set in place to help to minimize the air pollutants.

KEYWORDS: Climate,
城乡

2nd SETAC Central/West Africa Regional Conference  Defo, C. "APPLICATION OF PRINCIPAL COMPONENT ANALYSIS TO DETECT GEOCHE..." [47940]

Final ID: D15

SESSION: Environmental pollution and waste management

TITLE: APPLICATION OF PRINCIPAL COMPONENT ANALYSIS TO DETECT GEOCHEMICAL PARAMETERS INFLUENCING Pb and Cd RETENTION IN URBAN TROPICAL SOILS

AUTHORS/INSTITUTIONS: Celestin Defo, FASA University of Dschang / School of Wood, Water and Natural Resources; Yerima Palmer Kfuban, FASA University of Dschang / Agronomy and Soil Science; Patience Maaldu, University for Development Studies, Agricultural Technology

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ABSTRACT BODY: This study investigated Pb and Cd concentrations in soils within the Ntem watershed in Yaoundé, to prevent the risk on the public health. Representative soil samples were also collected directly from some soil profiles and analyzed by atomic absorption spectrophotometry (AAS) after filtration. Soils samples were air-dried and ground to pass through a 2 mm sieve and the total Pb and Cd were extracted with strong acids and determined by atomic absorption spectrophotometry (AAS). The Component Plot in Rotated Space gave one a visual representation of the loadings plotted in a 2-dimensional space. The component loadings showed that Pb, Cd, CEC, OM, and clay load highly and positively on the first component. DeltapH (?pH) had a loading closed to zero on the first component, but loaded highly on the second. The Component 1 described better these interactions showing affinity between metals and geochemical parameters studied except ?pH which was excluded in the models. Results revealed that, Pb, Cd, CEC, OM, and clay load highly and positively on the first component while DeltapH (?pH) has a loading loads highly on the second.OM, CEC and clay played major role in heavy metal immobilization in these soils while DeltapH (?pH) played minor role.

KEYWORDS: Metals, Soil, Statistics, Urban

2nd SETAC Central/West Africa Regional Conference  Anika, O. "THE POTENTIAL OF BIOGAS PRODUCTION FROM FRUIT WASTES (Watermelon, Mango and Pawpaw).

Final ID: D16

SESSION: Environmental pollution and waste management

TITLE: THE POTENTIAL OF BIOGAS PRODUCTION FROM FRUIT WASTES (Watermelon, Mango and Pawpaw).

AUTHORS/INSTITUTIONS: Ogemdi Anika, University of Abuja / Microbiology; Bukola Akin-Osanaiye, UNIVERSITY OF ABUJA, ABUJA NIGERIA / Department of Microbiology; Ernest Asikong, UNIVERSITY OF CALABAR CALABAR NIGERIA / Department of Microbiology

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MEMBERSHIP STATUS: Student Guest

ABSTRACT BODY: ABSTRACT The study determined the potential of biogas production from fruit wastes: mango, watermelon and pawpaw and their combinations by the activities of complex consortia of microorganisms. Fixed batch type anaerobic digesters were locally fabricated and used for the study. The retention time was for forty-five (45) days. The different substrate wastes were prepared into slurry treatments by grinding and mixing with water in the ratio of 1:3, but 1:2 for only watermelon treatment because of its high moisture content. The different treatments loaded into the digesters were mango (M), watermelon (W), pawpaw
(P), mango + watermelon (MW), pawpaw + watermelon (PW), mango + pawpaw (MP), and mango + watermelon + pawpaw (MWP) each inoculated with 10% starter culture from an old but active cow dung digester. Determination of process pH, temperature and viable anaerobic counts were carried out to monitor how their variations in the anaerobic digesters affected the biogas production process, using pH meter (model PHS-3D), mercury in glass thermometer and a locally designed anaerobic glove box. Quantification was by liquid displacement. The pH, temperature and anaerobic counts varied over the forty-five (45) days retention time. The total volume of biogas produced from each digester at the end of the forty-five (45) days retention period was 2971 cm$^3$, 1577 cm$^3$, 83 cm$^3$, 5103 cm$^3$, 1630 cm$^3$, 916 cm$^3$, and 4348 cm$^3$, from W, M, P, WM, PW, MP and MWP respectively. The excellent biodegradability potential displayed by watermelon waste and to a lesser extent mango waste is of great importance in waste management and the energy transition vision of Nigeria. **KEYWORDS:** Biogas production, fruit wastes, watermelon, mango, pawpaw, complex consortia, anaerobic glove box, viable anaerobic counts.

**KEYWORDS:** Biodegradation

2nd SETAC Central/West Africa Regional Conference Majoni, S. "Speciation and bioavailability of heavy metals in soil and s..." [47948]

**Final ID:** D17

**SESSION:** Environmental pollution and waste management

**TITLE:** Speciation and bioavailability of heavy metals in soil and sediments in Umguza area of Bulawayo

**AUTHORS/INSTITUTIONS:** Stephen Majoni, Botswana International University of Science and Technology / Chemical and Forensic Sciences; Tariro Muchingami, National University of Sciences and Technology NUST / Applied Chemistry

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**MEMBERSHIP STATUS:** Guest

**ABSTRACT BODY:** Umguza is a populated locality in the Matabeleland North province of Zimbabwe that surrounds the city of Bulawayo. The Umguza River flows through Umguza and serves as a water source for agricultural and domestic purposes for communities that reside in the vicinity of the river. There has been wide spread concern of pollution of the Umguza River as it passes through the city of Bulawayo, with industries being accused of discharging untreated effluent into the river. The main aim of this work was to evaluate the extent of aquatic pollution by assessing levels of inorganic pollutants such as metal ions, nitrates, sulphates, and phosphates at sampling points within the vicinity of city of Bulawayo along the river and also in the Upper and Lower Umguza dams. This report is mainly focusing on the metal ions pollution. The evaluation of the extent of pollution was conducted by identification of the chemical forms of the metal ions. Speciation of metal ions is of interest in the evaluation of their origins, mobility and bioavailability. Speciation of selected heavy metals that included Cd, Cr, Cu, Fe, Pb, Mn, Ni and Zn were studied in the soil and sediments of Umguza catchment area. The chemical extraction method was used and the concentrations were determined using Atomic Absorption Spectroscopy and UV-VIS spectroscopy. The results indicated that the samples collected from various locations contained varying amounts of metals which were distributed among the exchangeable, reducible, oxidisable and residual fractions. The oxidisable fraction was the most abundant pool for Cd, Cr and Pb while Cu, Ni and Zn were mainly recovered in the residual fraction. Fe and Mn were highly associated with the reducible fraction. Lead was assessed to have a bioavailability fraction greater than 50% suggesting that it was readily released into the environment while all the other metals had bioavailability fraction less than 50%. Considering that metals mostly occurred in the non-residual fraction, it shows that the metals must have been derived from anthropogenic source. Even though the Umguza River passes through, and is exposed to pollution from the city of Bulawayo, the total metal concentrations in all sample locations were below the World Health Organisation and Food and Agricultural Organisation limits. **KEYWORDS:** Bioavailability, Sediment, Soil, Speciation
The level of heavy metals from the major roadsides of Lokoja town was evaluated using Atomic Absorption Spectrophotometer (AAS). Soil samples were taken from five different sites along the major highways Nataco, Ganaja, Adankolo, Kpata, and Zenith respectively. Soil samples at each sampling site were taken at the depth of 2 cm, 4 cm, and 7 cm beneath the soil. These were then mixed to give a representative sample per site. Samples were digested using aqua regia in the ratio 3:1, HCl:HNO₃, followed by addition of 10 cm³ H₂O₂. The volume of the digest was made up to 100 cm³ using distilled water. Portion of this solution was used for the determination of Cd, Fe, Pb, and Zn. Mean levels of the analysed metals ranged between 3.31±0.01 mg/kg Pb at Ganaja, to 1.56±0.01 mg/kg at Kpata. Cadmium was observed to be highest (0.06±0.02 mg/kg) at Kpata, with the least value (0.01±0.00 mg/kg) at Ganaja. Zinc was highest (3.21±1.23 mg/kg) at Nataco, and least (0.94±0.05 mg/kg) at Kpata. Iron was highest (627.11±10.38 mg/kg) at Nataco, with the least value (339.78±6.23 mg/kg) at Kpata. Mean pH of the soil ranged from 8.39±0.47 at Adankolo, to 7.11±0.20 at Kpata. Mean organic carbon (OC) was observed to be highest (0.76±0.32) at Ganaja, and least at Nataco (0.34±0.02). Mean moisture content was observed to be highest (1.82±0.09%) at Nataco, with the least (0.86±0.02%) at site Zenith.

