

**5<sup>th</sup> international conference on science & technology of the  
university PKFokam Institute of Excellence at Emana  
Campus, Yaoundé - Cameroon**

**TOPIC "Technology (or useful arts)"  
&  
"Applied scientific research" : Key  
to success?**

**12 - 14 June  
2018  
PKFokam at Emana  
Campus, Yaoundé -  
Cameroon**

**Registration : [conf@pkfokam-cap.org](mailto:conf@pkfokam-cap.org)  
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CONFERENCE PROGRAM

**Day 1, Tuesday, June 12, 2018**

7:30 – 8:15	<i>Conference Check-in and Registration open / Enregistrement des participants</i>	
<b>SESSION 1</b>		<i>Chair : Prof. Dr. Thomas NJINE, the Rector of the university PKFokam Institute of Excellence</i>
8:15 - 8:30	<i>Prof. Dr. Thomas NJINE</i>	<i>Welcome speech</i>
8:30 – 9:15	<i>Dr. Nestor Kamdem</i>	<i>General meeting, PKFokam conference</i>
9:15 – 10:00	<i>Dr. Nestor Kamdem/ Dr. Maurice Simo Djom</i>	<i>PKFokam awards 2019, communication</i>
10:00-10:20	<b>COFFEE &amp; TEA / B2B</b>	
<b>SESSION 2</b>		<i>Chair: Dr. Félix MEUTCHIEYE</i>
10:20 – 10:45	NGOUANA Laura P1	<i>Effet of salt stress on the growth of lycopersicon esculentum</i>
10:45 -11:10	BILLA Samuel Fru P2	<i>Influence of biochar issued from crop wastes on the yield of variety 8034 cassava (Manihot esculenta Crantz) in two agroecological zones of Cameroon</i>
11:10 – 11:35	MAFOUO VANESSA P3	<i>Preservative effects of Neem oil (Azadirachta indica) on farm-mixed poultry feed against Aspergillus flavus and Aspergillus niger</i>
11:35 – 12:00	DONGMO DJIOTSA Francis P4	<i>Development of a sustainable poultry sector through the use of alternative natural resources in Cameroon: case study of the common guinea fowl (Numida meleagris)</i>
12:00 – 12:25	TSEUGUEM Pius Pum P5	<i>Gouty arthritis preventing effect of the aqueous and methanolic extracts of Paullinia pinnata on Monosodium urate crystals model in rat</i>
12:25 – 12:50	TCHUISSE N Marlyn P43	<i>Grain morphological characterization and protein content of some local rice varieties in Cameroon</i>
12:50 – 14:00	<b>LUNCH BREAK / POSTER SESSION</b>	
<b>SESSION 3</b>		<i>Chair: Dr. Eric NJANKWA NJABON</i>
14:00 – 14:30	NGNEUNMEU Yvan P6	<i>Deep Learning for detection of Diabetic Retinopathy</i>
14:30 – 15:00	NKUIKA FANYA Arnaud P7	<i>The concentrate 5% and 10% HIS automation (software) for feed</i>

15:00 – 15:30	MBOUEDEU YOUMBI Josias	P8	Microservices Architecture - Robust Software Architecture for Efficient and Scalable Applications
15:30 – 16:00	DEFO Celestin	P9	Modelling approaches for simulating wetland pollutant dynamics
16:00-16:15	<b>COFFEE &amp; TEA / B2B</b>		
<b>SESSION 4</b>		<b>Chair: Dr. Nestor KAMDEM</b>	
16:15 – 16:40	NZADI SIWE Elie	P10	Fundamentals physics governing heat transfer in improve biomas stove
16:40 – 17:10	FOKAM Miantzia Olivier	P45	Molecular biology techniques as tools of traceability of bush meat: case of Peter's duiker ( <i>Cephalophus callipygus</i> Peters, 1876) and of Bay duiker ( <i>Cephalophus dorsalis</i> Gray, 1846)
17:10 – 18:00	Dr. Guilene MPAME	P11	Prospective on road safety smart tools
<b>Day 2, Wednesday, June 13, 2018</b>			
7:30 – 8:20	<b>COFFEE &amp; TEA / B2B</b>		
<b>SESSION 5</b>		<b>Chair: Dr. Valery KEMTCHOU</b>	
8:20 – 8:45	BOGNING Aldrin Lambert	P12	Feasibility Studies and Optimization of photovoltaic installation for Deuk town electrification in the Mbam-and-Inoublu
8:45 – 9:10	TEDAH Douglas	P13	Sustainable community water supply in rural area in Cameroon : a novel strategy for potable water points maintenance
9:10 – 9:35	Dr. TOGUE KAMGA Fulbert	P14	Downscaling the conventional iron barrier technology to safe drinking water
9:35-10:00	TSOUNGUI FOE Andre Leolein	P15	Manufacture and test of a mini hydro turbine
10:00 – 10:25	TCHAKOUNTE Frank Mael	P41	Effects of the feeding regime on growth performance and nutritive value of giant african snail ( <i>Archatina marginata</i> ) meat
10:25 – 10:40	<b>COFFEE &amp; TEA / B2B</b>		
<b>SESSION 6</b>		<b>Chair: Dr. Guilene MPAME</b>	
10:40 – 11:05	KENGNE TENKEU Janvier	P16	Physicochemical quality of water and zooplanktonic biodiversity of Mfou municipal lake
11:05- 11:30	RONICK MINLO Fred	P17	Assessing the Performances and Strategy of Improvement of the Water Distribution Network of the Urban Environment of Ebolowa, Cameroun

11:30 - 11:55	KAMTOH Charles P47	<i>Development and Environment: The case of the management of Forest in Cameroon</i>
11:55- 12:20	DJUIDJE KOUOMOU Flora Peguy P20	<i>Characterization of endophytic Streptomyces from cocoyam (Xanthosoma sagittifolium L. Schott) roots from Southern-western Cameroon and their plant growth promoting effects on cocoyam tissue culture plantlets.</i>
12:20 - 13:00	Dr. NANA Paulin P19	<i>Opportunities of farming insects for food and feed: a global overview</i>
13:00 - 14:00	<b>LUNCH BREAK / POSTER SESSION</b>	
<b>SESSION 7</b>		<b>Chair: Dr. Jean Duplex WANSI</b>
14:00 - 14:30	SIPPING KEMEGNE Marius Trésor P21	<i>Study of Antioxidant and anti-inflammatory effects of Ganoderma resinaceum polysaccharides.</i>
14:30 - 15:00	GOMPE BOBDA Eric Gustave P22	<i>Secondary metabolites of two medicinal plants of Cameroon; Mostuea batesii and Mostuea thomsonii (Loganiaceae): Extraction, isolation, characterization; some chemical transformation and biological activities</i>
15:00 - 15:30	KUATE TUEGUEM William Norbert P23	<i>Toxicology of some plants with insecticidal potential listed in the Cameroonian flora using the corn weevil as a biological model</i>
15:30 - 16:00	MONTHE POUNDEU Frank Steve P24	<i>Fractioning of plant extracts as alternative to optimized antibacterial activity: case of Enantia chlorantha stem barks</i>
16:00-16:15	<b>COFFEE &amp; TEA / B2B</b>	
<b>SESSION 8</b>		<b>Chair: Prof.Dr. Henri Lucien KAMGA FOUAMNO</b>
16:15 - 17:15	Dr. WANSI Jean Duplex P18	<i>Magnetic Resonance Spectroscopy (NMR)</i>
17:15 - 18:15	Dr. MEUTCHIEYE Felix P25	<i>Seeds technologies, policies and strategies in Cameroon : A review in Animal Production</i>
<b>Day 3, Thursday, June 14, 2018</b>		
7:30 - 8:20	<b>COFFEE &amp; TEA / B2B</b>	
<b>SESSION 9</b>		<b>Chair: Dr. Rochelle PACIO</b>
8:20 - 8:45	MAGWELL Pierre Fils Rodrigue P26	<i>Influence of sulphate nutrition on growth performance and antioxidant activity of Spirulina platensis</i>
8:45 - 9:10	AYAGIRWE Balthazar Rodrigue P27	<i>Cavy as alternative genetic resource for animal protein production in post conflict zone: the case of DR Congo</i>
9:10 - 9:35	MUKAM Raïssa P28	<i>Optimization of the adsorption of chromium VI in a filter</i>

			<i>made with sand coated with iron oxide</i>
9:35 – 10:00	MVONDO NGANTI Dorothée	P29	<i>Pathogenicity and in vitro control of Lasiodiplodia sp and Fusarium sp, pathogens associated with cocoa dieback in Cameroon</i>
10:00 – 10:25	TANKWA T. Vianney Love	P30	<i>Streptomyces cameroonensis</i>
10:25 – 10:50	MOUSSANGO Davy Victor	P42	<i>Antifungal potential of Syzygium aromaticum essential oil against some fungi associated with papaya rot (Carica papaya L)</i>
10:50 – 11:10	<b>COFFEE &amp; TEA / B2B</b>		
<b>SESSION 10</b>		<b>Chair: Prof. Dr. Henri Lucien KAMGA FOUAMNO</b>	
11:10 – 11:40	TEMEGNE NONO Carine	P31	<i>Mycorrhizae and Single Superphosphate influence the Yield of Bambara-bean in the Centre Region of Cameroon</i>
11:40 -12:10	KAZE Rodrigue Cyriaque	P32	<i>Development of geopolymer mortars from iron-rich aluminosilicate (laterite) as sustainable construction materials: mechanical properties and acid resistance</i>
12:10 – 12:40	NYEMB BAYAMACK Joel Fabrice P33		<i>Variability of geotechnical properties of sedimentary and volcanic rock-derived laterites in a humid tropical region (Southwestern Cameroon), upgrading to road construction</i>
12:40 – 13:10	NJANKWA NJABON Eric	P34	<i>Brownian Dynamics Simulations of the Interactions Between Lactate Dehydrogenase (LDH) and G- or F-Actin. Part I: Muscle and Heart Homo-Isoforms</i>
13:10 – 14:00	<b>LUNCH BREAK / POSTER SESSION</b>		
<b>SESSION 11</b>		<b>Chair: Dr. Fulbert TOGUE KAMGA</b>	
14:00 – 14:25	FONKWA Georges	P35	<i>Prevalence of Myxosporidiosis in Oreochromis niloticus Linnaeus, 1758 (Cichlidae) at MAPE reservoir dam (Adamawa - Cameroon)</i>
14:25 – 14:50	DJUISSI MOTCHEWO Nadège	P36	<i>Effects of avocado seed powder as feed additive on blood parameters and oxidative stress indicators in rabbit doe</i>
14:50 – 15:15	MEFFOWOET CHEKAM prisca	P37	<i>Prevalence and intensity of gastro-intestinal parasite in Mifi and Koung khi (West Cameroon) on pig</i>
15:15 – 15:40	MBOG MBOG Séverin	P38	<i>Assessment of the system of treatment of the solid biomedical waste in some sanitary formations of fourth, fifth and sixth categories in Cameroon.</i>
15:40 – 16:05	FORBI FUNYI Preasius	P46	<i>Prospects for sustainable solid waste Management in Yaoundé Urban Area</i>
16:05-16:20	<b>COFFEE &amp; TEA / B2B</b>		

<b>SESSION 12</b>		<b>Chair: Prof. Dr. Thomas NJINE</b>
<b>16:20 – 17:20</b>	<b>Prof. Dr. KAMGA FOUAMNO Henri Lucien P39</b>	<i>Society, education and technology: the nexus</i>
<b>17:20 – 18:00</b>	<b>Announcement of prizes winners</b>	
<b>18:00</b>	<b>FAREWELL RECEPTION</b>	

## Modelling & software engineering session

### Modelling approaches for simulating wetland pollutant dynamics

**DEFO Celestin**

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**P9**

Modelling approaches became very popular worldwide in recent decades due to their insightful ability for predicting and forecasting the behaviour of systems over extended period of time. In the present study, linear models (simplified Freundlich) were developed for predicting Ni concentration uptake in plant species as function of its content in influent wastewater. Data were collected for influent wastewater and different plant samples during 15 months in vertical subsurface flow constructed wetlands (reactors) vegetated with Typha Latifolia, Phragmites Karka and Acorus Calamus on gravel beds. The regressors of the models were the Ni influent concentrations while the regressands were Ni uptake in plant tissues. The determination of Ni concentrations in influent and plant samples was performed according to standard procedures (digestion with diacid, filtration and reading in atomic spectrophotometer after calibrating the device). Results showed a good fit of data between the Ni influent concentrations and plant uptake, indicated by p values < 0.001 for all the models investigated. The coefficients of determination were R<sup>2</sup>=0.92 for Typha Latifolia and Phragmites Karka while it was R<sup>2</sup> = 0.89 for Acorus Calamus. Henceforth, the validation of models showed good agreement between simulated and experimental data (p values >0.05), regardless of the plant species. The application of these modelling approaches is useful for an operative design of plant species in constructed wetlands.

