COAT OF ARMS MSN LOGO

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+ Text in the body can take up a different font size
+ Font style should be uniform for both titles and in-body text
+Line spacing needs to be unified throughout the document

NATIONAL ANTHEM

Arise, O compatriots
Nigeria's call obey
To serve our fatherland
With love and strength and faith
The labour of our heroes past
Shall never be in vain
To serve with heart and might
One nation bound in freedom
Peace and unity.

Oh God of creation
Direct our noble cause
Guide our leaders right
Help our youth the truth to know
In love and honesty to grow
And live in just and true
Great lofty heights attain
To build a nation where peace
And justice shall reign

THE NATIONAL PLEDGE

I pledge to Nigeria my country
To be faithful, loyal and honest
To serve Nigeria with all my strength
To defend her unity, and uphold her honour and glory
So help me God.

FIIRO LOGO

PRESIDENT BUHARI PICTURE

GOVERNOR AMBODE PICTURE

FIIRO DG PICTURE

Vision
To mitigate mycotoxin contamination in human and animal, foods and feed chains and ensure that the quality of our foods/feeds meet globally recommended standards

Mission
The Mycotoxicology Society of Nigeria seeks to improve the living conditions of mankind through increased support and promotion of mycotoxin research in Nigeria

The Mycotoxicology Society of Nigeria (MSN) is a body of scientists in the academia, industry, government and non-governmental organizations, farmers and other stakeholders in the food and feed sectors in Nigeria. The body was established based on the need to reduce and prevent the harmful effects of mycotoxin contamination in food and feeds.

MSN is a non-governmental, non-political and non-profit-making scientific organization founded in 2006. MSN seeks to improve the health of humans and animals through the promotion of safe food, feeds and environment with respect to mycotoxins.

The Society creates awareness, conducts advocacy and strategic behavioural communication workshops, seminars and symposia, as well as publishing information on research findings that relate to mycotoxins in Nigeria, so that such information could be applied for the resolution of mycotoxin problems and the preservation of plants, animals and aquatic resources and their products.

The dangers inherent in the consumption of mycotoxin-contaminated meals, which may include kidney/liver disorders and immune-suppressions, have been scientifically proven and are being made available to the general populace who are not aware and also economically-challenged.

Contact:

MSN Secretariat:
Mycotoxin Laboratory, Central Laboratory Complex.
NAFDAC
Oshodi, P M B 21482 Ikeja
Lagos, Nigeria
Telephone: +234(0) 8135613698
+234(0) 8036277090
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Email: info@ngmycotoxin.org

HISTORY OF MYCOTOXICOLOGY SOCIETY OF NIGERIA

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+ number/location of conferences till date

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The National Agency for Food and Drug Administration and Control (NAFDAC), in conjunction with the International Atomic Energy Agency (IAEA) organized the First Regional Workshop on Mycotoxins in 2005. The workshop drew participants from Nigeria and other West African countries like Ghana and Benin Republic. Resource persons and materials were from the FDA, IAEA, IITA and some national sources. The gathering properly placed the dangers arising from mycotoxin contamination in food and feed in Nigeria as well as the global trade and health implications.

The need to immediately step up efforts in research and awareness on mycotoxins was realized. Meetings were held and contacts were made until an inaugural meeting was held on 16 January, 2006 at Babcock University, Ilishan Remo, where Dr Ranajit Bandhyophadyay of IITA, Ibadan who is also a founding member of the International Society for Mycotoxicology (ISM) briefed participants on the mycotoxin situation at the global level.

The following institutions were represented at the meeting: Babcock University, Ilishan Remo; University of Agriculture, Abeokuta; University of Ibadan; Standards Organisation of Nigeria; Plant Quarantine Services, Ibadan; Brooderhouse Limited; Animal Care Konsults; Federal Institute of Industrial Research, Oshodi, Lagos; Olabisi Onabanjo University, Ago-Iwoye; and Winelight Analytical Instruments, Lagos, a company that contributed financially to the successful hosting of the meeting. Some local food processors were invited and educated on the need for proper hygiene in storage and processing of food items and the event was covered by the Press.

This meeting gave birth to NMASN and Dr Stephen Fapohunda of Babcock University, Ilishan Remo was elected as the founding President. The National Agency for Food and Drug Administration and Control (NAFDAC) graciously volunteered to host the secretariat.

The first annual conference of the network was held the same year at IITA and issues like membership, focus and relationship with cognate bodies at national and international levels were addressed. Scientific papers were also presented at the conference.

MEMBERSHIP

Membership is open to graduates of Mycology, Toxicology, Biochemistry, Agriculture, Microbiology, Animal Science, Food Science, Chemistry, Plant Pathology, Veterinary and Human medicine and related discipline in the Academia, Industry, Research Institutes, Government Ministries and Agencies.

Membership categories:

- Fellow
- Corporate / Institutional
- Individual
- Student

MEMBERSHIP FEES

Fellow	20,000
Corporate / Institutional	120,000
Individual	5,000
Student	2,000

Membership annual dues can be paid to the Society account number: 1771192289, Skye Bank.

TRUSTEES OF MYCOTOXICOLOGY SOCIETY OF NIGERIA (MSN)

PICTURES

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PRESIDENTIAL ADDRESS

THE 12TH ANNUAL CONFERENCE AND WORKSHOP OF THE MYCOTOXICOLOGY SOCIETY OF NIGERIA (MYCOTOXSON), 1ST – 3RD NOVEMBER 2017.