**KEYWORDS:** Metals, Roadway, Soil, Urban

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**POSTERS SECTION**

**Final ID:** P01

**SESSION:** Environmental pollution and waste management

**TITLE:** ASSESSMENT OF PUBLIC PARTICIPATION IN HOUSEHOLD WASTE MANAGEMENT IN AWKA METROPOLIS, ANAMBRA STATE, NIGERIA

**AUTHORS/INSTITUTIONS:** Agnes NWOSU, NIGERIA MARITIME UNIVERSITY, OKERENKOKO, DELTA STATE / MARINE ENVIRONMENT AND POLLUTION CONTROL

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**MEMBERSHIP STATUS:** Guest

**ABSTRACT BODY:** ASSESSMENT OF PUBLIC PARTICIPATION IN HOUSEHOLD WASTE MANAGEMENT IN AWKA METROPOLIS, ANAMBRA STATE, NIGERIA

Nwosu, Agnes Ogechukwu

Department of Marine Environment and Pollution Control, Nigeria Maritime University, Okerenkoko, Warri South West LGA, Delta State  August  2018

Poor waste management practices contribute to no small measure to rapid environmental degradation. This study assesses the level of public participation in household waste management in Awka metropolis of Anambra state, Nigeria. The study is intended to develop
a framework for sustainable public participation in waste management. Therefore, it explores the compliance levels of some distinct groups of the population in waste management. To this extent, the roles of the government and the public were clearly identified. Factors inhibiting the performance of the identified roles were determined, while strategies to mitigate or avert these challenges were proposed in the framework for sustainable waste management in the metropolis. In view of this, a survey approach was employed in the study. Using a cluster and simple random sampling technique approach, four hundred (400) questionnaires were administered to the public and one hundred and five (195) questionnaires were administered to operators of Anambra State Waste Management Authority (ASWAMA). Inferences were drawn using frequency tables, percentages and mean percentages as statistics. Results obtained revealed poor waste management practices and low compliance with waste management regulations. Hence, the study recommends the need for the government to explore ways of encouraging increased public participation in waste management from the planning/decision making stage to final implementation and monitoring stages. In conclusion, the study proposed a framework for sustainable public participation in waste management, and charges the government to support studies in aspects of waste management such as reduce, reuse, recycling and waste prevention.

**Keywords:** Waste Management, Public Participation, Environmental Degradation, Framework

**KEYWORDS:** Sustainability

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**Final ID:** P02

**SESSION:** Environmental pollution and waste management

**TITLE:** Antioxidant Enzymes and Lipid Peroxidation as Biomakers of Hydrocarbon-Induced Stress in Earthworm

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**ABSTRACT BODY:**

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**Abstract:** Toxic levels of hydrocarbons affect a variety of processes in soil organisms (earthworms). One of the major consequences of this is the enhanced production of reactive oxygen species (ROS), an indicator of damaged cells in living organisms. Accumulation of ROS may be the consequence of disruption of the balance between their production and the antioxidative system activity comprising of enzymic antioxidants such as catalase (CAT), and superoxide dismutases (SOD). This study investigated hydrocarbon-induced stress in earthworm using antioxidant enzymes and lipid peroxidation as biomarkers. Soil contamination was simulated in a pot experiment, using spent engine oil (SEO) at different concentrations (0, 10, 20, 30 and 50g) to 1.5kg of soil each. Lipid peroxidation, CAT and SOD activities were monitored after 14days and 28days of exposure. SOD and CAT activities increased significantly (p<0.05) in a concentration dependent manner at day 14 of exposure when compared with the control. These antioxidant enzyme activities decreased appreciably after 28days to all applied doses from 15.25-10.30U/mg and 13.23-6.14µm/mg, for SOD and CAT respectively. Lipid peroxidation, did show significant variations in a dose dependent manner, depicting more of oxidative stress when compared to control worms. This study demonstrated the sensitivity of earthworm as good candidate for hydrocarbon contamination. The result of this study showed SOD and CAT activities to be induced by spent engine oil contamination and suggests that integration of biochemical biomarkers, can serve as useful tools in environmental monitoring.

**Keywords:**
Aflatoxin (AF) a secondary metabolite of Aspergillus species is a group of mycotoxin. It contaminates stored foods leading to aflatoxicosis and dyslipidemia. Probiotics (PB) are live safe gut bacteria that are known to enhance metabolism by enabling safe detoxification of the aflatoxin in the host. This study investigated the effects of PB on intestinal lipid profile of aflatoxin B1 (AFB1) exposed rats. Fifty male albino rats of 190-200g body weight were grouped into two based on feed: Normal control (NC) and AF groups fed normal feed and AFB1 (40 ppb) contaminated feed respectively for eight weeks. Both were further divided into five groups of five rats each; NC group consisted of NC baseline (NCB), NC treated (NCT), given PB of 1×10^6 CFU per kg b.wt of consortium containing Lactobacillus (L) casei, L. plantarum, L. fermentum and L. delbrueckii, and NC control (NCC) given distilled water. AF groups consisted of AF baseline (AFB), Aflatoxin treated (AFT) given PB and AF control (AFC), given distilled water. The AFB and NCB were sacrificed at the beginning of PB treatment while NCT, NCC, AFT and AFC groups were sacrificed at 2 and 4 weeks. The small intestine (SI) was harvested and divided into sections [duodenum (DD), jejunum (JJ) and ileum (IL)]. Lipids [cholesterol (CHO), triacylglycerol (TAG) and phospholipid (PL)] of the SI sections were determined using spectrophotometric methods. One-way analysis of variance followed by Tukey's test were used to analyze the results with p < 0.05 considered significant. Exposure to AF significantly reduced TAG, CHO and PL in DD by 40.18 %, 61.09 % and 28.45 % respectively, TAG in JJ by 17 % and increased PL in JJ and IL by 83.33 % and 25 % respectively but no significant effect on CHO in IL and JJ and TAG in IL when compared with NCB group respectively. Administration of probiotics resulted into significant reduction of TAG in IL of NCT2 and AFT groups while resulting in a constipation of CHO in JJ of AFT4 and NCT groups when compared with their control counterparts. However, it had no significant effect on TAG in JJ and DD and CHO in IL and DD of treated groups. Probiotics induced constipation also resulted in the DD and JJ of AFT and NCT groups and IL of AFT4 group. This study indicated that probiotics altered absorption of lipids in a non-specific manner.