### Microservices Architecture - Robust Software Architecture for Efficient and Scalable Applications

**MBOUEDEU YOUNBI Josias**

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**P8**

The digital transformation presents companies with many challenges. Among other things, the focus is on time to market and increasing efficiency. Solutions should be placed faster on the market and in the company and competitive advantages for the company should be secured. At the same time, the



keyword "microservices" is appearing more and more often in this context. What exactly is behind it and how can you successfully use microservices as a component of a digitization strategy? Microservices are highly customizable, service-oriented, which take over individual tasks and functions in the business process. Microservices are one of the most important software architecture trends. They are small, clear and quickly developable due to their low software complexity. Unlike traditional monolithic architecture, which includes a large program of tens of functions, microservices can be deployed, managed, scaled, and monitored independently, enabling rapid changes and fast, high-scalability release times and autonomous teams. The presentation will introduce the microservices architecture. In doing so, motivation and practical learnings are the main focus. Then architectural approaches are presented and evaluated.

#### **THE CONCENTRATE 5% AND 10% HIS AUTOMATION (SOFTWARE) FOR FEED**

**NKUIKA FANYA Arnaud**

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**P7**

The concentrate (Mineral Supplement Nitrogen Vitamin) is essential for the manufacture of feed. After 08 years of research I found the fastest way mathematically that resulted in the best results and then I automated it (innovation). My automatic method is called the « method Fanya Nkuika Arnaud ». I combined the square of KARL PEARSON, English mathematician (1857-1936) and other methods for obtaining this calculator. This book will enable researchers, breeders and students to understand the mechanics of concentrate automation through mathematical formulas. This second book is the complement of the first one already published entitled "Automating the manufacture of feeds with software. ". The third book will explain the combination of software feeds and software concentrate for the establishment of a complete factory robotic production. Operating diagram of the factory already available.

#### **Deep Learning for detection of Diabetic Retinopathy**

**YVAN NGNEUNMEU**

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**P6**

Introduction Deep learning can be defined as a family of computational methods that allow an algorithm to program itself by learning from a large set of examples that are relevant for the desired behavior. In fact, it consists of training neural networks with many layers. Diabetic retinopathy, which is an eye condition that affects people with diabetes, is one of the leading causes of blindness globally. The disease can be treated if detected early, but if not, it can lead to irreversible blindness. Performing retinal screening examinations on all diabetic patients is an unmet need, as many people live in areas without easy access to specialist care. So, there are many undiagnosed and untreated cases of diabetic retinopathy. The general purpose of this work is to apply deep learning techniques to develop an algorithm for automated detection of diabetic retinopathy in retinal fundus photographs. Methods and results Developing an algorithm for automated detection of diabetic retinopathy requires that we use a set of fundus images from diabetic patients, as the algorithm will classify images as healthy or having diabetic retinopathy. For that purpose, a specific type of neural network optimized for image classification called deep convolutional neural network (CNN) is trained using a data set of publicly available fundus images from a range of patients representing several ethnicities. Patients with diabetic retinopathy could then be sent to a specialist for further evaluation and treatment, and it would aid in reducing the rate of vision loss. Today's studies show 94% accuracy in detecting mild to severe symptoms of the disease. Conclusion A Deep learning algorithm can be used to screen retinal

7

fundus images of diabetic patients and to identify diabetic retinopathy, with high reliability, which cases should be referred to an ophthalmologist for further evaluation and treatment. Further research could be necessary to determine the feasibility of applying the algorithm in the clinical setting.

## *Drug & Development, Life sciences, Chemistry, Physics, Engineering*

### **Influence of sulphate nutrition on growth performance and antioxidant activity of *Spirulina platensis*** **MAGWELL Pierre Fils Rodrigue**

*Magwell Pierre Fils Rodrigue*<sup>1</sup>, *Minyaka Emile*<sup>1\*</sup>, *Wamba Fotsop Oscar*<sup>3</sup>, *Leng Marlyse Solange*<sup>1</sup>, *Lehman Léopold Gustave*<sup>2</sup>

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**P26**

*Spirulina platensis* is an alkalophilic cyanobacterium with high nutritional and therapeutic properties, especially known to improve immune response and hematopoiesis. The quality of this alga closely depends on the culture medium, needs to be monitored for the use of this alga under nutrition and health problems in African sub-Saharan countries. Screening for magnesium sulphate (MgSO<sub>4</sub>) and potassium sulphate (K<sub>2</sub>SO<sub>4</sub>) concentrations on growth performance of *S. platensis* was conducted in vitro. The «Paracas» strain of *S. platensis* was cultured in five concentrations of MgSO<sub>4</sub> (0.08; 0.16; 0.32; 0.64 and 1.28 g/L), K<sub>2</sub>SO<sub>4</sub> (0.08; 0.16; 0.32; 0.64 and 1.28 g/L) and the MgSO<sub>4</sub>/K<sub>2</sub>SO<sub>4</sub> combination (0.16/0.00, 0.08/0.08, 0.04/0.12, 0.02/0.14 and 0.01/0.15 g/L). The sulphate salts supply increased the pH and improved the growth performance of *S. platensis* in vitro. The number of filaments, dry weight, specific growth rate, soluble protein and cystein content were measured in different media as well as peroxidase and polyphenoloxidase activities. Microscopic analysis revealed that the number of whorls and filaments is influenced by sulphate salts concentration. The best growth performance and antioxidant activity were recorded on the medium supplemented with MgSO<sub>4</sub>/K<sub>2</sub>SO<sub>4</sub> (0.02/0.14 g/L). This set of results indicates that optimum growth and antioxidant activity of *S. platensis* is obtained in vitro by increasing the medium pH through supplementation with MgSO<sub>4</sub>/K<sub>2</sub>SO<sub>4</sub>.

Key words: *Spirulina platensis*, sulphate salts, growth performance, antioxidant activity.

### **Cavy as alternative genetic resource for animal protein production in post conflict zone: the case of DR Congo**

**AYAGIRWE Balthazar Rodrigue**

*Ayagirwe Balthazar Rodrigue*<sup>1,3</sup>, *Nasser Yao*<sup>2</sup>, *Felix Meutchieye*<sup>3</sup>, *Martina Kyalo*<sup>2</sup>, *Yacouba Manjeli*<sup>3</sup>

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**P27**

Domesticated cavies (Guinea-pigs) are commonly used in sub-Saharan Africa for meat consumption, income generation and manure production in mixed crop-livestock systems. It has been used for several millennia and continues to be used as an animal for slaughter by the natives of the Andean



countries and is used as a laboratory and pet animal worldwide. However, it was not until the 20th century that these rodents begun being domesticated in Africa and currently many countries in SSA are rearing cavy for meat consumption, and cavy production systems in several countries is known. In this work, we evaluated the genetic diversity and population structure of cavy from four regions (South and North Kivu, Katanga and Kinshasa) of Democratic Republic of Congo (DRC). We screened 343 samples with 16 Simple Sequence Repeats (SSR). A total number of 113 alleles were found in the four studied populations with an average of 5.77 alleles per locus per population, the highest number being recorded in South Kivu (7.23) and the lowest in Kinshasa (4.69). The observed heterozygosity were less than expected with 50.7% of deficit. High inbreeding was observed with South Kivu having the low rate compared to others studied populations. However, the high rate of molecular variance observed suggested opportunities for intra-population selection before crossing individuals from the different populations for possible genetic improvement. The structure analysis indicated that DR Congo cavy population is sharing three gene pools with different rate between populations and has shown a moderate genetic structure. The molecular diversity observed in this study provides useful information for breeding programs to aid selection of diverse parents for establishment of breeding populations that could be used for cavy improvement.

Key words: guinea pig; microsatellites; genetic diversity; small stock; sub-Saharan Africa

**Gouty arthritis preventing effect of the aqueous and methanolic extracts of Paullinia pinnata on Monosodium urate crystals model in rat**

**TSEUGUEM Pius Pum**

*Pius Pum Tseuguem, Sorelle Ngassam Mbankou, Elvine Pami Nguielefack-Mbuyo and Télésphore Benoît Nguielefack  
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**P5**

Gouty arthritis results from monosodium urate (MSU) crystal deposition in joint tissues. The deposited MSU crystals induce an acute inflammatory response which leads to damage of joint tissue and severe pain. The profound modification of life style and nutrition habits has led to important increase in the prevalence of gouty arthritis. More, the pathology is poorly handled. This work investigates the anti-gouty arthritis activities of the aqueous (AEPP) and methanolic (MEPP) extracts of Paullinia pinnata. The gouty arthritis was induced by intra-articular injecting of 50 µl of MSU (100 mg/ml) in the left hind ankle of each rat and animals were treated orally from 24h post-injection, with AEPP and MEPP (100 and 200 mg/kg), allopurinol (5 mg/kg) or respective vehicles of the two extracts for 6 consecutive days. The paw and ankle volume of rats as well as the paw and ankle pain sensation threshold were measured before gouty induction, before treatment initiation and every 24h of the 6 days of experimentation. Animals were then sacrificed for the collection of synovial fluid, brain, spinal cord and the serum. Myeloperoxidase (MPO) was assayed in the synovial liquid, while nitrite oxide (NO), malondialdehyde (MDA) and superoxide dismutase (SOD) were assayed in serum and homogenates of spinal cord, left and right hemispheres. AEPP and MEPP significantly ( $p < 0.001$ ) and dose-dependently reduced MSU-induced hyperalgesia and inflammation in both ankle and the paw, along the six days of treatments. MPO production was also significantly inhibited ( $P < 0.001$ ) by both extracts with percentage ranging from 76.30 to 85.19%. Plant extracts also significantly inhibited the NO ( $P < 0.001$ ), MDA ( $P < 0.001$ ) content and increased the SOD activity ( $P < 0.05$ ). The AEPP and the MEPP possess potent anti-gouty activity that may be related to their anti-inflammatory, analgesic, anti-oxidant and cell migration inhibitory activities

Keywords: Paullinia pinnata; gouty arthritis; MSU; oxidative stress.