His Excellency; Mr. Akinwumi Ambode
The Executive governor of Lagos State,
Honourable Commissioner for Agriculture, Lagos State: Mr Oluwatoyin Suarana
Professor (Mrs.) Gloria Elemo, Director General, Federal Institute of Industrial Research
Our Guest Lecturer: Prof H. A. Makun, FUT Minna
Captains of Regulatory Agencies,
Representatives of Various Industries,
Distinguished Academics and Professionals,
Farmers and Market Women,
Gentlemen of the Press,
Ladies and Gentlemen.

I welcome you all to the 12th Annual Conference and Workshop of the Mycotoxicology Society of Nigeria tagged "Lagos", 2017; with the theme "Mycotoxins in Agricultural Commodities: Implications on Food/Feed Safety and Trade in sub-Saharan Africa."
The Mycotoxicology Society of Nigeria (MSN), founded in 2006 creates awareness conducts advocacy and strategic behavioural communication workshops, seminars and symposia, on mycotoxins and improve the health of humans and animals through the promotion of safe food, feeds and environment with respect to mycotoxins. MSN also publishes information on research findings that relate to mycotoxins in Nigeria, so that such information could be applied for the resolution of mycotoxin problems and the preservation of plants, animals and aquatic resources and their products.
The dangers inherent in the consumption of mycotoxin-contaminated meals which may include kidney/liver disorders and immune-suppressions have been scientifically proven and are being made available to the general populace who are not aware and also economically-challenged.

In 2013, some members of the Society wrote a chapter in the book – Mycotoxins and Food Safety in Developing Countries, published by INTEC publishers, Croatia. This particular chapter titled, "Fungal and Mycotoxin Contamination of Nigerian Foods and Feeds" had been downloaded more than 500 times. The top downloads of the paper were from Nigeria, United States of America, Vietnam, United Kingdom and India (http://www.intechopen.com/account/login).

The importance of mycotoxins in our agricultural products and their attendant implications on the safety of foods and feeds, trade and health cannot be over emphasized. Foods and feeds sold in our open markets are neither regulated nor traceable. This has made the zero reject program of the Federal government an uphill task. Recently The NAFDAC team in Kaduna carried out a survey on "kulikuli" sold within Kaduna metropolis and the result indicated that most of the groundnuts used for "kulikuli" are from the rejected mouldy groundnuts. Currently the World Food Project is operating a system whereby foods to be given in IDP camps are tested for quality and contaminants including aflatoxins before shipment. Can we learn from them? The need for ministries, agencies, regulators and farmers

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to work together to achieve a Society where food and feed are safe, are of good quality and can be sold locally and internationally cannot be over emphasized. I therefore appeal to all stakeholders including our political leaders worldwide to grant the same global attention given to HIV/AIDS in terms of massive education, political support and wide spread sensitization, to mycotoxins in order to ensure availability of safer food and reduction of deaths associated with the disease related to mycotoxin consumption. I employ our researchers to regularly patronize our Journal-MYCOTOXICOLOGY. All editions of the journal are available on the Society's website for downloading.

We thank God for the increased patronage and visibility of the Society in both National and World affairs and pray for increased frequency in the coming years. Members of MSN have various research linkages with industry and the technical community across the globe, I encourage us to utilize this opportunities to promote mycotoxin research in Nigeria. In Nigeria, MSN is currently represented at the PACA Technical Committee, National Food Safety Committee and IITA Steering Committee on Aflasafe.

I urge our members to update their personal details with the Public Relations Officer Mr. Daniel Apeh and to visit our social channel groups regularly for information on trainings, conferences, workshops and scientific collaborations and visits.

We appreciate the efforts of our Chief Host, Dr. Mrs. Elemo, the Director General FIIRO, who inspite of the lean resources at her disposal accepted to host this Conference. We are also extremely grateful to Chromogene and Steve Nicholas (Nig) Ltd. for their continual patronage. Our thanks also go to the Guest Lecturer, Prof H.A. Makun, the Society decided to look inward for a member in good standing to deliver the keynote address this year and other worthy members will be featured subsequently.

I congratulate all of us once again for this year's outing and wish you all a happy deliberation.
Folasade Bosede Oluwabamiwo (Ph.D.)
President, MSN
1st November, 2017.

12th ANNUAL CONFERENCE OF THE MYCOTOXICOLOGY SOCIETY OF NIGERIA (MSN)

"LAGOS 2017"

PROGRAMME OF EVENTS

DATE 1ST – 3RD NOVEMBER 2017

VENUE: FIIRO, OSHODI, LAGOS

Day: 1

VENUE:	**Akinrele Auditorium**
9.00 – 9.45	Arrival and Registration
9.45 – 10.00	Introductions
10.0 – 10.05	National Anthem
10.05 – 10.10	Welcome address by the President (MSN) Dr. (Mrs.) B. F. Oluwabamiwo
10.10 – 10.20	Chairman's Speech: Professor Afolabi Oluwadun
10.20 – 10.30	Welcome address by the DG. FIIRO Prof. (Mrs.) G. Elemo
10.30 – 10.50	Goodwill messages: Guest of Honour and other invited guests
10.50 – 10.55	Vote of thanks: LOC Chairman
10.55 – 11.00	Group photograph
11.00 – 11.20	TEA BREAK
11.20 – 1.05	Chair Prof. Stephen Fapohunda
11.20 – 11.25	Citation on the guest lecturer Professor Hussaini Makun by Dr. Isaac M. Ogara
11.25 – 12.00	Guest lecture Titled: "Improving Public Health and Trade through Mycotoxin Control"
12.00 – 12.25	Interaction
12.25 – 12.45	Induction of the D.G. FIIRO: Prof. Mrs G. Elemo