**KEYWORDS:** Accumulation, Chronic toxicity, Metabolism
Final ID: P04
SESSION: Aquatic and terrestrial toxicology and ecology
TITLE: Potential ecological risk index and bacteriological loads as indices for estimation of health status of Aquatic Environment
AUTHORS/INSTITUTIONS:
PRESENTER (E-MAIL ONLY):  
SECTOR:
MEMBERSHIP STATUS:
ABSTRACT BODY: Most of the Rivers in Niger Delta Nigeria looks awful, but full of life and activities and there is high productivity of nutrients and metabolic functions. Human activities are ever observed and the River is often subjected to external stressors mostly of anthropogenic origin. Poor sewage disposal, refuse dump and dredging activities are going on simultaneously in this River’s bank. The potential ecological risk index (PERI) was used to determine the metal contamination status, while bacteriological analysis was implore to assess the level of microbial contamination. The Rivers was sectionalized according to the point source pollutions and sampled monthly for a period of one year, depicting wet and dry seasons. The isolates were analysis in the laboratory and identified using a flexible method developed locally and confirmed using Bergey’s Manual of Determinative Bacteriology. The PERI was determined using the concentrations of the heavy metals in the bottom sediment and confirmation test was done using the method proposed by Hakanson. The findings revealed showed that the locally developed method is very simple and efficient and comparable with the standard methods. The results of this investigation showed that human activities may have influenced microbial load in the Rivers. The risk factor for the metals in the sediments revealed that the Rivers is very high at risk, which may pose serious environmental threat and health risks to the resident organisms, which may be magnify along the trophic level. Therefore, sensitization of the inhabitants becomes inevitable, since the level is above the threshold which may be detrimental to aquatic life and human at the top of the trophic level of the food chain.
KEYWORDS: Ecological risk assessment, Metals, Sediment, Toxicity

Final ID: P05
SESSION: Agriculture, mining and the environment
TITLE: Isolation and Characterization of Heavy Metals Resistant Bacteria in Soil Samples from Mambilla Artisanal Mining Site, Nguroje, Taraba State.
AUTHORS/INSTITUTIONS: SILAS TATAH, federal University Wukari / Biochemistry; Olawale Otitoju, federal University Wukari / Biochemistry Department; Solomon Asemave, federal University Wukari / Biochemistry
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SECTOR: Academia
MEMBERSHIP STATUS: Student Guest
ABSTRACT BODY: Incidence of soil contamination by heavy metals is widely increasing with the spread of industries. Artisanal mining of blue sapphire gemstone on the Mambilla plateau has been on the increase in recent years. Therefore, the present study was aimed at characterizing and determining resistance to lead, mercury and copper by selected bacteria strains isolated from soil in Mambilla Plateau artisanal mine and to explore their bioremediation capacity. Bacteria were isolated from soil samples obtained from different locations at Mambilla artisanal mining site, Nguroje area. Five (5) distinct bacteria were isolated through graml
staining and some biochemical tests and they were identified as *Staphylococcus aureus*, *Escherichia coli*, *Bacillus*, *Enterobacter aerogenes* and *Pseudomonas aeruginosa*. Out of the five (5) bacterial isolates, three (*Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*) were selected and grown on nutrient agar plates incorporated with heavy metals namely Lead, Mercury, and Copper. These isolates showed multiple tolerance to these metals. *Staphylococcus aureus* exhibited maximum tolerance to Lead, Mercury and Copper at concentrations of 0.15, 0.25 and 0.10g/100ml respectively. *Pseudomonas aeruginosa* showed maximum tolerance to lead, Mercury and Copper at concentrations of 0.20, 0.20 and 0.10g/100ml. *Escherichia coli* exhibited maximum tolerance to Lead, Mercury and Copper at concentrations of 0.25, 0.15 and 0.15g/100ml respectively. The isolates also exhibited high level of resistance to these metals with MICs ranging from 0.15-0.30g/100ml. Copper was the most toxic metal with MIC of 0.15g/100ml while Mercury was the least toxic with MIC of 0.30g/100ml. Antibiotic sensitivity test showed that the three bacterial isolates were multi antibiotic resistant. The results of the present study showed that *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Escherichia coli* are capable of utilizing heavy metals. Therefore, these bacterial isolates could be a potential agent for bioremediation of heavy metals contaminated environments.

**KEYWORDS:** Biomonitoring, Bioremediation, Human health, Metals

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**2nd SETAC Central/West Africa Regional Conference**

Asibey, M. "Understanding and defining electronic and electrical waste i...” [47925]

**Final ID:** P06

**SESSION:** Environmental pollution and waste management

**TITTLE:** Understanding and defining electronic and electrical waste in the Ghanaian Context for effective management

**AUTHORS/INSTITUTIONS:** Michael Osei Asibey, Kwame Nkrumah University of Science and Technology; Rudith King, Kwame Nkrumah University of Science and Technology / Department of Planning

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**MEMBERSHIP STATUS:** Student Guest

**ABSTRACT BODY:** The concept of electronic waste (e-waste) management is deemed as ‘foreign’. This has had enormous impact on its management, especially countries in the global south; therefore, the need to have a better understanding of what it is in the local context in Ghana for effective management. Ghana’s e-waste recycling sector is largely informal and has dramatically increased in intensity but is a major source of environmental pollution with severe health implications. Based on extensive review of literature (specifically, Ghana’s Hazardous and Electronic Waste Control and Management Act (Act 914) and other policy documents) and interviews with heads of relevant institutions and informal e-waste associations, the paper discusses two priority areas on: (i) the local knowledge of e-waste in terms of definition and composition; and (ii) the influence of local conceptualisation of e-waste on its management in the informal sector. Three key conclusions are drawn from the study: (i) there exists a major divide in how e-waste is conceptualised (definition, composition and implication). While literature and relevant institutions regard it as harmful and adopts and applies the concept from international conventions (such as the Basel and EU-WEEE Directive), informal e-waste associations regard it as a major livelihood support to the urban poor with minimal risks; (ii) generation of e-waste will continue to increase in Ghana with intense risks; and (iii) interventions to manage and address associated health and environmental risks have been slow and ineffective because of these differences. The paper argues that inasmuch as there is the need to think globally, there is the need to act locally. The study concludes that policy and planning considerations should reflect on having clear-cut guideline of what e-waste is and bridging the gap for effective and efficient management to promote an inclusive and sustainable development.

**KEYWORDS:** Behavior, Development, Policy analysis, Risk management
Final ID: P07  
SESSION: Environmental pollution and waste management  
TITLE: Effect of aging on the toxicity of palm oil mill effluent and soil fertility indices  
AUTHORS/INSTITUTIONS: Daniel Ugwu, Federal College of Agriculture, Ishiagu; Obioma Njoku, University of Nigeria Nsukka / Department of Biochemistry; Parker Joshua, UNIVERSITY OF NIGERIA, NSUKKA / Biochemistry  
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MEMBERSHIP STATUS: Student Guest  
ABSTRACT BODY: Palm oil mill effluent (POME) is a serious environmental pollutant when discharged without treatment. Reports show that the untreated POME alters soil properties in ways that are inimical to plant growth. Interestingly, little information is available on the effect of aging as a treatment strategy on the inherent toxicity parameters of POME and the effect of aged POME on soil fertility indices. In this study, the effect of aged POME on soil nutrients was evaluated. The result of chemical properties of the aged POME shows significant (p < 0.05) increase in organic matter (90.4 %), organic carbon (90.4 %), nitrogen (8.8 %), phosphate (20 %), and potassium (62.16 %) when compared to the untreated POME. Soil sample from a fallowed farm land in Inyi Community of Enugu State Nigeria was amended with different concentrations of the aged POME; 0, 250, 500, 750, and 1000 g of POME per 1 kg of soil, followed by cultivation of maize seedlings. After 28 days of plant growth, the effect of the aged POME on soil organic matter, total nitrogen, available phosphorus and exchangeable potassium was determined. These parameters increased (p < 0.05) with increase in the concentration of aged POME when compared to the control. Overall, aging ameliorated the toxicity of untreated POME and valorized the POME as soil organic fertilizer.  
KEYWORDS: Biodegradation, Ecotoxicology, Soil, Waste water

Final ID: P08  
SESSION: Agriculture, mining and the environment  
TITLE: HUMAN HEALTH RISK OF GASEOUS MERCURY AROUND HOUSEHOLDS IN GHANAIAN SMALL-SCALE GOLD MINING COMMUNITY  
AUTHORS/INSTITUTIONS: OPOKU GYAMI, Kwame Nkrumah University of Science and Technology / Analytical Environmental Chemistry; EUGENE ANSAH, K. N. U. S. T. / Chemistry; Godfred Darko, Kwame Nkrumah University of Science and Technology / Department of Chemistry; Peter Sørensen, Aarhus University; JESPER BAK, Aarhus University / Agriculture Biology Environment and Natural Resources  
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SECTOR:  
MEMBERSHIP STATUS:  
ABSTRACT BODY: Extraction of gold using mercury has been a way out of poverty for millions of people in developing countries. Spatial distribution of total gaseous mercury (TGM) concentrations in ambient air was investigated in Gbani, an artisanal mining community in the upper east region of Ghana from May – June, 2018. TGM in ambient air were measured using RA-915+ automated mercury vapour detector made by LUMEX. The daytime point sample TGM concentrations ranged from 4 – 5014 ng with an average of 308 ng for households that do not burn gold-mercury amalgam. For households that burn mercury, the TGM concentrations were ranging from 2 ng to above 50000 ng. This is substantially higher than the World Health Organization air-quality guideline for annual average Hg exposure (1000 ng), the USEPA RfC value of 300
ng and the Ministry of Environment, Japan's guideline value of 40 ng for chronic atmospheric Hg(0) exposure. The results indicate that the inhabitants of the community are exposed to high concentrations of gaseous elemental mercury. Point sample concentrations were used to calculate hazard quotient ratios by means of a probabilistic risk assessment method. The results indicated that 83.8% of the population overall was at risk (hazard quotient ratio ? 1 and cut off at the 95th percentile value of the sample population) of mercury toxicity, that is damage to the central nervous system due to chronic exposure. So, based on the investigation of Gbani, our study shows that residents of the communities can be at serious health risk due to exposure of atmospheric Hg(0). Keywords: Artisanal gold mining; Total gaseous mercury; probabilistic risk assessment.