**Curatives effects of the aqueous and methanolic extracts of Paullinia pinnata LINN (Sapindaceae) on CFA-induced arthritis in Wistar rats: inhibition of pain, inflammation and some cytokines production**  
**TSEUGUEM Pius Pum**

*Pius Pum Tseuguem, Aurelie Metago Ngoufack, Alphonse Mouga Ngangoum, Mathias Tsague Kenfack and Téléphore Benoît Nguélefack*

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**P49**

Paullinia pinnata is widely used in folk medicine in the west region of Cameroon for the treatment of a wide range of disease. Our aims was to evaluate the curative effects of P pinnata on arthritis and to determine whether P pinnata may inhibit Myeloperoxidase (MPO), TNF- $\alpha$  and IL-1 $\beta$  production in arthritis. The curative effects was performed by injecting 50  $\mu$ l of CFA in the left hind ankle of each rats, except those of the neutral control. P. pinnata extracts were administered orally at the dose of 100 and 200 mg/kg for 16th days; starting on the 7th day after CFA injection. The in vivo anti-inflammatory and anti-hyperalgesic effects of P. pinnata was tested on the joint and paw of CFA-injected leg; MPO assessment in the synovial liquid of the injected ankle and the TNF- $\alpha$  and IL-1 $\beta$  was assessed in the serum of the rats. Both AEPP and MEPP significantly and dose-dependently reduce CFA-induce hyperalgesia and ankle/paw oedema resorption, from the acute to the chronic treatment with the maximum activity obtained from the 4th hours with both extracts ( $P < 0.001$ ). These effects was progressive and the analgesic and oedema resorption of treated animal was almost equal to that of the Neutral group by the end of the experiment. Both extracts significantly inhibit TNF- $\alpha$  secretion, at the 100 mg/kg with  $P < 0.01$  (49.11% for AEPP and 51.50 % for MEPP) (85.63%), both extracts has also inhibit significantly IL-1 $\beta$  secretion at the 100 and 200 mg/body weight with  $P < 0.01$  (85.87%), (88.35%). These results shows that P. pinnata aqueous and methanolic extracts from the leaves possess curative effects against CFA-induce arthritis. These effects may be promoted by the inhibition of cell's membrane disruption and suggest that P. pinnata may have immunomodulatory activities and support the use of this plant in folk medicine.

Keywords: Paullinia pinnata; CFA; curative effects; anti-arthritis; TNF- $\alpha$ ; IL-1 $\beta$ .

**Toxicology of some plants with insecticidal potential listed in the Cameroonian flora using the corn weevil as a biological model**

**KUATE TUEGUEM William Norbert**

*Atindo Songwe Thierry, Ndongo Bekolo, Kuate Tueguem William Norbert, Tenkam Samuel and Ambang Zachée*

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**P23**

In the objective of increasing the family of plants with potential pesticides is an alternative method against chemical control, we have evaluated under laboratory conditions the effect of seeds powders of Annona muricata, Moringa oleifera, Melia azedarach, and leaves of Cyrtosperma senegalensis and Melia azedarach on the parasite of stored maize (Sitophilus zeamais). Four quantitative parameters (mortality rate, attacking percentage of seeds, weight loss of seeds and germination rate) were at the base of this study and significant differences were recorded. To realize this work, a split plot randomize is used. The results obtained were compared with those of the control and synthetic insecticide (Poudrox 5 %) within a period of seven weeks. The means comparison averages shows that

the treatment by seeds of *M. oleifera* was most effective at 1st week of conservation in the white variety maize for the mortality rate parameter. The means comparison averages of the attacking percentage parameter for the 7th week of conservation shows that the seed powder of *A. muricata* (19,26 %), seeds of *M. oleifera* (27,74 %), leaves and seeds of *M. azedarach* (33,99 % and 36,59 %), were effective, since they are significantly different from control with corn cob powder (49,33 %) and not significantly different from Poudrox treatment (31,03 %). It arises from the averages comparison of the weight loss parameter, that the powders with seeds of *M. oleifera*, *M. azedarach*, *A. muricata* and with the leaves of *M. azedarach* were more effective in the white variety (3,05 %, 6,01%, 2,3 % and 5,41 % respectively) than in the yellow variety (4,11 %, 6,32 %, 2,91 % and 6,56 % ) since it reveals significant differences between these treatments and the control with the corn cobs. However, leave powder of *C. senegalensis* was not effective for the conservation of maize against *S. zeamais*. From the germinative test results, the toxicity of the powder used doesn't have a negative effect on the physiology of protected seeds. The biological control with seeds powder of *A. muricata*, de *M. oleifera* de *M. azedarach* and the leaves of *M. azedarach* is possible since they possess an effective insecticidal potential against maize weevils and their use in agriculture can guarantee security not only to maize farmers but also for the environment.

Keywords: Powder, insecticide, toxicity, mortality, weight loss, maize.

#### Effet of salt stress on the growth of *lycopersicon esculentum*

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**P1**

In order to search varieties of tomato (*lycopersicon esculentum*) which can also be grown in salted soil areas in order to efficiently exploit all cultivable areas in order to increase the overall tomato production, the different effects of salinity on growth parameters (stem height, leaf area and number of leaves), physiological parameters (relative water content, and chlorophyll content (a, b and a + b)), biochemical parameters (amount of protein total and amount of total sugars) were studied in two tomatoes varieties (Super Rio Master and Rio Grande) traditionally grown in Cameroon. These varieties are subjected to four different concentrations of NaCl (0, 50, 100 and 200 mM) for twenty-four days of shading culture.

The results obtained show that salt stress leads on the one hand to a reduction in growth parameters (stalk height, leaf area and number of leaves), physiological (relative water content, and chlorophyll content (a, b and a + b)). The stem height is significantly reduced in both varieties and the reduction rate from S0 to S3 at the end of the experiment is 34.12 % for V1 and 35.69 % for V2. The number of leaves is significantly reduced in both varieties, the reduction rate from S0 to S3 at the end of the experiment is 95.24 % for V1 and 74.96 for V2 and on the other hand an increased accumulation of a biochemical parameter (the amount of total sugar) with an accumulation rate of 2.72 % at the leaf level; 4.37 % at the stem and 4.68 % at the root level for V1 and 4.54 % at the leaf level; 6.92 % at the stem and 5.43 % at the root level for V2. These parameters would be interesting early indicators of salt stress resistance. The results obtained show that there is no significant difference between the two varieties in the face of salt stress. Salinity is an unfavorable factor for the growth and development of *Lycopersicon esculentum*.

Keywords: *Lycopersicon esculentum*, salt stress, tolerance, early indicators, vegetative development.

**Fractioning of plant extracts as alternative to optimized antibacterial activity: case of *Enantia chlorantha* stem barks**

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P24

The infectious diseases caused by bacteria constitute the main cause of morbidity and mortality throughout the world and in particular in developing countries. In this work, the influence of fractioning of stem barks methanol extract of *Enantia chlorantha* were investigated. The aim being to optimize the activity of this extract. The extract was prepared by maceration of barks powder in methanol. Fractioning was done using increasing solvents polarity: Hexane, Ethyl Acetate, n-butanol. Standard phytochemical methods were used for phytochemical screening. Minimum Inhibitory Concentrations (MIC) and Minimum Bactericidal Concentration (MBC) of the methanol extract and fractions were determined using broth microdilution method. The methanol extract of *E. chlorantha* stem barks was found to be active on all the bacteria tested ( $32 \leq \text{MIC} \leq 128 \mu\text{g/ml}$ ). Its activity being significant ( $\text{MIC} < 100 \mu\text{g/ml}$ ) out of 3 of the 6 clinical isolates used. *Salmonella enterica* serovar paratyphi A was the most sensitive bacterium ( $\text{MIC} = 32 \mu\text{g/ml}$ ). Compared to the extract and other fraction, the n-butanol fraction was found to be more active ( $32 \leq \text{MIC} \leq 64 \mu\text{g/ml}$ ). Significant antibacterial activity was observed on all of the 6 bacterial isolates. Lowest MIC value ( $32 \mu\text{g/ml}$ ) of this fraction was obtained with *E. coli* (136), and *Salmonella enterica* serovar typhi (SAL9). The present results showed that the n-butanol fraction of the methanol stem barks extract of *E. chlorantha* possess the essential antibacterial components and could best be used to fight against bacterial infections as compared to methanol extract.

Keywords: *Enantia chlorantha*, methanol extract, fractioning, antibacterial activity.

**Mycorrhizae and Single Superphosphate influence the Yield of Bambara-bean in the Centre Region of Cameroon**

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P31

Phosphorus (P) is a limiting factor for crop yields on more than 30% of the world's arable land. In order to feed the growing world population, which will reach 10 billion by 2050, it is vital to boost food production with less input. Bambara-bean (*Vigna subterranea* (L.) Verdc.) can play an important role in this context, since one of its main attributes is its tolerance to poor soils and drought, as well as its ability to produce under conditions where other crops fail. However, the yields of Bambara-bean remain low due to many production constraints. The objective of this study was to reduce food insecurity by improving the yield of Bambara-bean with P fertilizer. The experiment was carried out in

the experimental field of the University of Yaounde I. The experimental design was a split plot with three factors; the landraces (V1 and V2), the single superphosphate (SSP) doses (0, 50, 100, 150 and 200 kg P<sub>2</sub>O<sub>5</sub>.ha<sup>-1</sup>) and AMF (Arbuscular Mycorrhizal Fungi) inoculum (M0: without AMF and M1: with AMF). P<sub>2</sub>O<sub>5</sub> doses and AMF (composites *Gigaspora margarita*, *Acaulospora tuberculata* and *Glomus intraradices*) significantly boosted growth (number of branches, shoot height) and yield of Bambara-bean. The dose 150 kg P<sub>2</sub>O<sub>5</sub>.ha<sup>-1</sup> significantly increased the yield of Bambara-bean by 100% compared to the control (0 kg P<sub>2</sub>O<sub>5</sub>.ha<sup>-1</sup> + M0) in V1. AMFs significantly increased the yield of Bambara-bean by 87.5% compared to the control (0 kg P<sub>2</sub>O<sub>5</sub>.ha<sup>-1</sup> + M0) in V2. P fertilizer (P<sub>2</sub>O<sub>5</sub>) and biological fertilizer independently improved the grain yield of Bambara-bean. However, low doses of SSP (100 kg P<sub>2</sub>O<sub>5</sub>.ha<sup>-1</sup>) may be associated with AMF to maximize grain yield of Bambara-bean.

Key-words: Arbuscular Mycorrhizal Fungi (AMF), Bambara groundnut, fertilizers, phosphorus, P starvation

#### OPTIMIZATION OF THE ADSORPTION OF CHROMIUM VI IN A FILTER MADE WITH SAND COATED WITH IRON OXIDE

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P28

Chromium is one of widely used metals in the industries. Today, due to a lack of respect or inadequacy of existing laws or accesses, a large number of sites and former industrial sites are polluted by chromium. Chromium is found in industrial discharges and is very toxic and soluble in water. In this memory, a filter based on iron oxide coated sand is proposed to remove chromium VI from groundwater and surface water. This elimination is governed by the advection-dispersion equation. For this aim, the linear advection-dispersion equation was solved analytically by the Laplace transform method and numerically by the fourth order Runge kutta method, to determine the spatio-temporal distribution of the pollutant through the filter. The control parameters are the adsorption coefficient, the initial concentration and the first order degradation coefficient. The results obtained show that a clear improvement is observed for a material having a high adsorption capacity and a high first order coefficient. For a duration of 20 days, and at depths  $x = 20$  cm to  $x = 30$  cm, the concentration of chromium decreased. Considering 20% of the initial concentration of chromium, we can find that the valves on the filter are of the order  $x = 10$  cm for  $t = 1$  day,  $x = 20$ cm for  $t = 5$  days and  $x = 30$  cm for  $t = 30$  days. The results of this memory should be used to manufacture low-cost filters based on iron oxide-coated sand.

Keywords: filter based on sand coated with iron oxide, chromium, adsorption, advection-dispersion equation, Laplace transforms fourth order Runge kutta.