12.45 – 1.05	Interaction with members of WACUSAN (Dr. K. A. Arowora & Dr. A. Oyebanji)
1.05 – 2.05	LUNCH BREAK
SEESION 1	
Chairman:	Prof. Olusegun Atanda
TIME:	2.05 – 2.55
2.05 – 2.15	PACA's Experience on Aflatoxin Mitigation and Management in Nigeria
	PACA Country Officer Mrs. Stella Denloye
2.15 – 2.35	Food Safety challenges of "Kulikuli" sold in Kaduna Metropolis: Oluwabamiwo B. F., Nden E. and Abdulahi M.
2.35 – 2.45	Proximate Composition and Total Aflatoxin Content of some Selected Grain Crops in Selected States in Nigeria: Arowora K. A., Oluwabamiwo B. F., Imo C. and Eneji V. O.
2.45 – 2.55	Evaluation of Different Fertilizer sources for the Management of Aflatoxin Contamination in Groundnut in the Southern Guinea Savanah Agro Ecological Zone of Nigeria: Eche C. O. , Vali M. B., Ekefan E. J.., Ajeigbe H. A. and Ocholi F. A.
Chairman:	Dr. A. Oyebaniji
TIME:	2.55 – 3.25
2.55 – 3.05	
	Assessment of Aflatoxin Occurrence in Food Materials from South Eastern Nigeria: Anukwoji C. A. and Okigbo R. N.
3.05 -3.15	Determination of Co-Occurrence of Aflatoxins, Ochratoxin A, Fumonisin and Deoxynivalenone in Sorghum from Selected Markets in Lagos. Imafidon T. F., Irurhe O.O., Oluwadun A.O.

3.15 – 3.25	Automation of Statistical Reports of Mycotoxins of Agricutural Products in Sub-Saharan Africa: C.E. Chibudike, A.F. Orji, Obinor I.P and H.O. Chibudike , Olakunle J.O
3.25 – 3.35	A Comparative Assessment of Aflatoxin Detoxification in Tiger Nut and Date Fruit Using Citrus Juices: Peter, F. A., Ekwumemgbo P. A. and Omoniyi K. I.
3.35 – 3.45	Mycotoxins and fungal metabolites in Groundnut- and maize-based Street vended snacks in Nigeria: Kayode O.F., Fapohunda S.O., Sulyok. M., Ezekiel. C.N., Krska R.,& Oguntona C.R.B.
3.45 – 6.00	Workshop/ Tour of Exhibition stands: Dr. Ewuola
6.00 -7.00	Cocktail Party

DAY 2	Chair: Dr. K. A. Arowora
TIME:	9.00 – 9.40
9.00 -9.10	Fungi and Total Aflatoxin associated with Egusi Melon *Citrullus Lanatus* (Thumb) Matsum and Nakai, Seeds Sold in Some Markets in Nasarawa State, Nigeria: Isaac M. Ogara, Bosede F. Oluwabamiwo, Ezekiel A. Bulus
9.10 – 9.20	Effect of Fermentation on the Characteristics & Reduction of Deoxynivalenol and Zearalenone in Sorghum and Millet from some Selected States of Nigeria: Ayoade, A. F., Oladiti, A. T. & Aroyeun, S. O.
9.20 – 9.30	Co-Occurence of Fumonisin, Aflatoxin and Ochratoxin In Rice (*Oryza Glaberrima*) Grown in Niger State, Nigeria: Ifeonu, S.C., Makun, H.A., Adefolalu, F.S. & Apeh D. O.

9.30 – 9.40	Ochratoxin and Fumonisin Contamination of Six Staple Foods From Niger State, Nigeria: Imienwanrin, M.R., Makun, H. A., Muhammad, H. L., Apeh, D.O., Muhammad, H.K., & Salubuyi, S.B.
	Chair: Dr. D. Abba
TIME:	9.40 – 10.00
9.40 – 9.50	Fungal and Bacterial Metabolites Contamination of Cocoa Beans in Three Agro Ecological Zones of Nigeria: Aroyeun S.O., Michael Sulyok and Rudolf Kriska
9.50 – 10.00	Occurrence of Aflatoxin and Fumonisin in Six Staples in Niger State, Nigeria Stephen, M.A., Makun, H.A., Adefolalu, F.S., Muhammad, H.K., Apeh, D.O., Salubuyi, S.B.
10.00 – 10.30	Breakfast
10.30 – 11.30	AGM
11.30 – 1.30	Simultaneous Laboratory Sessions Groups 1-3
1.30 – 2.30	Lunch Break
2.30 -4.00	Groups interchange
	Coordinators: Dr. C. N. Ezekiel, Dr. S. Aroyeun & Mrs. T. Imafidon
	Workshop Topics: Group 1 ELISA Rbiopharm
	Group 2: Determination of Aflatoxins using Diode Array detector (FIIRO), Dr. O. F. Kayode *et.al*
	Group 3: Determination of Aflatoxins B1, B2, G1 and G2 using Fluorescence Detector with post column derivartization (NAFDAC) Mrs T. G. Adebiyi *et.al*
Day 3	Chair Mrs. M. Eshiet
TIME:	8.00 – 11.00

	Workshop continues
11.00 – 12.00	Comparison and Discussion of Results obtained using Methods 1, 2 and 3
12.00 – 1.00	Certificate Presentation

CO-OCCURENCE OF FUMONISIN, AFLATOXIN AND OCHRATOXIN IN RICE (*Oryza glaberrima*) GROWN IN NIGER STATE, NIGERIA

Ifeonu S.C.*[1,2], Makun H.A.[2], Adefolalu F.S.[2] and Apeh D.O.[3]

[1]Department of Biochemistry, Bingham University, Karu, Nasarawa State.
[2]Department of Biochemistry, Federal University of Technology, Minna, Niger State.