**KEYWORDS:** Risk assessment

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**Final ID: P09**

**SESSION:** Environmental pollution and waste management

**TITLE:** When the Cars Crawl on the Way: Traffic Hawking and Pollution Dynamics in the City of Lagos

**AUTHORS/INSTITUTIONS:** Eshalomi omo, University of Ibadan

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**MEMBERSHIP STATUS:** Student Guest

**ABSTRACT BODY:** The culture of hawking has been, and remains an index of commercial activities in the traffic gridlock of the Lagos mega city. Traffic hawkers are a common site as they spontaneously spring out immediately there is a build-up of traffic. These activities not only have effect on the hawkers; they also impact the environment in such a manner that has implications for others located within the hawking space. This paper analyses the dynamics in how traffic hawking pollutes the environment by investigating the various factors within selected Lagos city metropolis that instigate the traffic gridlock leading to pollution. Four areas were purposively selected for data collection as the degree of pollution and types of waste varied in the selected areas. Lekki/Ajah roundabout and Maryland/Ikeja road represent urban settlements, while Ikorodu and Egbeda represent the suburban settlements. Data were generated through ethnography, participant observation and in-depth interviews conducted with people involved in traffic hawking, traffic warders and patrons of the wares sold in traffic. Findings indicate that spatial variation in waste generation is informed by social class, literacy level, availability of information, economic power, experience, exposure, and spatial segregation, amongst others. The reality of traffic hawking resonates with the contradictions that are tied to the struggle for survival in the city of Lagos. As effective waste management is an indicator of not just development but also of good governance, the paper identifies ways to ensure a more effective approach of addressing the challenges of waste and pollution in the city.

**KEYWORDS:** Behavior, Degradation, Spatial, Urban
Final ID: P10
SESSION: Environmental pollution and waste management
TITLE: Working towards an integrated environmental sustainability framework for Nigeria
AUTHORS/INSTITUTIONS: Kabari Sam, NIGERIA MARITIME UNIVERSITY, OKERENKOKO, DELTA STATE / Environmental Management and Pollution Control; Nenibarini Zabbey, University of Port Harcourt / fisheries; Michael Okiotor, NIGERIA MARITIME UNIVERSITY OKERENKOKO DELTA STATE / Department of Marine Environment and Pollution Control; Christie Akpoduado, J Idomeh, S Aghomi, NIGERIA MARITIME UNIVERSITY OKERENKOKO DELTA STATE / Environmental Management and Pollution Control
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MEMBERSHIP STATUS: Guest
ABSTRACT BODY: Over the past decades, Nigeria has developed several policies and legislations for environmental regulation. Within these legislations exist elements for environmental management. Despite this progress, this study argues that environmental sustainability in Nigeria needs further development to be able to integrate new scientific information, economic, environmental and socio-cultural values to maximize business and societal benefits. This study seeks to develop an integrated framework for achieving environmental sustainability. While the study considered environmental sustainability as a multi-stakeholder concept, roles of different stakeholders were identified. The study further highlighted elements of environmental sustainability and possible challenges to its implementation in Nigeria. We conclude this paper with a roadmap for how Nigeria might implement such an integrative approach, as well as identify a series of policy priorities that should be addressed.
KEYWORDS: Degradation, Regulation, Remediation, Sustainability

Final ID: P11
SESSION: Environmental pollution and waste management
TITLE: Trace Metal Contamination of Soils in E-Waste Recycling Sites in Accra Metropolis and surroundings, Ghana.
AUTHORS/INSTITUTIONS: Gifty Kumi-Amoah, University of Ghana / Institute for Environment and Sanitation Studies; Samuel Bason, Agustine Donkor, University of Ghana / Department of Chemistry; Isaac Asante, University of Ghana / Department of Plants and Environmental Sciences; Rose Tawiah, Michael Ainooson, University of Ghana / Department of Chemistry; Brajesh Dubey, Indian Institute Technology / Department of Civil and Environmental Engineering
PRESENTER (E-MAIL ONLY): gkumi-amoah@gmail.com SECTOR: Academia
MEMBERSHIP STATUS: Guest
ABSTRACT BODY: Globally, electrical and electronic waste (e-waste) management has received much attention due to its negative impact on the environment and human health. In Ghana, recycling of e-waste is one of the most popular management practices which is carried out mostly by the informal sector. Workers employ rudimentary techniques such as open burning and dismantling to retrieve valuable components. In the process, toxic chemicals in the waste electrical and electronic equipment (WEE) may be released into the environment. In this study, concentrations of fifteen (15) heavy metals (Al, Ag, As, B, Ba, Cd, Cu, Cr, Fe, Mo, Ni, Pb, Sb, Se, Zn) in soils within seven (7) e-waste recycling sites in and around Accra Metropolis were
determined by Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES) after hot acid digestion. Additionally, the leachability of these toxic elements from mixed waste printed circuit boards (PCBs) and plastic housing (PH) from recycling/dump sites were tested with rain water, deionized water, synthetic precipitation leaching procedure (SPLP) solution and seawater over a period of 192 hours at regular intervals. Overall, the results indicated, all the metals analysed were detected in all the seven sites (Gather Away, Sikkens North, Sikkens South (in Agbogloshie), Paloma, Nungua Redco, Ashaiman Motorway, Ashaiman Afariwa) with varying concentrations. Sikkens North, was the most contaminated followed by Ashaiman Motorway, Gatheraway, and Sikkens South. Further, 55% of the 153 soil samples analysed had at least one of their heavy metals content above USEPA limit suggesting soil pollution. In all, eleven (11) heavy metals exceeded their maximum threshold: Ag, As, B, Ba, Cd, Cu, Mo, Pb, Sb, Se, and Zn in the entire samples. On the other hand, the toxicity characteristic potential of the elements extracted by the solvents was in the order: deionized water>rainwater>SPLP>seawater. The results further prove that leaching from PCBs and PH are significant source of trace metals from recycling/dump sites.

KEYWORDS: Metals, Monitoring, Risk assessment, Toxicity

2nd SETAC Central/West Africa Regional Conference

Final ID: P12
SESSION: Agriculture, mining and the environment
TITLE: Prevalence of Diabetes Mellitus and Hypertension among pregnant women attending ante-natal Clinic in Federal Medical Centre Owerri
AUTHORS/INSTITUTIONS: CO Ezekwesiri, Federal Medical Centre, Owerri, Nigeria; JOY Dike-Ndudim, Imo State University Owerri / Department of Medical Laboratory Science
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MEMBERSHIP STATUS: Type 11 AF Dev2 Asso Exp: 2018-10-17
ABSTRACT BODY: Prevalence of Diabetes Mellitus (DM) and Hypertension (HBP) among pregnant women attending ante-natal Clinic in Federal Medical Centre Owerri, Nigeria was conducted to determine the percentage of the pregnant women that are affected by Diabetes and Hypertension during pregnancy. Diabetes Mellitus is high glucose in the blood which happens when there is a problem with insulin level in the blood which makes it possible for body cells to absorb glucose. Meanwhile Hypertension is blood pressure higher than 130 over 80mmHg due to certain known or unknown causes. Hundred pregnant women who were attending ante-natal Clinic in Federal Medical Centre Owerri within the ages of 21-35years were selected and 2mls of venous blood samples were collected from each subject using disposable syringe and needle for fasting blood glucose estimation. Blood glucose was analyzed colorimetrically using Enzymatic Endpoint method. Subjects that had blood glucose level of 126mg/dl and above were repeated for another 2 consecutive times. Result showed that 5% of the pregnant women was diabetic and 7% was hypertensive. 60% of the diabetic pregnant women fed mostly on carbohydrate diet while 42% of those that were hypertensive were overweight. Little exercise and moderate feeding as well as Patient education are necessary to keep pregnant women healthy and out of overweight. Government should liaise with good spirited public and private establishments to make available health facilities at subsidized rate to ensure early detection and possible solution to any abnormality in pregnancy.