#### Development of geopolymer mortars from iron-rich aluminosilicate (laterite) as sustainable construction materials: mechanical properties and acid resistance

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P32

This project looks at the possibility of using calcined iron-rich aluminosilicate (laterite) as solid precursor for making geopolymer mortars. Calcined laterite was activated with (12M) alkaline solution of NaOH/Na<sub>2</sub>SiO<sub>3</sub> ratio of 2.4. Pastes and mortars with aggregate: binder ratio of 1:2 was investigated using two curing temperatures 27 and 80 °C. The mechanical properties and durability of resulting products were evaluated. The three-point flexural strength varies from 4.60 to 7.36 MPa and 7.40 to 12.05 MPa while the compressive strengths vary from 14.05 to 25.07 and 22.40 to 32.20 for specimens cured at 27 °C and 80 °C, respectively at 7 and 28 days. The flexural and compressive behavior of the specimens were directly correlated to the apparent porosity, water absorption and bulk density and final microstructure which each decreased with curing time. Geopolymer mortars obtained at 80 °C developed a better resistance to than the ones cured at 27 °C. The presence of additional ferrisilicate silicate product which co-existed with polysialate polymer network, in samples treated at 80 °C enhances its acid resistance. However maximum deterioration was observed on samples treated at 27 °C. This was due to the depolymerization of polysialate networks and, the leaching of ferrousilicate in acidic environment. The resulting characteristics obtained in this project valid our approaches that laterite appear as alternative solid precursor for geopolymer binder synthesis.

#### **Study of Antioxidant and anti-inflammatory effects of Ganoderma resinaceum polysaccharides.**

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P21

The development/discovery of new drugs is essential to overcome oxidative stress and inflammatory related diseases as neurodegenerative, metabolic diseases, malaria and cancers. So, the main strategy is consisting of exploiting and applying ethnobotanical knowledge by pharmaceuticals' industries to treat diseases cited above. Globally, 80% of the world's population uses medicinal plants for treatments which contain a variety of bioactive components. Among them polysaccharides have attracted a lot of attention since last decades according to their less toxicity and broad range of bioactivities. Moreover, polysaccharides of medicinal plants can able to alleviate or limit the consequences of oxidative and inflammatory imbalance in the body. Nevertheless, mushroom- derived polysaccharides are less studied particularly in Africa despite their pharmacological importance which is already exploited. Lentinan, Immulina, Krestin are some examples of drugs-based polysaccharides. Based these results the development of new and more effective therapies is an attractive challenge for researchers. In this context, two polysaccharides fractions (GRP I and GRP II) were isolated from Ganoderma resinaceum fruiting bodies, a medical interest basidiomycete of the Ganodermataceae family. These fractions were investigated for their antioxidant and anti-inflammatory activities in vitro and in hypergalactosemic model Wistar rats after 14 days of experimentation. Then, the two polysaccharide fractions were partially characterized to best understand structure-biological activity relationship. As results, we have shown that these polysaccharides have exhibited strong antiradical and antioxidant activities (DPPH, ABTS, chelation ion ferrous and NO) ranging 0.5-2.5 mg/mL and

14



stabilized the Human Red Blood Cell membrane (0.1-0.5 mg/mL). At 100 mg/kg BW, GRP I and GRP II improved oxidative status by significantly reducing MDA levels and by increasing catalase and SOD activity principally in the train and liver. Besides, fractions inhibited overproduction of nitric oxide. With these biological activities, GRP I and GRP II can be exploited as immunoadjuvants in the treatment of oxidative stress and inflammatory associated pathologies. Keywords: Oxidative stress, inflammation, cytotoxicity, polysaccharide fractions and Ganoderma resinaceum.

### **Magnetic Resonance Spectroscopy (NMR)**

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**P18**

Magnetic resonance spectroscopy (NMR) is the type of spectroscopy that has had the greatest impact on the determination of the structure of organic compounds. It was developed by two teams of physicists, Felix Bloch (1905-1983, Stanford University) and Edward Mills Purcell (1912-1997, Harvard University). The first commercial NMR apparatus appeared in 1953, and since that time, NMR spectroscopy has become an essential tool in the characterization and identification of various molecules.

NMR is a revolutionary means of communicating with matter at the atomic level through waves similar to those used in radio. The applications of the NMR are innumerable: MRI (Magnetic Resonance Imaging), in the medical sector, is the best-known application. By identifying very precisely the chemical nature and the environment of each atom, the NMR allows for example - it was besides one of its first applications "general public" - to know all about a wine (limestone rate, sunshine, nature of the soil ...) and thus to check the quality. With this technique, one touches as much on chemistry, physics, spectroscopy, quantum mechanics, as on electricity. Today, this method is applied in the fight against doping and against fraud. NMR is at the origin of the main advances made in fields ranging from chemistry to brain function, but also in basic biology and pharmacology. NMR has even recently made it possible to identify which parts of the brain react differently in autism and thus to advance research in this field. NMR of liquids is a basic tool for the study of small organic molecules in solution, natural or synthetic substances, and the study of soluble macromolecules (proteins, nucleic acids, polysaccharides, synthetic polymers). NMR solids can study amorphous or weakly crystalline substances such as glasses and natural or synthetic polymers insoluble; it is a very complementary technique of X-ray crystallography. A similar technique is intended for the study of heterogeneous samples such as solid supports for organic synthesis or soils for an environmental characterization.

Key Words: Magnetic resonance spectroscopy (NMR); characterization, identification; molecules, X-ray crystallography

### **Characterization of endophytic Streptomyces from cocoyam (Xanthosoma sagittifolium L. Schott) roots from Southern-western Cameroon and their plant growth promoting effects on cocoyam tissue culture plantlets.** **DJUIDJE KOUOMOU Flora Peguy**

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P20

In Cameroon, cocoyam is a nutritional and economical relevant crop ranked second tuber crop mostly consumed after cassava. However, in Cameroon and worldwide, Cocoyam Root Rot Disease (CRRD) caused by *Pythium myriotylum* is the major limit of growth and productivity of this crop. Recently, field observations indicated that andosols around Mount Cameroon, particularly rich in actinomycetes, are naturally suppressive to CRRD. The focus of this study was to isolate, evaluate and characterize cocoyam endophytic actinobacteria from cocoyam roots collected in the localities around Mount Cameroon for their potential antagonistic activities against *P. myriotylum* and their ability to promote plant growth. 171 actinobacteria were isolated from healthy white cocoyam roots. Based on their morphological characteristics, these actinobacteria were distributed into 7 distinct groups of isolates namely PERM1, PERM2, PERM3, PERM4, PERM4, PERM5, PERM6 and PERM7. About 60% isolates were assigned to group PERM2. The antifungal activity by dual culture on PDA permitted to selected PERM1, PERM2, PERM4 and PERM5 as active isolates (more than 50% of inhibition against *P. myriotylum*). These four isolates were subsequently identified using phenotypic and molecular tests, characterized for extracellular hydrolytic enzymes production, plant growth promoting (PGP) traits and their effects were evaluated on tissue culture-derived cocoyam plantlets. Identification of these antagonistic endophytic cocoyam isolates indicated that all belonged to *Streptomyces* genus. The sequencing of the 16S rRNA genes and alignment with sequences retrieved from GenBank databases showed that PERM2 and PERM4 were clustered alone in a different subclade although closely to *Streptomyces samsunensis* and *Streptomyces brunneogriseus* respectively. The comparison of some physiological and biochemical properties of PERM2 and PERM4 with the most closely related *Streptomyces* species showed that these strains differs phenotypically. PERM2 and PERM4 might represent new species. The selected actinobacteria exhibited several properties often associated with plant growth promoting traits. All selected *Streptomyces* were able to produce siderophores, phytohormone (IAA), ACC deaminase and solubilize phosphate. The isolate PERM2, with maximum IAA (20.30 µg/ml) produced, increased significantly root length (14.26 ± 0.5 cm) compare to positive control (6.87 ± 0.3 cm). Moreover, PERM2 increased significantly fresh weight of roots (1.903 ± 0.06 g) compare to negative control (0.371 ± 0.06 g). Otherwise, PERM2 also increased number of secondary roots significantly compare to negative control. These results suggest the possibility of using endophytic *Streptomyces* strains especially isolate PERM2 in formulation of potential bio fungicides and biofertilizers.

Keywords Cocoyam (*Xanthosoma sagittifolium*), *P. myriotylum*, endophytic *Streptomyces*, characterization, dual culture assay, Plant Growth Promotion.

**Secondary metabolites of two medicinal plants of Cameroon; *Mostuea batesii* and *Mostuea thomsonii* (Loganiaceae): Extraction, isolation, characterization; some chemical transformation and biological activities**

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P22

The genus *Mostuea* belonging to the Loganiaceae family and comprises many species among which most are present in Africa and Madagascar such as: *M. batesii* Baker, *M. thomsonii*, *M. brunonis* Didr, *M. hiersuta*. The species *Mostuea batesii* and *M. thomsonii* grows primarily in the secondary rainforest, and is distributed in central Africa, from Cameroon through the south of the Central African Republic, Gabon. This plant is widely used in traditional medicine in most of these countries. This plant is also believed to possess hallucinogenic properties, and its extended uses have been associated with cerebral disorder or schizophrenia. Furthermore, a subcutaneously administered root-bark extracts displayed a mean lethal dose of 0.25 g/kg in mice, with death arising through a phase of hyperexcitability<sup>1</sup>. In anaesthetized dogs, an intravenous dose up to 0.10 g/kg produced hypertension, a short phase of tachycardia and hyperpnoea followed by cardiac and respiratory depression<sup>1</sup>. As part of our continuous effort in searching and characterizing natural product from Cameroonian medicinal plants with potential and effective biological activities various pathogens, six new compounds (three indole alkaloids, two quinoleic alkaloids and one triterpene) together twenty-one known compounds have been isolated from *M. batesii* and *M. thomsonii*. The acetylation and methylation reaction of two of the isolated compounds allowed us to obtain two new derivatives. The structures of these compounds were elucidated using HRESI-MS, 1D and 2D NMR spectroscopic data. Some of these compounds were evaluated in vitro for their antimicrobial activities against a wide range of microorganisms.

Keywords: *Mostuea batesii*, *Mostuea thomsonii* Loganiaceae, Indolic alkaloids.

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### **Streptomyces cameroonensis**

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**P30**

Actinomycetes are a family of bacteria, the most important of which are streptomycetes because of their high production of antibiotics. These antibiotics are recognized for their great potential in men as well as in plants: anti-oxidants and antimicrobials. Belonging to this large family, a strain was recently isolated from the soil of Nkolbisson in 2012 by Tchatchou student of the Biotechnology Center of Nkolbisson. After many studies conducted, this strain was named *Streptomyces cameroonensis* and has so far demonstrated its many both antimicrobial (against *E.coli*, *S. aureus*, *H. influenzae*, *M. figiensis*) and antioxidant (DPPH and ABTS tests) properties.

