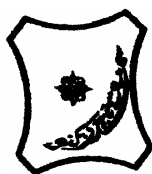


Bajopas Volume 9 Number 1 June, 2016

BAYERO JOURNAL OF PURE AND APPLIED SCIENCES (BAJOPAS)

VOLUME 9 NUMBER 1, JUNE, 2016



© FACULTY OF SCIENCE, BAYERO UNIVERSITY, KANO, NIGERIA

BAYERO JOURNAL OF PURE AND APPLIED SCIENCES (BAJOPAS)

VOLUME 9 NUMBER 1, JUNE, 2016

PUBLISHED BY:
FACULTY OF SCIENCE, BAYERO UNIVERSITY, KANO, NIGERIA

ALL COPYRIGHT RESERVED
© FACULTY OF SCIENCE, BAYERO UNIVERSITY, KANO, NIGERIA

TYPESET AND PRINTING BY:
AMCO Printers,
Shop No. 29 Old Campus Business Area,
Near New Anatomy and Physiology Buildings,
Bayero University, Kano, Nigeria.
(☎ +2380 9621 3362)
email: aminubukar80@gmail.com; al_amsak2004@yahoo.com

BAYERO JOURNAL OF PURE AND APPLIED SCIENCES (BAJOPAS)

EDITORIAL

The Editorial Board of the Bayero Journal of Pure and Applied Sciences (BAJOPAS) of the Faculty of Science, Bayero University, Kano is pleased to release its sixteenth edition, Volume 9, Number 1, June, 2016 to the national and international scientific community. The Journal contains well researched and reviewed scientific works that are adequately peer reviewed.

The publications aim is always to satisfy the goal of ensuring rapid and wide dissemination of results of scientific researches that could finally trigger the advancement of human kind in all its ramifications. The Journal's scope is wide in that it reported findings in the areas of pure and applied sciences, namely: Agricultural Sciences, Botany, Biochemistry, Chemistry, Computer Science, Engineering, Environmental Sciences and Geography. Also, areas of Laboratory Science, Technology, Mathematical Sciences, Microbiology, Physics, Medical Sciences and Zoology form part of the contents of the Journal.

Scientists in the academia, research institutes and industries who actively participated in the propagation of their works through this classical international medium are therefore congratulated. To this end, it would be pertinent to thank our team of trusted and talented professionals who ensured the objective editing of the manuscripts sent to them, inspite of all their tight schedules. The effort of Bayero University, Kano and other donor agencies that ensured the success of BAJOPAS is fully acknowledged.

With this, I would like to seize this opportunity to emphasize for a quick and prompt review process and submitting back the manuscript(s) to the publishers on time. This would surely encourage the progress of the Journal as well as the contributing authors. To the Editorial Board members, thank you for the support and cooperation. Accept my warmest regards.

Professor M.D. Mukhtar,

Editor – in – Chief,

Bayero Journal of Pure and Applied Sciences (BAJOPAS),

Faculty of Science,

Bayero University, P.M.B. 3011, Kano, Nigeria

Email address: bajopas.pas@buk.edu.ng

Website: <http://www.ajol.info/index.php/bajopas>

Also indexed at DOAJ and EBSCO host

BAYERO JOURNAL OF PURE AND APPLIED SCIENCES (BAJOPAS)

EDITORIAL BOARD

EDITOR-IN-CHIEF

Professor M.D. Mukhtar

Department of Microbiology,
Bayero University, P.M.B. 3011, Kano,
Nigeria

BIOCHEMISTRY EDITOR

Professor M.K. Atiku

Department of Biochemistry, Faculty of
Biomedical Sciences, College of Health
Sciences, Bayero University, PMB 3011,
Kano, Nigeria.

MATHEMATICAL SCIENCES EDITOR

Dr. Bashir Ali (Associate Professor)

Department of Mathematical Sciences,
Bayero University, PMB 3011, Kano,
Nigeria.

PHYSICS EDITOR

Dr. H. Maiunguwa

Department of Physics,
Bayero University, PMB 3011, Kano,
Nigeria.