KEYWORDS: Accumulation, Behavior, Biomonitoring, Waste water
The field experiments were carried out in 2014 cropping seasons at the experimental site of the Soil and Plant Nutrition Division of the Rubber Research Institute of Nigeria, main station Iyanomo, Benin City, Edo State. This study was conducted in the Field to determine the interactive effect of soil amendments with poultry manure and NPK fertilizer on some soil chemical properties and growth of *Hevea brasiliensis* saplings. The experimental design was a 3 x 4 factorial fitted into a Randomized Complete Block Design (RCBD) and replicated three times. The treatments consisted of sole application of NPK and poultry manure at rates of 0, 112 kg/ha, 6000 tons/ha and its combination (112 kg/ha and 6000 tons/ha). Soil analysis was carried out prior to and after the experiment. Data was collected on growth parameters (stem girth and plant height) and thereafter was subjected to statistical analysis (ANOVA) using Genstat and means were separated by Duncan multiple range test. The result of soil analysis showed general increase in the chemical properties after application of treatments in organic matter, nitrogen, pH, calcium, potassium, Avail phosphorus, ECEC and base saturation. The application of 112 kg/ha and 6000 tons/ha had the highest mean value for stem girth and plant height but was not significantly different from the treatment of sole application of both amendment. From this study the sole application of both amended, closely compete with their interaction. Hence, it is here by recommended that the application of NPK and poultry manure could be optimal for the cultivation of rubber in Iyanomo, Edo State in Nigeria.

**KEYWORDS:** Accumulation, Biotransformation, Ecological risk assessment, Metals
plots located across six-land use and land cover type in the two cities. Focusing on trees and shrubs with a diameter at breast height (DBH > 5 cm), 2026 stems were measured in Niamey whilst in Maradi 2454 stems were documented in Maradi. Urban forest biomass was estimated using a generalized model. Large urban trees with (DBH) > 40 cm formed 28.04% of the total trees inventoried in Niamey but held over 75.18% of the above-ground biomass (AGB). While large trees formed only 18.91 % of the total trees measured in Maradi, they held over 53.71 % of the AGB. Medium trees (DBH [10-40]) dominated all the two cities, representing 68.77% of all the stems measured. The corresponding values of the mean diameter and mean height and its standard deviation (SD) were 31.18 ± 3.48 cm for Niamey and 28.54 ± 3.32 cm for Maradi, 8.87±1.18 m for Niamey and 7.80 ± 10 m for Maradi. The corresponding values of the mean aboveground biomass and its confidence interval (CI) at 95% were 43.78(26.59, 60.97) t/ha for Niamey and 56.9 (27.0, 86.8) t/ha for Maradi. The three most dominant species in terms of AGB were *Azadirachta indica* (45.06%), *Faidherbia albida* (16.78%) and *Khaya senegalensis* (11.51%) in Niamey city. The urban exotic tree species represented 57.40 % of the total AGB and 42.60 % were native tree species in Niamey. While the three most dominant species in terms of AGB were *Azadirachta indica* (58.08%), *Faidherbia albida* (7.85 %) and *Terminalia mantaly* (6.65%) in Maradi city. In addition to that, exotic urban tree species represented 74.15% and native species represented 25.85 of the total AGB in Maradi. The average urban forest carbon stocks were 25.51± 9.55 t/ha in Niamey while it was 33.14±16. 60t/ha in Maradi. There was a significant difference between mean carbon stocks in and between the cities across LULC. Urbanization enhanced carbon sinks even though the carbon emission factor did not vary significantly across land use and between the two sites. This study recommends that the urban forest carbon stocks should be included in climate change mitigation in Niger. 

**KEYWORDS:** Climate, Landscape, Sustainability, Urban

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**Final ID: P15**

**Biosurfactant Production by Actinomycetes and Pseudomonas species in Different Culture Media**

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**ABSTRACT BODY:** Despite a number of advantages, including ecological compatibility and low toxicity, of biosurfactants over their chemically-synthesized counterparts, the cost of production constitutes a major drawback in their large-scale application. In this study, biosurfactant production by actinomycetes and *Pseudomonas* species was evaluated in different culture media. Initially, 25 organisms isolated from soils, sawdust and guts of termites (*Coptotermes formosanus*) and earthworm (*Lumbricus terrestris*), comprising 10 actinomycetes and 15 *Pseudomonas* species were screened, and three (3) isolates from each microbial group were selected on their abilities to degrade cellulose and xylan, as well as high emulsifying activity (E24) and cell surface hydrophobicity (CSH). These isolates were identified as *Truerella bernardiae*, *Lentzea albidocapillata*, *Actinomyces slackii*, *Pseudomonas putida*, *P. syringae*, and *P. stutzeri* using their 16S rRNA sequences. Biosurfactant production, measured as E24 (%), diameter of oil displacement (mm), crude amount (mg/l) and percent yield (mg biosurfactant/mg cell biomass), was evaluated in six different media (nutrient broth, glucose, glycerol, aviation fuel, petrol and rice husk) for 14 d. Results indicated that biosurfactants production was influenced by the culture medium type. Most of the organisms had similar E24 values in rice husk as in glucose or glycerol but lesser in aviation fuel and petrol. Rice husk yielded over two-times the amounts of biosurfactants produced in glucose and appreciably higher amounts than in the petroleum hydrocarbons. However, the *Pseudomonas* species apparently produced larger amounts of biosurfactants than the actinomycetes. Meanwhile, the highest emulsifying activities
and biosurfactant yields were mostly produced in nutrient broth as substrate. The use of rice husk, a readily available agro-waste, can be optimized for large-scale production of biosurfactants for various applications in industrial and bioremediation processes.

**Keywords**: Actinomycetes; Agro-waste; Bioremediation; Biosurfactant; Cell hydrophobicity; Emulsifying activity; Petroleum hydrocarbon; *Pseudomonas*; Rice husk; Surfactant

**Final ID: P16**

**Assessment of the Antioxidant Activity of Partially Purified Fractions of Daniellia oliveri (Rolfe) Hutch. & Dalziel Stem Bark Ethanolic Extract Using Different Methods**

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**ABSTRACT BODY**: Comparative estimation of different parameters used for the determination of antioxidant activities of partially purified fractions obtained from ethanol extract of *Daniellia oliveri* (Rolfe) Hutch. & Dalziel stem bark was carried out using different spectrophotometric methods. Fractionation was achieved by column chromatography using solvents of different polarities to obtain fourteen fractions, following which total antioxidant capacity (TAC), total flavonoid contents (TFC), total phenolic content (TPC), β-carotene bleaching inhibition assay, anti-lipid peroxidation inhibition assay and metal-chelating inhibition assay were conducted. Results showed the antioxidant activities of fractions expressed in mg/ml of Trolox equivalent (TE). Values ranged from 0.03-0.13 mg/ml. The total flavonoids concentration varied from 15.71-29.20 mg/ml expressed as quercetin equivalent. β-carotene bleaching inhibition assay varied from 21.20-89.60 ug/ml, while anti-lipid peroxidation inhibition assay and metal-chelating assay results varied from 13.98-41.63 nmol/ml, and 382.53-412.27 g/ml, respectively. Linear correlation analysis between the parameters revealed weak positive relationship (figure 7, 8, 9 and 10). Based on the results, it is concluded that fractions of ethanolic extract of *D. oliveri* stem bark, particularly fractions 11 and 12, possess potent antioxidant activity irrespective of parameters used, suggesting that this extract contain substances that could act through synergistic action related to, but not limited to direct free radical scavenging, chelation of transition metals and direct inhibition of lipid peroxidation.