**Variability of geotechnical properties of sedimentary and volcanic rock-derived laterites in a humid tropical region (Southwestern Cameroon), upgrading to road construction**

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**P33**

The influence of lithology on the variability of the geotechnical parameters of the laterites in humid tropical area, in South-west region of Cameroon was studied by the means of geotechnical tests and statistical analysis, with a view to their use in road construction. The results of the univariate and bivariate statistical analysis attest that the laterites resulting from the volcanic formations (basalts) are more fines (< 80  $\mu\text{m}$  = 26.8%), more plastics ( $\text{pi}$  = 29%) and have a lower bearing pressure (CBR = 38%) that those developed on the detrital sedimentary formations (< 75  $\mu\text{m}$  = 26.3%,  $\text{PI}$  = 27%, CBR = 40%). The principal component analysis (PCA) presents three groups of geotechnical parameters, (1) the parameters fines, clays, skeleton, mortar, sand and  $\gamma\text{s}$ , (2) the  $\text{Pp}$ ,  $\text{Pm}$ ,  $\text{pi}$ ,  $\text{es}$ ,  $\text{LL}$ ,  $\text{LP}$  and  $\text{OMC}$  parameters and (3) the parameters CBR,  $\text{Gm}$ , gravel and  $\text{ac}$  parameters. The hierarchical classification in principal components (HCPC) shows the existence of two families of laterites: the laterites developed on sedimentary formations belonging to the class 1/3, characterized mainly by  $\text{MDD}$ , sand and  $\text{Gm}$  parameters and the laterites generated by the volcanic formations (class 3/3), characterized by the  $\text{es}$ ,  $\text{pi}$ ,  $\text{LL}$ ,  $\text{Pm}$ ,  $\text{Pp}$ ,  $\text{PL}$ , <425  $\mu\text{m}$ ,  $\text{OMC}$ , <2 mm, <75  $\mu\text{m}$  and <2  $\mu\text{m}$  parameters. The laterites of the volcanic formations are only used as sub-bases layers for all classes of traffic while those of the sedimentary formations can be used in sub-bases layers for low to medium classes of traffics T2/T3 and in base layers for low traffics classes T1 Under similar bioclimatic conditions, laterites developed on detrital sedimentary rocks present the best performances in road construction compared to those generated by the basic volcanic formations. Key words: Littoral Cameroon; Sedimentary and volcanic rocks; Laterites; geotechnical properties; Statistical analysis; Traffic

**Brownian Dynamics Simulations of the Interactions Between Lactate Dehydrogenase (LDH) and G- or F-Actin. Part I: Muscle and Heart Homo-Isoforms**

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**P34**

Glycolytic enzymes may provide a mechanism by which they can compartment in cells by binding to cytoskeletal structures. One potentially important step in compartmentation is the binding of the cytoskeletal protein F-actin with lactate dehydrogenase (LDH). Brownian dynamics (BD) simulations of LDH interacting with G- or F-actin provided first encounter snapshots and relative binding free energies. Models of muscle (LDH-M<sub>4</sub>) and heart (LDH-H<sub>4</sub>) isoforms of lactate dehydrogenase for two species (rabbit and human) were examined. Strong electrostatic interactions were observed between both monomeric and polymerized actin for LDH-M<sub>4</sub>, but not LDH-H<sub>4</sub>. The electrostatic potential field of both rabbit and human LDH-M<sub>4</sub> featured extensive electropositive regions between B/C and A/D subunits. The electropositive regions were greatly attenuated in both species' LDH-H<sub>4</sub> isoforms. F-actin bears a negative charge; because of differences in the primary sequence, LDH-H<sub>4</sub> is also negative. LDH-M<sub>4</sub>, however, is positive. The charge difference causes LDH-H<sub>4</sub> to have a greatly reduced electrostatic potential in the regions between B/C and A/D subunits. Complexes formed between LDH-M<sub>4</sub> and G-actin involved residues found in the surface grooves between the A/D and B/C subunits. Binding of LDH-M<sub>4</sub> with F-actin presented several modes where the most frequent complexes involved two subunits of actin interact with two subunits of LDH-M<sub>4</sub>. LDH-M<sub>4</sub> interactions with F-actin relied

on 10 residues, nine of which were conserved between species. All except two LDH-M<sub>4</sub> were located in the positive grooves between A/D and B/C subunits. The quaternary structure of LDH-M<sub>4</sub> enhances the electrostatic potential between the A/D and B/C subunits. LDH-H<sub>4</sub>, however, does not show unique binding modes nor does it have a favorable relative binding free energy compared to LDH-M<sub>4</sub>. Thus, as seen experimentally [Ehmann, J. D.; Hultin, H. O. *Arch. Biochem. Biophys.* **1973**, *154*, 471], BD agrees that LDH-M<sub>4</sub> binds actin, but LDH-H<sub>4</sub> does not.

#### **Prospective on road safety smart tools**

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**P11**

Road casualties have been pointed as the main causes of heavy human and financial losses, particularly in Africa where driving policies and traffic tools are considered as important factors. It has been proven that about 60% of road accidents in Cameroon happened along the two main Yaounde-Douala and Yaounde-Bafoussam lines. Besides human losses in thousands, yearly financial bill is valued around CFA francs 100 billion. Private sector and World Bank have been tasked to develop strategies, policies and regulations to improve road safety nationwide. The current reflexion aims at presenting a project which if implemented would drastically impact positively road safety in Cameroon. Based on the frequencies of road potholes and absence of road signs, and given the large utilization of mobiles, the project plans to increase driving monitoring by the use of smartphone, equipped with GPS and inertial sensors. The system is made intelligent to be able to interact by voice indication with the driver, giving alert, detecting pothole, blocking calls and sms and by sending automatic messages to callers. The database functions under a real time images collection, done across pilot roads, kept and updated in a distant server by any driver on the road. Thus, these techniques when applied and made available, will contribute to increase drivers' attention, reduce carelessness and magnify the total road safety for the sake of communities.

Key words: Casualties, Traffic, Monitoring, Safety risks, distant systems

## **AGRICULTURAL SCIENCES & ENGINEERING**

#### **Pathogenicity and in vitro control of Lasiodiplodia sp and Fusarium sp, pathogens associated with cocoa dieback in Cameroon**

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**P29**

Cocoa orchards in different areas of Center and South-West region of Cameroon were found to suffer from dieback disease. Lasiodiplodia sp was the most frequent pathogen isolated from plant materials followed by Fusarium sp. Inoculation of healthy plant stressed or not with Lasiodiplodia sp produced



typical symptoms whereas *Fusarium* sp failed to produce these symptoms when plants are not stressed. Symptoms were more severe in plots where plants have been stressed. In vitro efficacy of two chemical fungicides viz. carbendazim + chlorotalonil and Mancozeb 80 % WP and aqueous extract of neem seeds was evaluated against *Lasiodiplodia* sp and *Fusarium* by poisoned food technique at different doses. All the employed doses of the tested fungicides significantly reduced the biomass of the tested fungal species. However, carbendazim + chlorotalonil and aqueous extract of neem seeds were found to be more effective because it showed fungicide effect while mancozeb 80 % WP showed fungistatic effect. Carbendazim and aqueous extract of seeds neem can be integrated in control program of cocoa dieback in Cameroon.

Keywords: Pathogenicity, dieback, fungicides, *Azadirachta indica*, aqueous extract.

**Effect of aqueous and methanolic extracts of *Thevetia peruviana* (Pers.) K.Schum on development of *Phytophthora megakarya* causal agent of black pod disease of cocoa in field**

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**P40**

The alternative research to synthetic molecules in the control of black pod rots of cocoa is at the origin of this work. The main objective of this work is to evaluate the antifungal potential of aqueous and methanolic extracts of *Thevetia peruviana* against *Phytophthora megakarya* causal agent of black pod disease of cacao on the field. Extract are obtained by maceration of powder in the methanol and water. Their antifungal activities were evaluated in vitro on a strain of *Phytophthora megakarya* (Mbal 211), in vivo on pods detached from sensible cocoa clone SNK10 and moderately tolerant cocoa clone BBK1016 and in situ in a peasant's plantation at Mbalmayo (center region of Cameroun) during two cocoa seasons from April to October 2011 and from April to November 2012. For each extract three doses were tested (12.5; 25 and 50µl/ml) in vitro. The CMI50 was used for farm work. In a general manner, the extract presented a total inhibition of radial growth of the fungus in the other 60 to 100 %. Methanol extract presented the same effectiveness as ridomil gold plus on the pods detached after inoculation. The extract equally inhibited the development of the fungus with a probability of 0.0004 in the case of SNK 10, without any significant difference in the case of BBK 1016. Statistical analysis of data collected during these two campaigns revealed a significant interaction of the year and treatment. The major results obtained compared to the rate of rot showed that the treatments aqueous extract and ridomil are closed during these campaigns with the values 53.65 and 36.92 % in 2011 and 14.95 and 10.51 % in 2012 respectively.

Key work. Black pod, *Thevetia peruviana*, extracts, cocoa seasons, inhibition.

**Prevalence of Myxosporidiosis in *Oreochromis niloticus* Linnaeus, 1758 (Cichlidae) at MAPE reservoir dam (Adamawa - Cameroon)**

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**P35**

20



In order to contribute to a better understanding of Myxosporean infections so as to develop prevention and control strategies, 350 *Oreochromis niloticus* (Nile tilapia) specimens were sampled from May 2016 to May 2017 from the MAPE dam (NL : 6°00'- 6°20', EL : 11°20'-11°40'; Adamawa-Cameroon). Classical methods were used for fish's sampling, conservation and Myxosporean species identification. An overall total of 12 Myxosporean species belonging to the genus *Myxobolus* were identified. A total of 159 fish (45.43%) were infected. Parasite species were scarce (Prevalence < 10%) apart from *Myxobolus camerounensis*, *M. israelensis*, *M. tilapiae* and *M. brachysporus* which were intermediate (10% ≤ Prevalence ≤ 50%). The Prevalence differed significantly between parasite species. The higher (15.14%) and lower (0.86%) prevalence was recorded for *Myxobolus tilapiae* and *Myxobolus pharyngeus* respectively. Moreover, older fish were the most infected and males were more parasitized than females with no significant difference. Out of 10 infected organs, kidneys were the most parasitized (36.57%) and harbored 11 parasite species. A broad spectrum of target organs was noticed for *M. camerounensis*. The prevalence was significantly higher in the dry season (52.94%) than the rainy season (39.59%). At total, 59.94% of infected fish were polyinfected and 5 types of polyinfections (2; 3; 4; 5 and 6 species) were recorded. As the number of combined species increased, the prevalence of polyinfections' categories dropped. The prevalence of Myxosporidiosis in *O. niloticus* was influenced by endogenous factors and seasons. The recorded data are helpful for developing prevention and control strategies so as to boost the fish's production.

Keywords: Myxosporean, Infection, Prevalence, *Oreochromis niloticus*, MAPE, Cameroon

**Prevalence and intensity of gastro-intestinal parasite in Mifi and Koung khi (West Cameroon) on pig MEFFOWOET CHEKAM prisca**

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**P37**

An epidemiological study was carried out to assess the prevalence, intensity of infestation and measures to control gastrointestinal parasites of pigs in Koung Khi and Mifi (West Cameroon) from April to May 2017. A total of 479 samples of pig feces were collected and examined using qualitative methods (flotation, sedimentation, and Ziehl Neelsen) and quantitative methods (McMaster). Seventeen types of parasites were identified. The most common parasites were *Hyostromylus rubidus* (47.8%), *Isospora suis* (16.3%), *Globosephallus urosubulatus* (9.2%) and the least represented were *Eurytrema pancreaticum* (0.2%) and *Balantidium coli* (0.2%) with high parasitic intensity in *H. rubidus* (536.11 ± 135.91) and *I. suis* (266.67 ± 76.37); The other parasites were *Trichostrongylus* sp (1.3%), *Stephanurus dentatus* (0.4%), *Macracanthorhynchus hirudinaceus* (0.4%), *Ascaris suum* (6.3%), *Strongyloides ransomi* (5.4%), *Fasciola hepatica* (2.1%), *Dicrocoelium* spp (0.6%), *Eimeria* spp (1.7%), *Oesophagostomum dentatum* (3, 8%) and *Metastrongylus* sp (1.9%). Significantly positive and negative correlations were identified (P < 0.05). Factors such as breed, animal sex, locality and livestock system have had a significant influence on the prevalence and intensity of infestation of individual parasites. Cases of mixed infections were detected with five types of parasitic associations. These were the most common double infections (32.86%) and triple (32.86%), followed by quadruplicate (15.71%), simple (15.71%) and five (2.86%). The Piétrain and Locale breeds were the most infected among the different registered breeds (P < 0.05). The prevalence and intensity of gastrointestinal parasite infestations were significantly higher in the animals present in MIFI (68.6%) than in Koung khi. There was a significant difference in the prevalence of cryptosporidiosis depending on the division,

breed and frequency of drug administration. These results suggest that effective prevention and control measures should be taken for the control of pig gastrointestinal parasites in these Divisions.