[3]Department of Biosciences, Salem University Lokoja, Kogi State.
* Corresponding Author's email: chiamaka.onyedum@binghamuni.edu.ng

ABSTRACT

Mycotoxins are natural contaminants of cereals and other food commodities throughout the world and they significantly impact human and animal health. Cereals are often the most severely affected crops by mycotoxins, and because cereals are a staple food for a large portion of humanity, mycotoxins are the most prevalent source of food-related health risk in field crops. Though some food and food products are often contaminated by numerous mycotoxins, most studies in Nigeria are focused on the occurrence of a single mycotoxin. This work surveyed the multi-occurrence of mycotoxins and determined the total fumonisin, aflatoxin and ochratoxin in rice grown in Niger state, Nigeria. To achieve this, a total of 45 rice samples were sampled from market and storage in the four microclimatic zones of Niger state, and the total fumonisin, aflatoxin, and ochratoxin levels were determined using the enzyme-linked immunosorbent assay (ELISA) method. This study showed occurrence of fumonisin, aflatoxin and ochratoxin in rice grown in Niger state. Aflatoxin was detected in all the samples, at a total concentration within 2.1 – 248.2 µg/kg, fumonisin was found in 66.66% of the samples, also at a high concentration within 10 – 520 µg/kg and ochratoxin in 37.83% of the samples within 3.5 – 16.9µg/kg. Aflatoxin occurrence was climate dependent, its concentration increased from the Wettest zone (I) to Driest zone (IV). Fumonisin contamination also occurred in all the microclimatic zones with Dry zone (III) having the highest mean value of 208.95 ± 258.75 (µg/kg) and Driest zone (IV) appeared lowest with a mean value of 43.75 ± 23.87 (µg/kg). However, ochratoxin occurred only in Dry zone (III) and Driest zone (IV) with mean values of 4.625 ± 1.187(µg/kg) and 11.08 ± 6.190(µg/kg) respectively. All fumonisin contaminations were below the recommended safe limit, while 86% of aflatoxin and 24% of ochratoxin contaminated samples were above safe limit. Also, fumonisin, aflatoxin and ochratoxin simultaneously occurred in 24.32% of the samples, while aflatoxin and fumonisin, ochratoxin and fumonisin, and ochratoxin and aflatoxin co-occurred in 64.86%, 24.32% and 37.88% of the samples respectively.The high aflatoxin and ochratoxin levels as found in rice in this study are regarded as unsafe, and multi-occurrences of mycotoxins in the rice samples with possible additive or synergistic toxic effects in consumers raise concern with respect to public health.

Keywords: Rice, Fumonisin, Aflatoxin, Ochratoxin, ELISA

PROXIMATE COMPOSITION AND TOTAL AFLATOXIN CONTENT OF SOME SELECTED GRAIN CROPS IN SELECTED STATES IN NIGERIA

Kayode A. Arowora[1], Bosede F. Oluwabamiwo[2] C. Imo[1] and Victor O. Eneji[1]

[1]Department of Biochemistry, Faculty of Pure and applied Sciences, Federal University Wukari, Taraba State.
[2]National Agency for Food and Drug Administration and Control, Kaduna area laboratory.
Corresponding author:aroworak2002@gmail.com

ABSTRACT

This study evaluated the proximate composition and total aflatoxins in some selected grain crops in selected states of Nigeria. This research work was concerned with the nutritional composition of maize, rice, groundnut and acha. Rice samples were procured from vandeikya local government of Benue state, while other samples were purchased from wukari market in Taraba state, Nigeria. Proximate compositions of the samples were determined by Standard methods of Association of Official Analytical Chemists (AOAC), while total aflatoxin levels were carried out using the method of Enzyme Linked Immunosorbent Assay (ELISA). Gross energy composition was theoretically determined. The mean moisture content determined for the samples were within safe level with the range (9.00-10.25%), while the following ranges were determined for the following parameters: crude protein (7.58-25.83%), crude fibre (0.26-5.41%), ether extract (0.18-49.205%), ash (0.49-2.84%), nitrogen free extract (17.66-88.36%). Gross energy compositions of the crops were between 395.40 and 614.01 Kcal/100g. This study revealed the variation in nutritional composition of grain crops analysed. Aflatoxins were not detected in the clean grain crops analysed with the exception of acha that had 0.5µg/kg which is below current EU maximum levels of 4µg/kg for ready-to-eat products.