BUSINESS/CIRCULATION EDITOR

Dr. Aminu Bukar

Department of Microbiology,
Bayero University, PMB 3011, Kano,
Nigeria.

ASSISTANT SECRETARY

Dr. Aminu Muhammad

Department of Pure and Industrial
Chemistry, Bayero University, PMB 3011,
Kano, Nigeria.

BIOLOGICAL SCIENCES EDITOR

Professor A. H. Arzai

Department of Microbiology,
Bayero University, PMB 3011, Kano, Nigeria.

GEOGRAPHY EDITOR

Professor Maharaz A. Yusuf

Department of Geography,
Bayero University, PMB 3011, Kano, Nigeria.

CHEMISTRY EDITOR

Professor S.Y. Mudi

Department of Pure and Industrial Chemistry,
Bayero University, PMB 3011, Kano, Nigeria.

SECRETARY

Dr. Tijjani S. Imam

Department of Biological Sciences,
Bayero University, PMB 3011, Kano, Nigeria.

EDITORIAL ADVISERS

Professor M. S. Sule

Department of Biochemistry, Faculty of
Biomedical Sciences, College of Health Sciences,
Bayero University, PMB 3011, Kano, Nigeria

Professor M. Y. Bello

Department of Computer Science,
Bayero University, PMB 3011, Kano, Nigeria

Professor H. N. Aliyu

Department of Pure and Industrial Chemistry,
Bayero University, PMB 3011, Kano, Nigeria

Professor Inuwa Ibrahim

Department of Anatomy, School of Medicine,
Sultan Qabus University, Oman

Professor B. S. Aliyu

Department of Plant Biology, Bayero
University, PMB 3011, Kano, Nigeria

Professor Yusuf Y. Deeni

School of Contemporary Sciences,
University of Abertay, Dundee, UK

Professor M.O. Fatope,

Department of Chemistry, School of Sciences,
Sultan Qabus University, Oman

Professor A. B. Gumel

Department of Mathematics, University of
Manitoba, Winnipeg, Manitoba, Canada
R3T IN7

BAYERO JOURNAL OF PURE AND APPLIED SCIENCES (BAJOPAS)

ASSOCIATE EDITORS

Prof. E. U. Essiet

Department of Soil Sciences, Faculty of Agriculture,
Bayero University, Kano, Nigeria

Prof. M.S. Sule

Department of Biochemistry, Faculty of Biomedical
Sciences, Bayero University, Kano, Nigeria

Prof. J.A. Falola

Department of Geography, Faculty of Earth and
Environment, Bayero University, Kano, Nigerian

Prof. M. Lawan

Department of Biochemistry, Usmanu Danfodio
University, Sokoto, Nigeria

Dr P. A. Mamza

Department of Chemistry, Ahmadu Bello University,
Zaria, Nigeria

Dr D.G. Diso

Department of Physics, Kano University of Science and
Technology, Kano, Nigeria

Dr. A.I. Salisu

Department of Human Physiology, Faculty of Medicine,
Bayero University, Kano, Nigeria

Prof. A.H. Kawo

Department of Microbiology, Bayero University, Kano,
Nigeria

Dr. Hamza Abba

Department of Chemistry, Ahmadu Bello University,
Zaria, Nigeria

Dr. Abiodun Falodun

Department of Pharmaceutical Chemistry, Faculty of
Pharmacy, University of Benin, Benin City, Nigeria

Prof. Y. Mustapha

Department of Plant Biology, Bayero University, Kano,
Nigeria

Dr. F.O. Ekhaize

Department of Microbiology, Faculty of Life Sciences,
University of Benin, Benin – City, Nigeria

Prof. Garba Babaji

Department of Physics, Bayero University, Kano,
Nigeria

Dr. Nasiru Rabiu

Department of Physics, Ahmadu Bello University, Zaria,
Nigeria

Prof. J.O. Amupitan

Department of Chemistry, Ahmadu Bello University,
Zaria, Nigeria

Prof. M. Kadiri

Department of Botany, University of Agriculture,
Abeokuta, Ogun, Nigeria

Prof. P.A. Audu

Department of Biological Sciences, Ahmadu Bello
University, Zaria, Nigeria

Prof. Auwalu Uba

Biological Sciences Programme, Abubakar Tafawa
Balewa University, Bauchi, Nigeria

Dr. B.I. Tijjani

Department of Physics, Bayero University, Kano,
Nigeria

Dr. Azeez - Akande, O.