Key words: Gastrointestinal parasites, prevalence, intensity, Prevention measures, pigs, Mifi and Kong khi

**Effects of the feeding regime on growth performance and nutritive value of giant african snail (*Archatina marginata*) meat**

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**P41**

Between February and June 2017, this study was carried out to evaluate the effect of feeding regime on growth performances and nutritive value of West African giant snails *Archatina marginata*'s meat. A total of 144 young snails with average body weight  $10 \pm 1$ g were fed for eighteen weeks on 3 feeding regimes. The feeding regimes were as follow: R0: papaw fruits; R1: papaw fruits + seashell and R2: compounded feed balance in protein, calcium and energy. The compounded feed (R2) induced the best ( $P < 0.05$  survival rate, weight gain, meat yield and meat quality. After 18 weeks of breeding, the compounded feed induced 38.1 g of live body weight, compared to 22.9 g for the control ration and 28.6g for the pawpaw supplemented with the seashell. The snails in control group recorded 32.6% meat yield compared to 35.9% for the ration R1 and 41.3% for R2. The highest shell yield (29.4%) was recorded with the ration R1. The protein content of meat varied significantly from feeding regime R0 (33.7%), R1 (39.7%) to R2 (43.7%). The compounded feed produced the cheapest gram bodyweight as compared with papaw alone and papaw supplemented with seashell (7.3 for 18.7 and 21.0 FCFA for R0 and R1). We can conclude that, feeding African giant snails (*Archatina marginata*) with a compound feed balance in protein, calcium and energy is more economic and efficient than fruits alone. Key words: *Archatina marginata*, Cameroon, compounded feed feeding, meat quality, meat yield, seashell

**Preservative effects of Neem oil (*Azadirachta indica*) on farm-mixed poultry feed against *Aspergillus flavus* and *Aspergillus niger***

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**P3**

The presence and growth of fungi in food and feeds may cause spoilage and result in a reduction in quality and quantity. Fungal contamination adversely affects poultry production and also affect human health. In vitro and in sacco trials were conducted to evaluate antifungal activity and preservative effect of neem oil (NO) against *Aspergillus flavus* and *Aspergillus niger*, in farm-mixed poultry feed. In vitro concentration of NO were 0.25, 0.5, 1, 1.5, 2, 2.5 and 3% (v/v) and in sacco 10, 15, 20, 25 and 30 g/Kg of feed. The most frequently isolated fungi in farm mixed poultry feed was *Aspergillus flavus* (50 %). The lowest colony diameters was *Aspergillus niger* ( $0.52 \pm 0.04$ ) was recorded with the highest concentration (3%) of NO. The highest fungi growth reductions were recorded with the highest concentrations (2.5 and 3%) of NO. At 30 days, there were not contamination of farm-mixed poultry feed by *Aspergillus flavus* ( $0 \pm 0, 00$  cfu g<sup>-1</sup>) and *Aspergillus niger* ( $0 \pm 0,00$  cfu g<sup>-1</sup>). Given its accessibility, neem oil could be implemented as part of suitable integrated preservative agent for fungal contamination, as it has been shown by inhibition of growth and number colony

Keywords: Neem oil, poultry feed, *Aspergillus flavus*, *Aspergillus niger*, preservative effect

**Effects of avocado seed powder as feed additive on blood parameters and oxidative stress indicators in rabbit doe**

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**P36**

The inappropriate use of antimicrobial creates conditions of high risk for the development and spread of resistance with highly consequences on public health over the world. One of the solution is the use of natural product in livestock whether as growth promoter or to fight certain germs.

The preliminary results we are presenting was intended to evaluate the effects of avocado seed powder as feed additive on blood parameters and oxidative stress indicators in rabbit doe. Therefore, 32 nulliparous and sexually mature does (8 months old), weighing 3.00 to 3.50 kg were distributed into 4 groups of 8 animals, comparable in terms of body weight. During the trial, group 1 (control) was fed ad libitum without avocado seed powder, while those of groups 2, 3 and 4 received the control feed supplemented with avocado seed powder at 0.5, 1 and 1.5% respectively. Two weeks after birth, blood sample was collected to evaluate blood parameters and oxidative stress indicators.

The results obtained revealed that the number of white and red blood cells, the blood concentration of hemoglobin and the hematocrit did not show any significant ( $P>0.05$ ) difference among treatments. However, platelets was significantly higher ( $P<0.05$ ) in females treated with 1.5% of avcadoseed powder ( $105.00\pm 21.55 \times 10^3/\text{ul}$ ) compared to those of the control group ( $80.00\pm 12.59 \times 10^3/\text{ul}$ ). Serum concentration of total proteins, albumin, globulins, HDL and Catalase were non significantly ( $P>0.05$ ) higher in animals fed with avocado seed powder compared to the control. Regarding these results, the use of avocado seed powder as feed additive could improve hematological parameters in rabbit doe.

**Seeds technologies, policies and strategies in Cameroon : A review in Animal Production**

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**P25**

Food and nutritional security are among the major Sustainable Development Goals to be achieved by sub Sahara countries where population growth is very tremendous. The aim of the current paper was to discuss the state of training and research, applied policies and strategies implemented in seed/ semen sector in Cameroon animal production sector. Compared to horticulture, it was observed that very little has been invested in animal semen or parent stock training research facilities. There is a general lack concerning this area more than 50 years after independence. Some promising initiatives targeted mainly large ruminants and monogastric species. All of them faded when the country went through long lasting economical crisis with consequences of disappearance of first findings. The main strategic lines operated by governmental bodies were the promotion of exotic germplasms and almost no investment in local seeds systems. These resulted into massive uncontrolled genetic mix ups which are spread all over the domestic animal genetic resources. Such incoherent strategy could not only lead to a wide genetic admixture of native heritage but is also bringing in challenging pathogenic outbreaks. It is therefore timely for scholars, private sector and public sector to regulate, mandate and implement long term approaches in order to tap into the extant findings concerning Cameroon native genetic

resources. Few contemporary cases like Brazil and Botswana have been analyzed for comparison to Cameroon case.

Key words: Genetic resources, Food security, Livestock, Partnerships, Cameroon

**Development of a sustainable poultry sector through the use of alternative natural resources in Cameroon: case study of the common guinea fowl (*Numida meleagris*)**

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**P4**

Cameroon faces a gap in animal proteins supplies, with consequence on food and nutritional security. The genuine promotion of non-conventional poultry farming, could therefore contribute to the reduction of growing gaps recorded in population suffering both of undernourishment or poor feeding habits. The native guinea fowl provided the gradual improvement of husbandry performances can become a major source of animal protein and income. It is therefore necessary to develop innovative routes for production, processing and marketing this particular bird, both for meat and egg. Between 2012 and 2017, studies conducted in Cameroon disclosed the following findings: there is a relative diversity of morpho-biometric characteristics of the local guinea fowl, which gives it remarkable adaptability in almost all agroecological zones; reproduction rate in captivity has been improved through better housing, feeding and health protection norms. Artificial egg incubation has been standardized, giving around 70% of hatching rate after 28 days. The average weight of an adult guinea fowl is  $1210 \pm 0,08g$  while the mean weight of eggs is  $34.69 \pm 0,19g$ ; guinea fowl is rustic, not heavy investment demanding and less susceptible to common poultry diseases. The natural guinea fowl germplasm is very large in both wild and extensive production systems. Guinea fowl meat and eggs are tasty and well accepted in communities. The guinea fowl can be cooked, grilled, dried and smoked. It is necessary to consider the extension of the innovative techniques, the involvement of coherent policies and the private sector for massive production of this genetic resource poultry, as well as further studies using modern biotechnology tools.

Key words: Poultry husbandry, Non-Conventional, meat, value chain, Cameroon

**Antifungal potential of *Syzygium aromaticum* essential oil against some fungi associated with papaya rot (*Carica papaya* L)**

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**P42**

The papaya rots caused by phytopathogenic fungi are the main cause of the decline in production yield and the alteration of the organoleptic and nutritional properties of papayas. The fungi isolated from the infected papaya tissue fragment are *Colletotricum gloeosporioides* and *Fusarium* sp. The essential oil (EO) of *Syzygium aromaticum* extracted by hydrodistillation with a yield of 9,66 % is mainly

composed of eugenol,  $\beta$ -caryophyllene, and  $\beta$ -bisabolène. This EO inhibits the radial growth of *C. gloeosporioides* and *Fusarium* sp at 375ppm and 500ppm respectively. Similarly, fungal conidia were completely inhibited at 100ppm for *C. gloeosporioides* and 250ppm *Fusarium* sp. Moreover, during the in-situ tests, a complete inhibition of the necrosis caused by *C. gloeosporioides* at 3000ppm is noted for the curative and preventive test. Also, for necrosis caused by *Fusarium* sp a complete inhibition was observed at 2000ppm and 4000ppm respectively for the curative and preventive test. The EO of *S. aromaticum* could be used for the formulation of a biopesticide for the protection of papayas against anthracnose and fusariosis.

### **Opportunities of farming insects for food and feed: a global overview**

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**P19**

In developing countries, the population growth implies real risks of exceeding the sustainable yield threshold of the ecosystem that is dependent on food, whether it is cropland, rangeland or fishery. Incidentally, Sub-Saharan Africa is the only region of the world where hunger is projected to worsen over the next two decades unless some drastic measures are taken to reverse food insecurity. The use of insects as food and feed therefore aligns perfectly within the context of sustainable diet. Insects as food and feed also emerge as a relevant issue due to the rising cost of animal protein, food and feed insecurity, environmental pressures and increasing demand for protein among the middle classes. Therefore, alternative solutions to conventional livestock and feed sources urgently need to be found. The consumption of insects, therefore contributes positively to the environment and to health and livelihoods. Until recently, insects were a seemingly inexhaustible resource obtainable by harvesting from nature. Some insect species, such as bees and silkworms, have a long history of domestication because of the value of their products. Insects are also reared in large numbers for the purposes of biological control (e.g. as predators and parasitoids), health (e.g. maggot therapy) and pollination. The concept of farming insects for food and feed is, however, relatively new; an example of rearing insects for human consumption in the tropics is cricket farming in Uganda and Democratic Republic of Congo. Recent high demand and consequent high prices for fishmeal/soy, is pushing new research into the development of insect protein for aquaculture and poultry. Insect-based feed products could have a similar market to fishmeal and soybeans, which are presently the major components used in feed formulae for aquaculture and livestock.

Key words: insects, protein, Farming, food security, feed business

### **Grain morphological characterization and protein content of some local rice varieties in Cameroon**

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**P43**



Rice is a staple food heavily consumed in Cameroon like in many developing countries. Locally cultivated rice is not readily available on local markets, though appreciated for its nutritive quality and good taste. This is partly due to low production and consumers' unawareness of the quality of local rice. The present study was aimed at unveiling the quality of some local rice cultivars. Sixty-eight cultivars were collected, and their grain size and shape characterized using IRRI's standard evaluation system. Cluster analysis separated these rice cultivars into eight groups. PCA evaluation of agro-morphological characters revealed that three of the principal components accounted for 74.4% of total variation. Based on this result eight of the cultivars (CMRGNd, CMRGDn, CMRGTi, CMRTBa, CMRDWb, CMRDTc3, CMRDTx5 and CMRDTx6) were selected for protein analysis by Bradford assay. Long size grains were predominant (42) over extra-long (16), medium (9) and short (1) grains. Slender shaped grains (36) were distinguished as well as medium (28) and bold (4) grains. Highest total protein content was observed in CMRGNd (14.3 %) and highest gluteline content in CMRGDn (10.1 mgEqvBSA/g DW). These results demonstrate the quality of Cameroon's locally cultivated rice and most specifically that of CMRGNd and CMRGDn germplasms for the development of fine nutritional rice. Pearson correlation of the different variables revealed no significant correlation between total protein content, gluteline content and the agro-morphological parameters studied, implying that none could be indicative of nutritional quality in terms of protein content.