Keywords: Grain crops, proximate composition, total aflatoxins, ELISA

EVALUATION OF DIFFERENT FERTILIZER SOURCES FOR THE MANAGEMENT OF AFLATOXIN CONTAMINATION IN GROUNDNUT IN THE SOUTHERN GUINEA SAVANNAH AGRO-ECOLOGICAL ZONE OF NIGERIA

Eche C.O.[1], Vabi M.B.[2], Ekefan E.J.[1] Ajeigbe H.A. [2] and Ocholi F.A.[1]

[1]Plant Pathology Research Group, Department of Crop and Environmental Protection, Federal University of Agriculture, Makurdi, Benue State, Nigeria
[2]International Crops Research Institute for the Semi-Arid Tropics, Kano, Kano State, Nigeria.
Correspondence: elqris@gmail.com

ABSTRACT

Field experiments were conducted during 2016 and 2017 cropping seasons at the Teaching and Research Farms, Federal University of Agriculture, Makurdi, Nigeria to evaluate the effects various combinations of Farmyard Manure (FYM), Gypsum, Single superphosphate (SSP) and NPK fertilizers applied at recommended rates on aflatoxin (AFB_1) contamination and yield of groundnut. A total of 11 treatments were evaluated and included; FYM, Gypsum, SSP, NPK, FYM+Gypsum, FYM+SSP, FYM+NPK, Gypsum+SSP, Gypsum+NPK, SSP+NPK and Control. The experiments were laid-out in Randomized Complete Block Design (RCBD) with four replications. Enzyme Linked Immunosorbent Assay (ELISA) method was used to detect and quantify aflatoxin loads. Data collected included Plant Height and Number of Branches at 4, 8 and 12 weeks after planting, Number of Days to 50 % Flowering and Yield (Fresh Pod, Dry Pod, and Haulms) and 100 Seed weight/plot. Data were subjected to Analysis of Variance and statistically significant differences were reported at $p < 0.05$ using Fisher's Least Significant Difference. Findings from the study showed that the level of AFB_1 contamination of groundnut by AFB_1 was higher in 2017 compared to 2016. In both years however, plants grown in plots treated with FYM had the highest concentration of AFB_1 (21.2 µg/kg and 30.3 µg/kg) representing 28.4% and 32.1% increase over the control plots in 2016 and 2017, respectively. When FYM was combined with SSP, NPK and gypsum, AFB_1 concentration was reduced by 18.4%, 26.5% and 50.3%, respectively in 2017. These same trends were obtained in 2016. Application of only gypsum consistently reduced concentration levels of AFB_1 the most. Contamination in groundnut grown on plots treated with only gypsum was reduced from 15.17 µg/kg and 20.57 µg/kg in the untreated plots in 2016 and 2017 respectively, to 3.76 µg/kg and 5.7 µg/kg representing over 70% reduction in both years. Although the use of FYM+NPK resulted in taller plants and higher haulm yield and SSP+NPK resulted in the highest pod yield, both were accompanied by higher levels of AFB_1 concentrations in groundnut samples. The study concludes that the use of FYM should be discouraged in the cultivation of groundnut. Rather Gypsum+SSP or Gypsum+NPK should be promoted since their use was associated with reduced levels of aflatoxin contamination and better pod and haulm yields.

Keywords: Aflatoxin; Groundnut; Evaluation, Fertilizers, Southern Guinea Savannah

ASSESSMENT OF AFLATOXIN OCCURRENCE IN FOOD MATERIALS FROM SOUTH EASTERN NIGERIA

Anukwuorji C. A.[1*] and Okigbo R. N.[2]

[1]Department of Applied Biology and Biotechnology, Enugu State University of Science and Technology, P. M. B. 01660 Enugu State, Nigeria.

[2]Department of Botany, Nnamdi Azikiwe University, P. M. B. 5025, Awka, Anambra State, Nigeria.
Corresponding author: dozygreat2k2@yahoo.co.uk; Tel: +2348032817415

ABSTRACT
This study was designed to investigate the occurrence of aflatoxins in "egusi", "ogbono" and Cassava chips exposed in the open markets in south eastern Nigeria. Simple random sampling technique was adopted in collecting the samples from the states. A total of 45 samples were collected from the five states in south eastern Nigeria (three samples from each state per sampling regime of collection) viz: Enugu State, Anambra State, Imo State, Abia State and Ebonyi State in three sampling regimes: dry harmattan, hot dry and rainy seasons. The target microbial metabolites (aflatoxins B_1, B_2, G_1 and G_2) in the food materials were screened using thin layer chromatography technique. Aflatoxin was detected in all the food samples screened at varying concentrations with values gotten from "egusi" and "ogbono" (0.209±0.278 and 0.262±0.274 respectively) being significantly ($P<0.05$) higher than 0.033±0.091 recorded from cassava chips. Aflatoxins G_1 and G_2 were detected at very low levels. The concentration of aflatoxins in the food materials also varies with the waves of collection with high concentrations detected during rainy season (except in "egusi") then in dry harmattan and the least was in hot dry season. Although the levels of contamination in this study were lower than the NAFDAC and Codex Alimentarius Commission maximum permissible levels of aflatoxins of 10 µg/kg and 4ug/kg respectively but the frequent contamination of these food materials at a reasonable concentration by these potent carcinogen especially AFB_1 and AFB_2 that were detected in relatively higher quantities call for serious concern, because "egusi" and "ogbono" are major soup condiments in South-eastern Nigeria while cassava chips is widely consumed by the inhabitants of this agro-ecological zone. These toxins, however small, when consumed in food materials bio-accumulates in the body causing serious health effects. Thus the need for awareness on the potential health risk of consuming food materials exposed in the open market for sale.
Keywords: Aflatoxin; "Egusi"; "Ogbono"Occurence, Fertilizers, South eastern Nigeria

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DETERMINATION OF CO-OCCURRENCE OF AFLATOXINS, OCHRATOXIN A, FUMONISIN AND DEOXYNIVALENOL IN SORGHUM FROM SELECTED MARKETS IN LAGOS

Imafidon T. F[1,2]., Irurhe O.O[1,2]. and Oluwadun A.O.[2]

[1]National Agency for Food and Drug Administration and Control.
[2]Olabisi Onabanjo University, Ago-Iwoye.