**Keywords**: Estimation; antioxidant; fractions; ethanolic extract; *Daniellia oliveri*

**Final ID: P17**

**Microbial Degradation of Spent Oil Contaminated Soil using Organic Manure**

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**ABSTRACT BODY**: Contamination of the soil environment by spent oil is becoming prevalent in most developing countries. This is consequently the most critical environmental problems as it poses significant danger to human health and the ecosystems. Thus, there is need for cost-effective remediation techniques that will rely on microbial enzymatic activities to transform or degrade the contaminants from the environments. The aim of this study is to determine the total Petroleum Hydrocarbon degradative potentials of the microbes. Two kilograms (2kg) of soil was thoroughly mixed with 200ml and 400ml of spent oil to give 5% and 10% contamination levels and a set of control was kept at 0%. 10% (w/w) each of organic manure; Poultry litter (PL), Cow dung (CD) and the Mixed Poultry Liter and Cow Dung (MPLCD) was individually introduced into each spent oil contaminated soil and the rate of biodegradation was monitored for a period of 12 weeks. The percentages of Total Petroleum Hydrocarbon (TPH) loss was significantly higher in the soil contaminated with 5% spent oil amended with MPLCD (40.46%) followed by PL (35.53%) and CD (27.70%) while 32.42% loss only was recorded in the soil
contaminated with 10% spent oil and amended with MPLCD while PL was 30.04% and 25.60% for CD. The hydrocarbon-utilizing bacteria isolated and identified from this study include Bacillus, Pseudomonas, Micrococcus, Staphylococcus. The hydrocarbon-utilizing fungi isolated and identified include Aspergillus and Penicillium. The counts of hydrocarbon – utilizing bacteria (HUB) population in 5% spent oil contaminated soil in MPLCD ranged from 5.20±1.55 x 10^6 to 7.00±0.10 x 10^6 cfu/g for PL 2.80 ± 0.16 x 10^6 to 3.00 ± 0.15 x 10^6 cfu/g while it ranged from 2.10±0.95 x 10^6 to 2.62±0.60 x 10^6 cfu/g for CD while for 10% spent oil contaminated soil, the HUB for CD ranged from 1.10 ± 0.74 x 10^6 to 1.80 ± 0.10 x 10^6 cfu/g of soil, the PL was from 1.50 ± 0.16 x 10^6 to 2.20 ± 1.60 x 10^6 cfu/g while MLPCD was ranged from 3.20 ± 1.11 x 10^6 to 4.90 ± 1.22 x 10^6 cfu/g of soil. For the hydrocarbon – utilizing fungi (HUF) population in 5% spent oil contaminated soil in PL ranged from 1.60±0.95 x 10^5 to 2.38 ± 0.10 x 10^5 sfu/g. CD ranged from 0.51 ± 0.20 x 10^5 to 3.10 ± 0.22 x 10^5 sfu/g, and MPLCD was from 2.20 ± 0.21 x 10^5 to 4.20 ± 1.20 x 10^5 sfu/g of soil while at 10% spent oil contaminated soil, the HUF ranged from 0.08 ± 1.20 x 10^5 to 0.90 ± 1.22 x 10^5 sfu/g for PL, 0.02 ± 0.10 x 10^5 to 1.00 ± 0.03 x 10^5 sfu/g for CD while MPLCD was ranged from 2.30 ± 1.21 x 10^5 to 3.50 ± 0.74 x 10^5 sfu/g of the soil. The amendment of spent oil contaminated soil with manure can significantly enhance the rate of biodegradation of petroleum hydrocarbon. These additives can best be suited to remove or neutralize the contaminants in the soil.

**Keywords:** Total Petroleum Hydrocarbon (TPH), Microbial degradation, Organic manure, Contaminated soil and Spent oil.

**Final ID:** P18

**PHYTOTOXICITY OF LEAD CONTAMINATED SOIL ON *Amaranthus cruentus***

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**ABSTRACT BODY:** The impact of Lead contaminated soil on *Amaranthus cruentus* yield was studied. Seeds of *Amaranthus cruentus* were sown on soil contaminated with battery slag containing a high concentration of Lead. The battery slag soil was analyzed to know the level of Lead contamination. The contaminated soil were diluted with uncontaminated soil to obtain different levels of contamination. Ratio 4:0; 3:1; 2:2, 1:3 and 0:4 in proportionate mixture of Contaminated to uncontaminated soil were made respectively making total of a 4kg soil in experimental pot. Plant growth parameter were taken 5 weeks after sowing with highest plant height of 15.2cm recorded in plant grown on the least contaminated soil and 0.9cm recorded on the plant grown on the most contaminated soil. Same trend was recorded on the plant stem diameter with 0.3cm and 0.05cm in most and least contaminated soil respectively. Number of leaves per plant was not significantly different in 0:4, 1:3, and 2:2 contamination levels but comparably smaller number of leaves recorded in plants grown on 3:1 and 4:0 contamination levels. Lead contamination greatly affected plant yield and farmers using abandon refuse dump sites will have yield lost due to lead contamination of such lands and this will amount to loss of resources and it is not unlikely that there would be bioaccumulation of Lead in such plants which poses threat to consumers’ lives.

**Keywords:** *Amaranthus cruentus*, Battery slag, Plant growth
Food Poisoning Through Dietary Intake Of Crop Contaminated With Pesticide Residue: A Review On Nigeria Case

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ABSTRACT BODY: On daily basis new pesticide found its way into Nigerian markets. At every stage of agricultural activities is pesticide usage a key player. Farmers over dependence on pesticides usage rather than old cultural methods of pest control had ushered in a lot of health hazard into Nigeria through dietary intake or occupational exposure. The effects range from mild abdominal pain, to organ damages and sometimes death. WHO estimated 3 million farmers had severe poisoning and about 18,000 death in each year of which Nigeria has a reasonable share most of which are not documented. This review though expressed how important usage of pesticides is to agriculture but the degree of health hazard posed by wrong usage and low level of application knowledge is outrageous. Many EU, WHO and FAO regulations had placed ban on some pesticide products especially the Organochlorine group yet some studies still discovered such pesticide residues in food above MRL. Many food crops grown in Nigeria were not free from residues above MRL especially in food poisoning through cowpea were recorded, because cowpea is more prone to insects attack and it is a food being largely consumed. Acute and chronic pesticide poisoning through consumption of contaminated food in Nigeria had also been reported. Other pesticides groups indicted in food poisoning in Nigeria are synthetic pyrethroid and Organophosphate. There is serious need to monitor production, sales and application of these pesticides in Nigeria to curtail more health issues and even to ensure economy vibrancy at international trade level.

FARMERS’ KNOWLEDGE ON SYNTHETIC AND BIO-HERBICIDES UTILISATION IN COWPEA AND MAIZE FIELDS IN OYO STATE, NIGERIA

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ABSTRACT BODY: Synthetic herbicides have contributed to significant increase in crop yield and production. Nevertheless, the extensive use of synthetic herbicides encourages environmental and health hazards. However, bio-herbicides are both eco-friendly and effective in weed management. Therefore, farmers’ knowledge level on synthetic and bio-herbicides application in cowpea and maize fields was investigated in Oyo State, Nigeria.

Farmers’ knowledge level on synthetic and bio-herbicides utilization in cowpea and maize fields was conducted in Ibarapa Central, Oyo West and Iseyin Local Government Areas using structured questionnaire. Proportionate sampling method was used to select 213 respondents from 1323 communities in the sampled area, 212 were retrieved. Coordinates of the Local Government Areas were captured with the aid of Global Positioning System (GPS) and imported into Geographical Information System (GIS) to produce maps of the study area. Data were collected on age of the farmers, years of farming experience, sex of the farmers, education background,
weed interference, names of the synthetic herbicide used, knowledge on bio-herbicide, and were analyzed using descriptive statistics.