Key words: Rice, agro-morphological properties, nutritional value, quality, Cameroon

**Bibliography synthesis of consumption of bush meat of two *Cephalophus* species of Cameroon and game-ranching perspective : *Cephalophus dorsalis* Gray, 1846 and *Cephalophus monticola* ou *Philantomba monticola* Thunberg, 1789.**

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**P44**

This study is the synthesis of 07 years of bush meat study. In 2011, we have analyzed bush meat channels in Mbam and Inoubou division and in 2012 we have looked bush meat problematic in Oku sub division. Between 2013 and 2014, we have worked on molecular biology technique like tools of identification of bush meat. In 2015, we have worked on feasibility of game ranching in Cameroon and since 2016 we work on phenotyping characterization of duikers. It has as global objective to contribute at the wild life sustainable management across to projection of game-ranching of *Cephalophus dorsalis* Gray, 1846 and *Cephalophus monticola* ou *Philantomba monticola* Thunberg, 1789 for the game meat production. The collect of information is based essentials documents indicated bush meat questions (engineer statements, master thesis and thesis). He results that, the mammals constitute class of animals more consumed with 86% of representatives in the urban markets. The carcass mass more representatives are that of duikers (39.82%) and of bush pig (33%). 909 kg of bush meat carcass have been measured and that, carcass of duikers represents 39.82% (23.76% of bay duikers; 12.54% of blue duikers). These results demonstrate that, the duiker's meats are preferable by the local population (35%). Duikers are the more producer of bush meat. But, this resource is treated by the poaching and demands their breeding in game-ranching for the sustainable production of game meat.

Key notes: duiker, game meat, game-ranching



**Molecular biology techniques as tools of traceability of bush meat: case of Peter's duiker (*Cephalophus callipygus* Peters, 1876) and of Bay duiker (*Cephalophus dorsalis* Gray, 1846)**

**FOKAM Miantzia Olivier**

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**P45**

This study was carried out during the period of June to July 2013 for the collection of the bush meat samples on one part, and on the other hand from October to December 2013, for its molecular analysis. The objective was to determine sequences of genes which code for the cytochrome C oxidase and to show how one can use them to trace animals. Methodologies used were the techniques of molecular biology based on the DNA barcoding. The results obtained indicate that: exploited species (*Cephalophus dorsalis*, *Cephalophus callipygus*) as bush meat were identified. Bay duiker presents the sub unit cytochrome C oxidase mitochondrion come from sequence 1 with 608 number and range to 129 to 608. It has a length of 655bp and 92% of similarity, with 1% of gaps. Peter's duiker presents the sub unit cytochrome C oxidase mitochondrion come from sequence 2 with 658 number and range to 12 to 672. It has a length of 663bp and 98% of similarity, with 0% of gaps. These tools have the positive impact on the wildlife management with the description of the new species, the clarification of existent species and the traceability of animals. But these techniques cannot substitute traditional taxonomy and phenotyping characterization which are current of execution on blue duiker and bay duiker for a game ranching perspective.

Key notes: molecular biology, DNA, traceability, wildlife

**INFLUENCE OF BIOCHAR ISSUED FROM CROP WASTES ON THE YIELD OF VARIETY 8034 CASSAVA (*Manihot esculenta* Crantz) IN TWO AGROECOLOGICAL ZONES OF CAMEROON**

**BILLA Samuel Fru**

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**P2**

Variety 8034 cassava is an important tuber crop cultivated by smallholder farmers to improve food security and income. Cultivation of the cassava is counteracted by declining soil fertility. Amongst organic managements, biochar is gaining interest for improving crop productivity. The overall objective was to evaluate the influence of three types of biochar on the growth and yield of cassava on ferruginous soil in two agroecological zones of Cameroon. The biochars were produced using an Elsa pyrolyser from locally available crop wastes; cassava stems, ricehusk and corncobs and applied at 20t/ha-1 on 2m<sup>2</sup> plots designed in a complete randomized block of four treatments with three replicates. Data collected were related to growth (height, stem girth and leaf area) and yield (tuber weight). Biochar, plant and soil quality were analysed using standard laboratory procedures. Data was analysed by ANOVA in SPSS vs. 17.0. Tukey test was used to separate means while linear regression was used to establish relationships between measured parameters. The results showed that growth and tuber yield of cassava in biochar amended plots were higher (25-40 tons/ha-1) in the Western highland than the 17-23 tons/ha-1 in the bimodal humid forest agroecological zone. The application of biochar improved soil fertility attributes as indicated by increase in SOM, CEC, pH and plant nutrients compared to the control. The maximum height, leaf area and best tuber yields were harvested from plots amended with Ricehusk biochar. Economic analysis showed that, farmers using ricehusk biochar

encured more profits with net benefits of 1.44 million fCFA and revenue return of 33.06 % compared to the control (583267 fCFA) and 12.33 %. The study concludes that biochar differentially increases cassava yields by supplying nutrients and improving soil properties in the agroecological zones of Cameroon. Therefore, to improve the yield of food crops, biochars produced from crop wastes could be the most suitable option.

Key words: Biochar; Cassava; Crop waste; Environment; Pyrolysis; Soil Conservation

## ENVIRONMENT

### Physicochemical quality of water and zooplanktonic biodiversity of Mfou municipal lake KENGNE TENKEU Janvier

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P16

A study aiming to evaluate the biodiversity and the structure of the zooplanktonic community in relationship to physicochemical quality of water was carried out from April to September 2016 in Mfou Lake, according to monthly sampling at the surface and depth.

The physicochemical analyses show that this lake is slightly acid, fairly oxygenated, weakly mineralized and present weak organic matter loads. The test t of Student shows that only nitrates vary significantly from the surface to the bottom. These characteristics classify Mfou Lake as mesotrophic.

The biological analyses show that the Lake is diversified with 42 zooplanktonic species represented by: 29 Rotifers species (69%), 3 Cladocera species (7%) and 10 Copepods species (24%). The total density was 2209 ind./L dominated by Rotifers (933 ind./L), Copepods (827 ind./L) and Cladocera (449 ind./L). The family of Brachionidae was the most abundant of Rotifers group with the species *Brachionus falcatus* (188 ind./L); The Moinidae family dominates in Cladocera with *Moina micrura* (344 ind./L) and the family of Cyclopidae with *Ectocyclops* sp. (77 ind./L) is most represented in Copepods. We however note a strong density of nauplii larvae (254 ind./L) and copépodites (280 ind./L).

The Shannon and Weaver index of diversity shows that the environment is diversify with a maximum of 4,26 bits/ind. in april and a minimal of 3,67 bits/ind. in august. Piéluou equitability index (0,76 ± 0,04) shows that there is a tendency to an equal distribution of zooplanktonic species. Kruskal-Wallis test shows significant variations (p < 0,000) of zooplanktonic densities and Mann Whitney test shows that the zooplanktonic densities obtained in June is significantly inferior (p < 0,000) with those obtained the other months.

This study showed that the Mfou lake located in suburban area undergoes few anthropic disturbances. But his future needs regular analysis for safeguard of this ecosystem.

Key words: Biodiversity, Mfou municipal lake, physicochemical, suburban area, Zooplankton.

**Assessment of the system of treatment of the solid biomedical waste in some sanitary formations of fourth, fifth and sixth categories in Cameroon.**

**MBOG MBOG Séverin**

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**P38**

To improve the healthiness of the hospitable environment to the profit of the populations, a survey on the management of the strong biomedical garbage (DBMS) has been led in the Sanitary Formations (FOSA) of some regions of Cameroon of the 1st to December 30, 2016. A questionnaire submitted to the persons responsible of the hospitals, chiefs of services, and supervisors of services and responsible of the hospitable hygiene and an interview with the staffs of care and the operators of incinerators permitted to appreciate the mechanisms and the knowledge on the management of the DBM. On the 150 distributed questionnaires, 98 answers have been gotten, either a rate of answer of 65,3%. To the level of every FOSA, the incinerators stopped functioning since 1993-2000. The problems of management of the DBMS have been observed to all levels. During the phase of collection, there is neither identification nor sorting. The trash cans are almost everywhere exposed. The maneuvers, for lack of to carry the trash cans on the back or the head, uses a rolling table. The garbage succeeds little in the open in a crevasse deep where they are burnt periodically to the free air. The collection, the storage and the transportation make themselves without any protective means (gloves, boots, masks, aprons, etc.). The essential determinants of this bad management would be the insufficiency of financial means and formation of the agents charged of the enticement, the staff's unconsciousness, and the use of practices non-standardized, for lack of program. Henceforth, The burying and or the improved artisanal incineration has been chosen like method of elimination of the DBMS in the present context of the categories concerned. A yearly program has been proposed in this sense. The strategies of approach are the formation and information, the incentive, the equipment, the supervision and the assessment. The execution of this program requires a budget of 5 423 454 CFA francs distributed between the formation (22%), the equipment (40%), the construction of the fosse/incinerator and the follow-up (38%). The tasks are distributed between a physician of public health, the persons responsible of units of care, and the agents appointed to the enticement and the elimination of the DBMS. The impact will be appreciated by the disappearance of the wild deposits thanks to the efficient elimination of all DBMS in the sanitary burying pit or artisanal incineration.

Keywords Biomedical Waste, Management, incineration · impacts, FOSA

**Prospects for sustainable solid waste Management in Yaoundé Urban Area**

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**P46**

The paradigm of waste management has from times immemorial been a major point of focus in urban areas and has remained current in the developmental history of many nations. In rural areas in most parts of the world, waste management is seldom discussed as the agrarian societal norms and behaviors of locals curb the accumulation of waste in the community. The story changes when we move to urban cities where waste production increases with population growth. With the management of waste depending mostly on the efforts of the municipality, waste resources suffer from poor management with the entire management cycle reduced to waste collection, transportation and disposal and only a minute portion of waste recycled.

Studies have shown that the poor behavior of people, inactive administrative policies, poor collection methods, little or no recycling, cost among others account for the deplorable municipal waste management in the Yaoundé urban area. However, the sustainable management of municipal waste can generate income, create jobs, improve health, and is environmentally friendly. This paper examines the current management and presents the opportunities for sustainable solid waste management in the Yaoundé urban area with best practices from successful countries all over the world.

## ENERGY & WATER

### Feasibility Studies and Optimization of photovoltaic installation for Deuk town electrification in the Mbam-and-Inoublu

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**P12**

The isolated zone Deuk eat only in electrogen group, in Cameroun where the sustainable use of solar technologies is policyholder by the study pilot's projects who omit the study of the solar stations sustainable building. The objective here is the studies of complete detailed feasibility then to optimizer the solutions, for the admission support that the optimization of advantage owing at the photovoltaic installation require a availability of dwelling and appropriate soil type at Deuk. Simulation model: Matlab is used to simulate the results of the multi-criterion optimization. Excel exploited to simulate the statistical curves, the profitability of energy saving's, and the variations of solar irradiation of Deuk. PVGIS used to simulate the monthly global solar irradiation and daily average data respectively. The contributions of these works indicate the types of soils that can shelter solar installations and building's types at 95%. Certain results simulated show the richness at 90% of favorable natural factors. The alternative to fossil fuels provides an economic cost of 25% and the choose to orientate Deuk's electric usage to the consumption and economic activities produces optimum profitability with the optimal investments confirmed by 70% of obtained connection rate, by the management best and the structural energetic mix talked. In the end, at energetics specific problems, the Net Present Value(NPV) method give the results of financial profitability criterion, so that the CER method generate the benefit of the economic saving profitability criterion and unblock an optimal; sustainable results, and these benefits are tools excellent essential at the success and sustainable carrying out of the civil and industrial energetic work big.