ABSTRACT

Some foods and feeds are often contaminated by numerous mycotoxins, but most studies have focused on the occurrence and toxicology of a single mycotoxin. Regulations throughout the world do not consider the combined effects of mycotoxins. Co-occurrence of mycotoxins is likely to arise because most fungi are able to simultaneously produce a number of mycotoxins and possibility of commodities getting contaminated by several fungi. The natural co-occurrence of AFlatoxins,(AFs) Ochratoxin A (OTA), Fumonisins (FUM) and Deoxynivalenone (DON) was investigated in 120 Sorghum samples (red and white varieties) purchased from five selected markets in Lagos using Enzyme Linked Immunosorbent assay. OTA was detected in all the samples at concentrations ranging from 0.9-23.6µg/kg, while total aflatoxin concentrations in the same samples ranged from 0.1-185.2µg/kg. Forty six (38.33%) out of 120 sampled sorghum were contaminated with AFs greater than 10µg/kg which is the regulatory limit of Codex Alimentarius Commission while 54 (45%) of the sample were contaminated with OTA at concentration exceeding 5µg/kg of CAC regulatory limit. All sampled sorghums were contaminated with FUMs and DON at concentration below EU regulatory limits of 2mg/kg for FUM and 1.75mg/kg for DON respectively. Eighty seven (72.5%) were co-contaminated with the four mycotoxins under study while 108 (90%) were co-contaminated with at least two mycotoxins. The mean values of AFs, OTA, FUMs and DON in red sorghum were 26.0µg/kg, 5.1 µg/kg, 0.6 mg/kg and 0.2 mg/kg respectively while the median value were 3.7 µg/kg, 4.4 µg/kg, 0.4 mg/kg and 0.2mg/kg for AFs, OTA, FUMs and DON respectively. The mean value of AFs, OTA, FUMs and DON in white sorghums were 11.0 µg/kg, 5.1 µg/kg, 0.4 mg/kg and 0.2 mg/kg respectively while the median value were 0.7 µg/kg, 5.7 µg/kg, 0.3 mg/kg and 0.2 mg/kg for AFs, OTA, FUMs and DON respectively. There was statistical significant difference in the median value of AFs ($Z= 3.825$, $P<0.05$) and FUMs ($Z= 3.474$, $P<0.05$) during dry and raining season while there was no statistical significant difference in the median of OTA and DON ($P>0.05$). The incidence of natural co-contamination of AFs with OTA, FUMs and DON were established in this study. It is, therefore, recommended that the presence of other mycotoxins apart from AFs be determined in sorghum in order to prevent mycotoxicosis and also to prevent border rejection when exported.

Keywords: Sorghum, Mycotoxins, Aflatoxins, Ochratoxins, Fumonisins, Deoxynivalenone, ELISA, Regulatory limits, EU, CODEX.

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AUTOMATION OF STATISTICAL REPORTS OF MYCOTOXINS OF AGRICUTURAL PRODUCTS IN SUB-SAHARAN AFRICA

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ABSTRACT

This paper discusses the idea and the design of an automated system for storage and management of mycotoxin reports for decision making. Mycotoxins are fungal secondary metabolites that contaminate various feedstuffs and agricultural crops. The contamination of food by mycotoxins can occur during production, storage, processing, transportation or marketing of the food products. High temperature, moisture content and water activity are among the predisposing factors that facilitate the production of mycotoxins in food. Aflatoxins, ochratoxins, fumonisins, deoxynivalenol and zearalenone are all considered the major mycotoxins produced in food and feedstuffs. In Africa, mycotoxin contamination is considered to be a major problem with implications that cause human and animal health hazards and contribute to a poor economy. Aflatoxin-related hepatic diseases are reported in many African countries. Ochratoxin and fumonisin toxicity in humans and animals is widespread in Africa. The available, updated information on the incidence of mycotoxin is not collectively vivid for policy making. A complete automated system allows the monitoring of statistical reports on mycotoxins stored in agricultural products. This study is to make provision for easy access and acknowledgment of mycotoxin data on different grains, fruits, vegetables and foods in sub-Saharan Africa in order to proffer necessary solution for improvement in health condition of the public.

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Keywords: Africa, health hazards, mycotoxins and automated.

FUNGI AND TOTAL AFLATOXIN ASSOCIATED WITH "EGUSI" MELON *Citrullus lanatus* (THUMB) MATSUM AND NAKAI, SEEDS SOLD IN SOME MARKETS IN NASARAWA STATE, NIGERIA

Isaac M. Ogara[1], Bosede F. Oluwabamiwo[2] and Ezekiel A. Bulus[1]

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ABSTRACT

Fungi and Total aflatoxin associated with old and newly harvested seeds of “egusi” melon *Citrullus lanatus* (Thumb.) Matsum & Nakai in Nasarawa state were investigated. Five markets, Agyaragu, Lafia, Nasarawa Eggon, Wamba and Akwanga were randomly selected for sample collection. The seeds were cultured on blotter paper plate for seven days. Organisms that germinated from the seeds were separately subcultured on Potato Dextrose Agar and identified morphologically. Total aflatoxin was determined using ELISA for old and newly harvested “egusi”. Five species of fungi were identified: A*spergillus flavus, A. niger, A. terreus, Mucor* sp*. and Penicillium* sp. The most frequently occurring fungus was *Mucor* sp., 60.70% followed by *A. niger, A. terreus and A. flavus. Penicillium* sp. had the least frequency of occurrence. Agyaragu had the highest occurrence of organisms isolated (50%). In all, 45% of samples were contaminated with aflatoxins including all samples from Agyaragu and Lafia at concentrations ranging from 11.2 *µg*/kg to 107.0 *µg*/kg. All contaminated samples exceeded EU limits, but 35 % exceeded US limit for total aflatoxin. Aflatoxin was not detected in samples from Akwanga and Wamba. There was no significant difference in contamination between the new and old melon seeds for machine (mechanically) or hand (manually) shelled ones. This could be due to the sample size in the study. More extensive studies need to be carried to verify or otherwise confirm this finding.