The result on the demographic information of the respondents revealed that age distribution of the respondents are between the ages of 46 years and above years (73%). Years of farming experience is between 16 – 30 years (87%). It was also observed that 85% of farmers are male. The result of education background shows that most of the respondents had no formal education (54%). 96% of farmers reported high rate of weed interference. The most common herbicide used by cowpea and maize farmer were paraquat (13 % and 29%), respectively. The result further revealed that two (0.9%) out of 213 farmers had knowledge of bio-herbicide utilisation.

Overall, majority of the cowpea and maize farms had little or no knowledge on bio-herbicide. They rely mostly on use of different synthetic herbicide for weed control, thereby increasing food insecurity, exposing both human and the environment to hazard.

Keywords: Bio-herbicide, weed interference, cowpea and maize field

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PHYTOTOXIC POTENTIALS OF THREE BOTANICALS IN COWPEA FIELD IN OYO STATE, NIGERIA

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ABSTRACT BODY: Cowpea is main food crops widely produced and consumed in Nigeria due to their high protein contents. Their production are constrained by weed interference. Intensive use of synthetic herbicides in crop production enhances environmental and health hazards. Bio-herbicides have been reported to be effective and eco-friendly. Therefore, herbicidal potential of three botanical extracts in cowpea production were assessed in Oyo State. Phytochemicals of the botanicals Eucalyptus torreliana (ET), Eucalyptus camaldulensis (EU) and Leuceania leucocephala (LL)) were determined using standard procedures. Concentrations (%) of the botanicals: 100 (C1), 75 (C2), 50 (C3), 25 (C4); distilled water (0, C5) and Paraquat (P) as controls (treatments) were used. 2 mL of each treatment were added to test seed germination (SGT) of Cowpea (Ife brown) and maize (DTMA-Y-STR) in petri-dish for seven days for phytotoxic effect. Plumule (PL, cm) and Radicle (RL, cm) length of the crops were measured. The treatments were applied before and five weeks after planting (WAP) in pots (one seed/10 kg soil) using complete randomized design and monitored for phytotoxic effect 11 weeks. Data were collected on cowpea for Plant height (PH, cm), Number of leaves (NL) and Grain yield (GY, g/pot); Relative Important Value (RIV) were also determined on weed flora at 3,5,7,9 and 11 WAP using standard procedures. Data were analyzed using descriptive statistics and ANOVA (α0.05). The phytochemical contents in EU were higher in total phenols, tannins and saponins (32.0, 27.4 and 20.2 mg/g, respectively). The SGT of cowpea ranged from 80.0±0.4 to 100.0±0.5 across the treatments. Cowpea had significantly higher PL (16.0±0.7) and RL (11.2±1.2) with LL under C4 than other extracts. In the pot experiments, phytotoxic effect on PH of cowpea (47.1±3.2) under P at 9 WAP were significantly higher, while PH (4.8±0.4) were least under Paraquat for cowpea. Phytotoxic effect of EU under C4 on cowpea NL (39.3±4.1) at 9 WAP was significantly higher, while 16.3±2.1 at LL under C3 was the least. Significantly higher GY (4.2±0.5) of cowpea were obtained at LL under C3 with the least value (0.1±0.1) at P. The RIV of Mitracarpus villosus (52.5) was higher at 3 WAP under C5, while the least was 7.34 at EU under C3 at 7 WAP. Concentrations of Leuceania leucocephala and Eucalyptus camaldulensis at 50 - 100%, respectively enhanced the grain yield of cowpea. Phytototixic effect of Eucalyptus torreliana at 50 - 100% concentrations reduced Relative Important Value of Mitracarpus villosus.
EVALUATION OF HEAVY METALS CONCENTRATIONS IN Oreochromis niloticus and Clarias gariepinus FROM RIVER AND AQUACULTURE SYSTEMS WITHIN OWERRI METROPOLIS, IMO STATE NIGERIA

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ABSTRACT BODY: A study was done to determine the concentrations of heavy metals in some edible fishes from both rivers and artificial ponds. Fish samples Oreochromis niloticus (Nile Tilapia) and Clarias gariepinus (African Catfish) were collected from two rivers (Nworie and Otamiri rivers) and two fish ponds (FUTO fish pond and Philip’s fish pond in Owerri municipal). The heavy metals analysed for were Mercury (Hg), Cadmium (Cd), Iron (Fe), Nickel (Ni), Zinc (Zn), Lead (Pb), Chromium (Cr) using FS 240 Varian Atomic Absorption Spectrophotometer (AAS) SpectrAA. The results showed that the heavy metal values in the fishes were below the maximum permissible limits of established standards for fish consumption, except for Hg (3.7, 1.7, 1.6, 1.4)ppm, Cd (8.327)ppm, and Fe (22.9676, 30.8005, 11.223, 7.535, 4.092, 13.211, 22.1751)ppm levels in fishes from some of the sample locations. The mean of the heavy metals concentration from different locations for Tilapia fish are in this order: Nworie river (5.955500±4.3606468) > Otamiri river (4.87014±3.3196641) > Philip’s pond (4.868114±3.1881898) > FUTO pond (1.617229±1.4047415), while in cat fish; Nworie river (4.023043±1.6613065) > Philip’s pond (3.603714±2.1016272) > Otamiri river (2.434886±1.5444764) > FUTO pond (2.268143±1.3807733). Data collected were subjected to T-test and Analysis of Variance (ANOVA), and there was no statistical significance difference (p>0.05) between the heavy metals contents of fishes from the rivers and fish ponds studied. The bioaccumulation of these heavy metals at high concentrations in man through food chain can cause heavy metal toxicity and subsequent health hazards. Hence the need for periodic monitoring and assessment of heavy metals levels in both water bodies and various aquatic lives that serve as source of food.

Keywords: Heavy metals, Aquaculture system, Otamiri River, Spectrophotometer, Fishes.

ANAEROBIC PRODUCTION OF BIOGAS USING A COMPRENDIUM OF CASSAVA PEELS AND DOXYGEN 20/20 CONTAMINATED POULTRY DROPPINGS TO BE AMELIORATED WITH BIOCHAR

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ABSTRACT BODY: Anaerobic digestion (AD) is a microbiological process whereby organic matter is decomposed in the absence of oxygen. This work investigates the role of biochar in ameliorating the effect of antibiotics in methane production and the role of biochar in optimising biogas production. Eight blends of wastes labelled A (30% Cassava peels and 70% antibiotic (doxygen 20/20) contaminated poultry droppings (from day 1 to day 7), B (30% Cassava peels, 70% antibiotic (doxygen 20/20) contaminated poultry droppings (from day 1 to day 7) and 5% biochar), C (30% Cassava peels and 70% antibiotic (doxygen 20/20) contaminated poultry droppings (from day 8 to day 14), D (30% Cassava peels, 70% antibiotic (doxygen 20/20) contaminated poultry droppings (from day 8 to day 14) and 5% biochar), E (30% Cassava peels and 70% antibiotic (doxygen 20/20) contaminated poultry droppings (from day 15 to day 21), F (30% Cassava peels, 70% antibiotic (doxygen 20/20) contaminated poultry droppings (from day 15 to day 21) and 5% biochar, G (30% Cassava peels and 70% non-antibiotic poultry droppings) and H (30% Cassava peels and 70% non- antibiotic poultry droppings and 5% biochar). Anaerobic digestion of the wastes blends was carried out simultaneously under the same environmental and operational conditions of 40 days retention period using eight metallic bio digesters of 32 L capacity each and the volume of gas produced was determined by water displacement method at ambient temperature. The biogas
yield result shows that blend H yielded the highest cumulative biogas of 122.7 L, while blend A yielded the least biogas of 13.5 L. Similarly, blends B, C, D, F and G yielded a biogas capacity of 41 L, 46.8 L, 65.7 L, 67 L, 83.1 L and 93.7 L respectively. The result of this study suggests that biochar has shown to be effective for the optimization of biogas production and also has the capacity to ameliorate effects of antibiotics in biogas production since antibiotics adversely affect the quality of agro wastes with respect to biogas production.