**Key Words:** feasibility, design, optimization, CER, dimensioning

### Sustainable community water supply in rural area in Cameroon: a novel strategy for potable water points maintenance

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P13

The purpose of this work was to contribute to the improvement of maintenance with a view sustaining the community water supply. More precisely, to analyze the state of services of the source works (wells and boreholes); to examine the current management and maintenance mode and propose a new strategy to ensure safe drinking water supply in rural areas. In the old system, the water points were managed by management committees while the mobilization of the funds was done by users in monthly payment. At this junction, the contributions were insufficient for the repair of the breakdowns, and long duration of repair of breakdowns occurred. Conflicts needed good management between users and management committees. In the new strategy, water points are managed by an operator (company), the payment method is associated to the water volume payment. The price of water takes into account, all the operating expenses (the maintenance-repair of all drilling works (including heavy maintenance-repair costs), remuneration of the water point manager and other services related to the water service, miscellaneous and unforeseen costs. This new strategy includes preventive and curative maintenance, rapid and effective intervention of maintenance workers. The results obtained in Okola, Cameroon revealed that 50% of these structures are not functional, 57% of the water points do not have management committee, and 42% of them are not trained. The expected financial contribution is 180 000FCFA / year / water point, but in the new strategy the financial contribution targeted is 401 500FCFA / year / point water and covering all operating expenses.

#### **Manufacture and test of a mini hydro turbine**

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P15

Due to the fight against global warming, the Governments have signed several protocols, including most recently the COP21 in Paris and the COP22 in Marrakech, aimed at reducing the emissions of green house gas in the atmosphere by the developing renewable energy (solar, wind, biomass, hydroelectricity etc.). In Cameroon energy supply, we have a huge energy deficit. The total capacity of all energy supply in Cameroon is around 1000 MW while the hydroelectrical potential is estimated at 20 000 MW. According to the Rural Electrification Agency of Cameroon, it turns that more of 14 000 localities don't have electricity. According to the informations concerning the per capita GDP, it would be preferable to opt for hydroelectricity because it is abundant, and its cost is more interesting than other renewable energy system. From the social point of view, that energy help to create the job and from the environmental point of view, it is a clean energy (no emission of carbon gas). For the emergence of Cameroun by 2035, we must be able to manufacture and produce green energy technologies based on the potential resources of energy that Cameroon has. As the result, the priority is hydroelectric energy supply. The solution for the isolated rural areas is to use the local resource of energy (river with small slope, waterfall etc) for the production of decentralised supply of energy. According to the law of electricity in 2011 and 2014, this sector is profitable for the independent producers because there is no reglementation for the energy supply with capacity less than 100 KW. In that contest, our applied and technological research aims to manufacture micro hydro turbines which can generate 500 to 1000 W energy, 24 hours for 24 hours for the households and territorial communities.



**Assessing the Performances and Strategy of Improvement of the Water Distribution Network of the Urban Environment of Ebolowa, Cameroun**

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**P17**

This study conducted in urban area of Ebolowa, Cameroon focuses on the diagnosis of structures and equipment of drinking water supply. The main objective of this work was to develop tools and methods for the reduction of water losses in the Ebolowa City water network in order to improve its performance. It was a question of making the inventory of the current works and equipments of production, to assess the leaks in the network, and to suggest solutions necessary to the improvement of this water distribution system. Therefore, the interviews with the leaders of water company (formally Camerounaise Des Eaux) and those of the technical service of PFEIFFER, the field observations, consultation and analysis of the company's database were used. The main results revealed that the overall network performance (77%) was considered ineligible, as it was less than 80%, reflecting the intensity of the losses in the network. The average Linear Loss Index (LLI) was 14.2 m<sup>3</sup> / Km / day classified as "bad" in terms of network performance. The financial consequences of these losses were estimated at 17,389,120 FCFA as a decrease in monthly revenues. Estimates of population water requirements revealed that in 2020 and 2035 Ebolowa populations would need 8471 m<sup>3</sup> / day and 15255 m<sup>3</sup> / day respectively. The current water production which rises to 4800 m<sup>3</sup> / day cannot meet these needs. Given the ongoing re-bonding, from 2020 to 2035, projected water requirements show a deficit of 3671 m<sup>3</sup> / day for 2020 and 10455 m<sup>3</sup> / day for 2035 to catch up. In view of the foregoing, it appears that the water losses of the Ebolowa network are important, the device implemented as part of the rehabilitation of the network will hardly cover the water needs of the population by the year the project expires in 2025 and beyond in 2035. It would be prudent for the public authorities through its competent administrations (MINEE and MINFI) and and the actual water company (CAMWATER), to take anticipatory measures that would allow the establishment of a backup system for the 2035 horizon.

**Development and Environment: The case of the management of Forest in Cameroon**

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**P47**

Introducing the problematic of economic development in the light of environmental sustainability, we look at the management of forest in Cameroun. Our analysis focusses on presenting the state of forest management in Cameroun while building the basis of an economic development that account for the concerns of environmental sustainability in the context a developing country such as Cameroon. In addition, we attempt to highlight the participation of each scientific domain in the debate on environmental sustainability



**Downscaling the conventional iron barrier technology to safe drinking water**

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**P14**

Fe<sub>0</sub> filters have been demonstrated to be efficient for the removal of both microbial and chemical contaminations. Due to the volumetric expansive nature of iron corrosion, the inter-granular space (pore space or porosity) is gradually filled with precipitated iron corrosion products. Eventually this might lead to a clogged system (porosity and permeability loss). Permeability loss is the main negative factor on the sustainability of Fe<sub>0</sub> filters. Metallic iron-based filters (or Fe<sub>0</sub> filters) have a great potential for decentralized safe drinking water provision. However, the whole effort to estimate the long-term performance of Fe<sub>0</sub> filters should be reconsidered since the whole literature on metallic iron (Fe<sub>0</sub>) for water treatment is based on the false premise that Fe<sub>0</sub> is a reducing agent. Accordingly, Fe<sub>0</sub> oxidation by water has been wrongly considered as a side reaction. This work deals with the filtration of aqueous contaminant in a Fe<sub>0</sub> scale down permeable reactive barrier consisting of iron particles mixed with sand particles. PRB technology is well known as a promising environmental remediation technology which media are mainly zero valent iron (ZVI), organoclays, natural zeolites etc. Here, the rate of flow, porosity loss and concentration of contaminant at the exit of the barrier are obtained using respectively the Darcy law, our model of porosity loss developed and the equation of solute transport in the iron barrier. Effects of the proportion of iron particles on the contaminant removal efficiency and the life service of the barrier are analyzed.

Keywords: Iron wall, Permeability loss; Volumetric expansion; Water treatment; Zero-valent iron.

**FUNDAMENTALS PHYSICS GOVERNING HEAT TRANSFER IN IMPROVE BIOMASS STOVE**

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**P10**

Today, over 2 billion people cook badly on slow, inefficient wood stove that waste wood, cause health problems and destroy our forests. It was reported by the world health organization, moreover, that indoor pollution caused by too much smoke emission in the traditional burning wood and biomass stoves results in about 1.6 million deaths per year in developing countries due to chronic respiratory diseases. Electricity and gas are preferred for cooking, when they can be obtained. However, they are costly, contribute to global warming, and depend on having a suitable infrastructure often not available in developing countries.

Gasifying biomass was found to be a good alternative to provide households with low-cost but clean source of energy for cooking. By limiting the amount of air used in burning woods, combustible gas that is rich in carbon dioxide and hydrogen are produced which is almost similar to liquefied petroleum gas fuel in terms of physical characteristics. Several studies revealed a biomass-stove that operates on gasification has low particles as well as CO<sub>2</sub> emission.

The aim of this work is to use the principles of modern engineering heat transfer to design the wood gas-stove using local materials. In the first part of the work we have established, use the

thermochemicals equations the wood-gas components and composition after the gasification process. The gasification efficiency is established to be more than 70 %. In the second part, we have established the heat transfer efficiency, the convective and radiative heat transfer are established to be 52% and 7% respectively. The stove efficiency established to be 37 %. So the wood gas-stove efficiency is more than the traditional stove efficiency which is less than 10 %.

Keys words: modeling, gasification, biomass, stove, efficiency.

## SPECIFIC TALK

### **Society, education and technology: the nexus**

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**P39**

The word society is often used to describe a group of people or interaction between friendly parties and is classified according to the degree to which these parties have unequal access to resources, prestige, or power. With industrialization and globalization, the degree of inequality developed among society members has been used as a tool to categorize these societies into three (pre-industrial, industrial, and post-industrial). This categorization which was initially based on the level of technology and method of food production achieved by each group is now more influenced by information, services, and high technology. Societies have recently witnessed great transformation, due to the information revolution technology which has also affected the market strategies and policies. The development of this technology depends on the society cultural abilities to pursue information change through teaching, training, or research. This establishes the nexus between the society, education and technology.

### **Restructurings the state-owned companies in Cameroon: Proposal of Strategic plan of standard a stake at CAMAIR-Co.**

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**P48**

Since 1980 open the era new of economic activities in network sometimes. They were very sustained by the success of the Porter's competitive advantage theory: free-exchange zone, privatization and concurrence. At this condition, the frontier between public and private companies, between public and private sector, was became uncertainty well and the restructurings become common in the public

sector especially the state-owned company, caused by the crisis and public debt. In front of these important vices, certain African countries were owing to integrate this competition of market without previous preparation of standard a stake of their enterprises at the exempt of CAMAIR-Co a lot of times immobilized and drove by the financial and structural problems six years after inauguration himself in 2011 but was happy at the contribution of the clean funds and at the steam remobilization, since 2011 without solutions. This oppressive reality motive the choses the theoretical objective to circumscribe the limits the state-owned company relative at the low n°2013/ 010 and the low n°2017/011 so that the AUPC (Collective Process Uniform Acts) of OHADA, and qualitative empiric objective to establish the blockings causes of the CAMAIR-Co airlines in the air transport. The favorite method is first theoretical identified at the analysis of origin concept object and rest empiric at the analysis tools (diagnostic of company in difficulty: global, financial, economic, commercial and marketing function, production function, government and social function) next deep at the strategic analysis tools of recovery in end by the Porter model (PESTEL, five strengths and values chain) to unblock at a strategic plan. For the contributions: the receiver exploitation the classic, low-cost and charter all airmail by two different directions of domestic and international lines then the receiver strategies: recent rage, partnership especially flexibility and CSR (Corporate Social Responsibility) sustained by the Cameron and Moulin restructurings sense under Ramus criterion. All things considered, by report at transfer of techniques of Boeing, the provisional strategic plan suggest the strategic important of first plan at the transfer of technologies with integrated optimal development itself, at the strategic direction called research-sustainable development for the optimization the Ramus's criterion, the strategies of communication, commercial and of marketing in the objective of sustainable success of the competitively, of the efficiency organization and the productivity in the commercial air transport African at least.

**Keys words:** economic restructuring, state-owned company in difficulty, air transport, standard a stake, strategic plan, CAMAIR-Co.