Keywords: Total Aflatoxins; “Egusi”, Fungi, Nasarawa State

EFFECT OF FERMENTATION ON THE REDUCTION OF DEOXYNIVALENOL AND ZEARALENONE IN SORGHUM AND MILLET FROM SOME SELECTED STATES OF NIGERIA

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[1] Ayoade A. F., [2]Oladiti A. T. and [3]Aroyeun S. O.

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ABSTRACT

Many reports are available in the literature about the relevance of fermentation to toxins reduction in food matrix. Staple foods like sorghum and millet were selected for this work. The two cereal crops were steeped for 24 hours, water was decanted from the cereals and the grains were milled into a paste. The DON and ZEN contents in the paste were analysed using liquid chromatography and tandem mass spectroscopy. The initial ZEN and DON before and after fermentation were evaluated. The results indicated reduction in both DON and ZEN significantly. The range of value obtained for DON was 26.21mg/kg – 127.30mg/kg for the unfermented samples. A different trend was observed for the sorghum as all the samples did not contain appreciable amount of ZEN whether fermented or unfermented. In conclusion, it was observed that fermentation significantly reduced DON and ZEN in millet and sorghum significantly.

Keywords: DON, ZEN, millet, sorghum, fermentation

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FOOD SAFETY CHALLENGES OF "KULIKULI" SOLD IN KADUNA METROPOLIS

Oluwabamiwo B. F., Nden N. E. and Abdulahi M.

[1]National Agency for Food and Drug Administration and Control (NAFDAC)

ABSTRACT

In order to assess the food safety status of "kulikuli" sold in Kaduna metropolis, microbial load and aflatoxin contamination levels were determined on randomly sampled "kulikuli" samples (n = 36) purchased from Kaduna markets. Total aflatoxins and microbial load were determined using ELISA and total plate count, respectively. Two samples were found to contain *Escherichia coli*, one of which also contained high level of coliform >2400 colony forming units. All samples complied with regulated standards for mould and aerobic mesophilic counts. It was found that 83.3% of the

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samples contained aflatoxins ranging from 3.3 to 143.1µg/kg, while 16.7% contained aflatoxins at levels below detection limit. Average content was 25.96µg/kg.

Keywords: Aflatoxins, kulikuli, food safety, microbial load, Kaduna

OCHRATOXIN AND FUMONISIN CONTAMINATION OF SIX STAPLE FOODS FROM NIGER STATE, NIGERIA

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ABSTRACT

Mycotoxins are important food-borne harmful substances which cause acute and chronic effects to animals and man when ingested. They are of great public health concern because

of their carcinogenic effect. This study therefore investigated ochratoxin and fumonisin contents, which are agriculturally significant, in six staple foods in Niger state. Multi-mycotoxin extraction and ELISA methods were used for the extraction and analysis of toxins in the food stuff. The results show 89.16 % incidence of ochratoxin and 87.5% of fumonisin in the samples respectively and different concentration of both in different crops. The result also show 78% co-occurrence between fumonisin and ochratoxin with some level of significance ($p<0.05$) and $R = 0.435$ (moderate positive correlation). Those samples whose concentration exceeded the recommended limit were regarded as unsafe. The percentage unsafe samples for ochratoxin and fumonisin, respectively, in different crops are as follows: Garri (75%/40%), Millet (35%/40%), Yam flour (35%/85%), Maize (15%/20%), Rice (10%/0%) and Sorghum (5%/100%). Tuber crops samples showed more susceptibility to mycotoxins in most cases. Samples from farm and store had more contamination than samples from market. The presence of these toxins in most of the samples at an unacceptable level has grievous public health implications that necessitate their regulation in food.

Keywords: Ochratoxin; Fumonisin; Staple foods, Niger State

FUNGAL AND BACTERIAL METABOLITES CONTAMINATION OF COCOA BEANS IN THREE AGRO ECOLOGICAL ZONES OF NIGERIA

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ABSTRACT

A survey was undertaken of a total of 150 farmers, 50 from each of the three studied agro-ecological zones of Nigeria: Humid Forest (HF), Derived Savannah (DS) and Southern Guinea Savannah (SGS); to determine local post-harvest management practices associated with