Department of Medical Microbiology and Parasitology,
Faculty of Medicine, Bayero University, Kano, Nigeria

Prof. A.O. Musa

Department of Physics, Bayero University, Kano,
Nigeria

Prof. M. B. Ibrahim

Department of Pure and Industrial Chemistry,
Bayero University, Kano, Nigeria

Dr. M. H. Ali

Department of Physics, Bayero University, Kano,
Nigeria

Dr. Y.I. Zakari

Department of Physics, Ahmadu Bello University, Zaria,
Nigeria

Dr. N. I. Fagge

Department of Physics, Bayero University, Kano,
Nigeria

Dr. A. B. Baffa

Department of Computer Science, Bayero University,
Kano, Nigeria

Dr. Saminu I. Bala

Department of Mathematical Sciences, Bayero
University, Kano, Nigeria

Dr. A. Y. Manu

Department of Med. Microbiology and Parasitology,
Faculty of Basic Clinical Science, Bayero University,
Kano, Nigeria

BAYERO JOURNAL OF PURE AND APPLIED SCIENCES (BAJOPAS)

GUIDE TO AUTHORS

Aim/Scope

Bayero Journal of Pure and Applied Sciences (BAJOPAS) is an international journal that publishes original research and critical reviews in broad areas of Agricultural Sciences, Biological Sciences, Biochemistry, Chemistry, Computer Science, Engineering, Environmental Sciences, Geography, Laboratory Science and Technology, Mathematical Sciences, Microbiology, Physics and Medical Sciences. BAJOPAS is an online (hard copy available also) biannual publication (June & December) with intent to publish more frequently in the future depending on availability of accepted manuscripts.

Submission

Articles for publication should be sent to the Editor – in – Chief, BAJOPAS, Faculty of Science, Bayero University, P.M.B. 3011, Kano or through the Journal email address: bajopas.pas@buk.edu.ng

Address

Postal: Faculty of Science, Bayero University, PMB 3011, Kano
Website: <http://www.ajol.info/index.php/bajopas>

Charges

Manuscripts submitted from Nigeria must be submitted along with a processing fee of ₦5,000.00, while articles submitted from other countries are not accompanied with processing charges. Articles not accompanied by the assessment fee will not be processed. Upon acceptance of a paper for publication, the corresponding author must submit the original paper (reviewed), corrected paper, CD version of the paper (CD-R) or through email and a publication fee of ₦10,000.00 (within Nigeria) or \$150 (outside Nigeria).

Review Process

Articles for publication will be peer reviewed by a minimum of 2 reviewers to ensure accuracy. The Board's decision on publishing a paper will be guided strictly by the reviewer's comments.

Copyright

Upon acceptance of a paper by the Journal, the author(s) have automatically transferred copyright of the paper to BAJOPAS. The transfer will ensure widest possible dissemination of information.

General Instructions

Authors are to submit three (3) copies of the manuscript. Submitted papers should contain results from original researches that are not being considered for publication elsewhere or previously published. Manuscripts submitted to the journal are peer reviewed to ensure high standard. Single author research papers are not accepted by BAJOPAS but critical reviews by single authors are accepted.

Manuscripts should be readable and computer typed on white A4 paper, portrait, double spaced throughout leaving 1" wide margin on both sides. Manuscripts should be written in English language and should not exceed 12 pages. Any additional page attracts extra charge. The programme should be MS Word format.

S.I. units and metric systems of measurement are acceptable and Latin words should be in italics.

Text: The text of the manuscript should appear in the following order. Title, authors name(s) and address (es), abstract, introduction, materials and methods, results, tables, figures, and plates, discussions, conclusion, recommendation(s), acknowledgement, references, (authors should please comply strictly to this format).