Final ID: P24

Histopathological and biochemical alterations of the earthworm, *Eudrilus eugeniae* as biomarkers of exposure to monocyclic aromatic hydrocarbons in oil impacted areas of Ijegun, Lagos Nigeria.

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**ABSTRACT**

This study was aimed at identifying histopathological alterations and changes in antioxidants defence systems in *Eudrilus eugeniae* (earthworm) that can be used as good battery of biomarkers for early detection of pollution associated with hydrocarbon. An accident occurred in 2008 in Ijegun which caused serious oil spill and pollution of the environment, this was as a result of a pipeline explosion. Investigation of the residual level in the soil show that total hydrocarbon (THC) had values as high as 402.52 mg/l. Toxicity evaluations against *Eudrilus eugeniae* showed that xylene (1.212 mg/kg) was the most toxic compound followed by toluene (1.335mg/kg), ethylbenzene (1.366mg/kg) and benzene (1.896mg/kg). The biomarker responses revealed an increase in malondialdehyde level and inhibition of the activities of Superoxide dismutase (SOD), Catalase (CAT), Glutathione (GSH) and Glutathione-S-Transferase (GST) in *Eudrilus eugeniae* collected around the oil impacted area of Ijegun. The results from the laboratory studies were confirmed in the field studies. Significant histopathological alterations were observed in all animals from the impacted sites. The pathological findings include cellular and epidermal degeneartion, presence of pigment and inclusion bodies. There was expansion of spaces between longitudinal muscles and enlargement of ectoderm cells. The results reflect the biological effects of hydrocarbon pollution around Ijegun and therefore confirming the relevance of histopathological and antioxidant enzymes as good battery of biomarkers for early detection of hydrocarbon pollution during environmental monitoring programmes in Nigeria.

Final ID: P25

Aerobic Microbes Community Associated With Decomposition of Pig Carcass Poisoned By Lead


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**ABSTRACT**

Microbial carcass decomposition is an area of forensic science that is relatively new, with little understanding. This current study investigated aerobic microbes community associated with exposed decomposing pig (*Sus scrofa*) carcasses on soil, to determine whether microbial community could potentially be used in the post mortem interval (PMI). The animals were exposed to different lead concentration and sacrificed. The rate of decomposition was investigated in which the exposed animal (0.18ppm) decomposed faster and had the most rapid decomposition rate and fall of hair due to early arrival of insects; hence this carcass was largely skeletonized at day 35. The carcass with high concentration (0.2ppm) despite this condition still decomposed faster because the location where it was placed had previously been used for similar research which speeds up rate of decomposition due to adaptation of the microbial community that has previously colonized the place. Pig feeds were analyzed from different farms for the presence of lead (Pb) and the results indicated that only one out
of the five feeds analyzed had no Pb concentration and this could be a primary source of Pb exposure to
domesticated animals because no level of lead is permissible in feeds by the WHO standard. Microbial
identification were carried out via conventional methods, aerobic bacterial communities suspected to be
associated with the decomposition process include Bacillus spp Staphylococcus aureus, and Salmonella paratyphi
while fungi were identified by sub-culturing on prepared solidified PDA at room temperature and fungi identified
include Aspergillus spp Fusarium spp, Cephalosporium spp, Scopulariopsis sp, Mucor sp, Cercinella spp,
Cylindrocladium spp, Phythium spp, Penicillium spp, Trichoderma spp, Phytophthora spp, Geothricum spp and
Saccharomyces spp. The presence of these microbes at various stages of decomposition can be used useful tool in
forensic investigation associated with lead poisoning.

Keywords: Forensic, Lead, Aerobic microbes, Carcass, Sus scrofa

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Comparative Study of Air, Soil, Noise and Radiation on some Telecommunication Mast in Ebonyi and
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ABSTRACT

BODY: Studies were conducted on some telecommunication mast for mobile telephone in the rural
areas of Ebonyi state with co-ordinates: N7.8107 E6.0875, N7.9366 E5.7954, N 7.5609 E5.9527, N7.9622
E6.4247, N 7.7527 E6.0463 and in urban areas of Enugu state with the following co-ordinates: N7.4907
quality, noise and radiation measurements in both areas are within the acceptable limits. The physiochemical
parameters and some heavy metal concentration in the soil around the sites were determined. The result shows
that the parameters and heavy metal concentration are within the acceptable limits of national and international
regulatory agencies. Generally the results shows that telecommunication mast does not pose any known negative
impact on humans and environment but caution must be exercised in the construction of mast within residential
areas.

Key Words: Air quality, Noise, Radiation, Physiochemical parameters, Heavy metals, Telecommunication mastil

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Treatment of effluent from alcoholic blending industry using fungal mycelia and their laccases.
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ABSTRACT

BODY: Alcoholic blending industries no doubt contribute significantly to the growth of the world’s
economy. However, the discharge especially, of large volumes of phenol-contaminated and coloured effluent
from these industries into the environment is of a great concern. Eco-friendly treatment methods like biological
treatments method for treating such effluents is becoming widely applied as their end products are less toxic or
harmless and cheaper in terms of costs. This study was aimed at treating effluent from an alcoholic blending plant
with fungal mycelia and their laccases. The physicochemical analyses of the raw effluent were carried out. Eighteen different species of fungi were isolated from the effluent and soil inundated with the effluent. The fungal isolates were screened for laccase production on Potato Dextrose Agar supplemented with 0.5 mM ABTS (2, 2’-Azino-bis-[3-ethylbenzthiazoline-6-sulphonic acid]). Only two white rot fungal isolates, A and B, which tested positive for laccase production were used for further studies. Time course studies for laccase production by the two isolates were carried out in a submerged medium M containing CuSO₄ (0.001g/l) as an inducer. The crude laccase solution from each isolate was used to treat the effluent at 10, 30 and 50% (v/v) concentration. Thereafter the physicochemical analyses of the treated effluent were carried out. The same process was carried out using agar plugs of the fungal mycelia. Results of the physicochemical analyses of the raw effluent showed that: alcoholic content (4.90 ±0.14 %), BOD (123.20 ± 2.26 mg/l), COD (312.80 ± 1.13), colour intensity (875050.00 ± 70.71 TCU), electrical conductivity (184.00 ± 0.50 µS/cm), Hardness (84.00 ± 2.83 mg/l), pH (6.20 ± 0.03), phenol (329.49 ± 22.19), Sulphate (14.90 ± 0.85 mg/l), tannins (2.30 ± 0.04 mg/l), TDS (1648.80 ± 52.80 mg/l), TS (1914.90 113.64 mg/l), TSS (280.00 28.30 mg/l), turbidity (1.80 0.00 NTU) and alkalinity (nil). It was observed from the result that as the concentration of laccase solution increased from 10% to 50% there was a corresponding increase in percentage reduction in the values of the parameters. Treatment with 50% laccase solution of isolate A showed percentage reduction of 77.7%, 40.9%, 22.4%, 61.4%, 71.6%, 22.2%, 86.4%, 35.6%, 34.8%, 30.5%, 34.0%, 46.4% and 41.7% for alcoholic content, BOD, COD, colour intensity, electrical conductivity, hardness, phenol sulphate, tannins, TDS, TS, TSS and turbidity respectively. Laccase of isolate B also showed percentage reduction of 77.7%, 42.2%, 24.2%, 44.4%, 70.4%, 26.2%, 85.2%, 38.8%, 32.2%, 40.4%, 94.0%, 50.0% and 44.4% for alcoholic content, BOD, COD, colour intensity, electrical conductivity, hardness, phenol sulphate, tannins, TDS, TS, TSS and turbidity respectively. It was observed that laccases from both isolates had the ability to reduced alcoholic content, electrical conductivity and phenol almost equally. However, laccase of isolate A reduced the colour intensity more than that of isolate B, while the laccase of isolate B reduced total solid in the effluent more than that of isolate A.

**Key words:** Alcoholic blending industry effluent, fungal laccase, ABTS, phenol, colour intensity, tannins, physicochemical analyses.