fungal and bacterial metabolites in cocoa beans. All the fungal and bacterial metabolites were detected using a Liquid Chromatography-Tandem Mass Spectrometric (LC/MS/MS) method. The possible relationships between the fermentation, drying and storage of cocoa beans across all the three agro-ecological zones and levels of fungal and bacterial metabolites were also evaluated. A total of 81 metabolites were detected out of which 57 fungal and three bacterial metabolites were extracted from the beans. Among the 57 fungal metabolites detected, 55 of these have not been documented for cocoa beans in Nigeria or elsewhere while this is the first report of bacterial metabolites in cocoa beans. Aflatoxins B_1 and B2 were quantified in 10.5 % and 8.8% % of the beans, respectively, while 83.3% of AFB1 exceeded the European Union maximum acceptable limit (MAL) of 2 ug/kg. Ochratoxin A contamination of cocoa beans ranged between 1.01µg/kg and 10.95µg/kg; 50% of positive samples contained levels higher than the EU stipulated limit of 5µg/kg for OTA in cocoa beans. The concentration of Zearalenone (0.51-19.66µg/kg) was, however, below the MAL with occurrence levels of 24.6% similar to the percentage occurrence of ochratoxin A (24.6%). The fermentation type, drying method and their durations significantly correlated ($p<0.01$ and $p<0.05$), with the levels of bean contamination. In order to ensure production of high quality cocoa products, cocoa beans should be produced with utmost precautions and application of different quality control tools which include Good Fermentation Practices, Good Hygiene Practices and application of the Hazard Analysis, Critical Control Points to cocoa beans.
Keywords: Fungal; Bacterial; Cocoa beans, Ochratoxin, Zearalenone, Nigeria

OCCURRENCE OF AFLATOXIN AND FUMONISIN IN SIX STAPLES IN NIGER STATE, NIGERIA

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ABSTRACT

Mycotoxins are harmful food-borne poisons with acute and chronic effects in animals and man. This study investigated the occurrence of aflatoxins and fumonisins which are agriculturally significant in six staples in Niger State Nigeria. Multi-mycotoxin extraction and ELISA (Enzyme-Linked Immunosorbent Assay) methods were used for the extraction and analysis of the toxins in the food stuffs. One hundred and twenty samples of rice, maize,

millet, sorghum, cassava and yam flour from the four microclimatic zones in Niger State were collected and analyzed. Aflatoxins were detected in all samples (100%) incidence at total concentration range of 4.90 - 49.85µg/kg, while fumonisin had 68.30% incidence with concentration range of 50-8150µg/kg. The mean concentration of aflatoxin from the microclimatic zones are: the wettest zone I (18.31 µg/kg), wet zone II (21.13 µg/kg), dry zone III (17.93 µg/kg) and driest microclimatic zone IV (8.61 µg/kg); while the fumonisin are: wettest zone I (2290 µg/kg), wet zone II (1750 µg/kg), dry zone III (1490 µg/kg) and driest zone IV (1700 µg/kg). The data shows that the amount of rainfall and temperature influences the contamination levels of aflatoxin and fumonisin in these food stuffs. It was observed that stored samples had the highest overall mean concentration of 22.79µg/kg followed by samples from farm 18.46µg/kg and marketed sample 9.10 µg/kg for aflatoxin contamination, while for fumonisin the overall concentrations were 2470µg/kg, 2270µg/kg, and 1040µg/kg for stored, farm, marketed samples, respectively. Co-occurrence of fumonisin and aflatoxin were observed in most of the samples analyzed with exception of rice that showed less susceptibility to fumonisin contamination. With regards to CODEX acceptable limits for mycotoxins contamination, for aflatoxin 97.5% of the samples were unsafe while for fumonisin 22.5% of the samples were unsafe. The presence of these toxins in most of the samples at unacceptable levels has grievous public health implications that necessitate their regulation in food.

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Keywords: Aflatoxin; Food safety; Fumonisin, Nigeria

OCCURRENCE OF AFLATOXIN CONTAMINATION IN GROUNDNUT AND MAIZE GRAINS SOLD IN SELECTED MARKETS IN ZARIA METROPOLIS

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ABSTRACT

Consumption of food contaminated with aflatoxin has caused both chronic and acute aflatoxicosis that has resulted in loss of livestock and human life. This study was aimed at investigating aflatoxin contamination in groundnut and maize grains sold in selected markets

in Zaria metropolis. A total of 36 samples, 18 samples each of groundnut and maize, were collected. The sample representatives were subjected to proximate analysis and the major parameters were found to be statistically significant ($p< 0.05$). The ground samples of the grains were subjected to isolation followed by slide culture technique and microscopic identification. Total aflatoxins were extracted from the samples using 80% (v/v) methanol and quantified by Enzyme-linked Immunosorbent Assay (ELISA). The results revealed high toxins concentration of 18.1µg/kg in maize from Samaru market and 16.9µg/kg in groundnut from Sabon Gari market while the least concentration of 0.4µg/kg in maize was from Dan-Magaji market. The occurrence levels of the toxins within the two grains were not statistically significant ($p > 0.05$). The proximate compositions of the samples analyzed contain organic and inorganic nutrients that can enhance the growth of aflatoxigenic fungi and subsequent production of the toxin. Fourteen (14) isolates from the 36 samples were confirmed to be *Aspergillus flavus* and eight (08) *A. parasiticus* with percentage occurrence of both 39% and 22% from the grains. Aflatoxin contaminations occur in all the 14 samples out of 36 grain samples subjected for cultural analysis which account for 38.9%. To avert the hazard of aflatoxin contamination, the National Agency for Food, Drug Administration and Control (NAFDAC) and other relevant agencies in Nigeria should take steps to monitor and keep track of the aflatoxin level in grains commonly sold.

Keywords: Aflatoxicosis, Occurrence, Livestock, Fungi, Groundnut, Maize.

LOC MEMBERS

Dr. Lawal AdekunleKolawole : LOC chairman

Dr. (Mrs) Kayode Olabisi Funmi: LOC secretary

Dr. Orji Frank Anayo

Mrs. Imafidon Tayo

Mrs Talatu Ethan

Miss Adetoun Esan

Mr. Odunuga Adedeji

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