Title page: The title of the paper should unambiguously reflect the content and the main theme of the paper. The full names and addresses of authors (including names of institutions, country, email address and telephone numbers) should be stated. In the case of joint authorship or multiple authorship, the name and mailing address of the author to whom further correspondence would be referred should be indicated, otherwise, the name of the first author on the list is assumed to be the correspondence author, not corresponding author. Authors' names should start with surnames then initials of other names.

Introduction: This should contain mainly essential background information and important relevant references. The objectives of the work and its relevance or contribution must be clearly stated. The literature cited must be discussed to show the relationships between the published and the research study.

Materials and Methods: New methods and modifications of established ones should be described in detail to enable repetition by other workers. For the established and published methods, references should be made to the relevant publications.

Generally acceptable, scientific terms should be used. Discuss the factors, problems encountered and the solutions as they apply to your study. Due attention should be given to experimental design and statistical analysis of data where applicable.

Results: Table and figures should be kept to minimum. Type each table on a separate sheet of paper. Each table must be numbered in Arabic numerals and should contain brief title on top. Figures and plates should be of scanned reproducible quality.

Discussion: This section may be combined with results. Avoid repetition of methodology and results in your discussion. Discussion should indicate clearly the significance and implications of the results obtained. Relate your work to published studies. References should be cited, e.g. Sule (2008), Mukhtar and Deeni (2001), or Atiku *et al.* (1987) if there are more than two authors.

Note: Results and discussion could be presented together. In such case, each result should be presented immediately by discussion specific to the result and this should continue until all the results have been presented and discussed

Conclusion: Conclusion should be drawn from the aim(s) and objectives of the work. It should not carry too much detail of the results.

Recommendations: Should be optional and must be drawn from the study.

Author's contributions: Contribution by each author must be stated clearly. Contributors must have actively participated in the conduct or supervision of the research. Proof reading or writing the manuscript does not confer one an authorship of a manuscript.

Conflict of interest: There should not be any conflict of interest among the authors in whatever form.

Acknowledgement: Optional and should acknowledge support and assistance rendered by individual(s) or organizations.

References

The reference style should be the APA format.

One author:

Abdullahi, I.L. (2003): A Study of Vegetable Cultivation in the Peri-urban Kano. *Journal of Applied and Pure Sciences*, **1**(1):6 – 14.

Two authors:

Bukar, A. and Magashi, A.M. (2007): Antibacterial and Antifungal Effect of High pH and Paraffin Wax on Tomatoes, Oranges and Peppers. *African Journal of Biotechnology*, **6**(6):720 – 722. <http://www.academicjournals.org/AJB>

More than two authors

Soroceanu, M.A., Miao. D., Bai, X., Su, H., Goltzman, D. and Karaplis, A.C. (2004). Rosiglitazone Impacts Negatively on Bone by Promoting Osteoblast/Osteocyte Apoptosis. *Journal of Endocrinology*. 183:203-216.

BAYERO JOURNAL OF PURE AND APPLIED SCIENCES (BAJOPAS)

PUBLICATION CHARGES

A publication fee of Ten Thousand Naira (₦10,000.00) only will be charged per manuscript (from within Nigerian) and \$150 only (from outside Nigeria) on acceptance of the manuscript for publication. This is to be paid in certified bank draft, certified cheque or cash. In case of payment into the Journal's account, the bank teller should be photocopied or scanned and sent to the Secretary for confirmation.

The bank details are:

Bank: Skye Bank

Account Name: BAJOPAS

Account Number: 5100147786

OFFPRINTS/REPRINTS

Any author who requires reprints of his/her paper should indicate this upon receipt of the acceptance letter and will be required to pay for the reprints.

ADVERTISEMENT RATES

Advertisement rates (full page)	- N25,000
Half page	- N15,000
Quarter page	- N10,000

Subscription rates (for two issues published in one year):

Institutions	- N6,000
Personal	- N4,000
Students	- N2,000

Orders for advertisement and subscription are to be made to the Circulation/Business Editor, Bayero Journal of Pure and Applied Sciences (BAJOPAS), Faculty of Science, Bayero University, P.M.B. 3011, Kano or via bajopas.pas@buk.edu.ng.