



Holy Cross College (Autonomous) Nagercoil - 629 004

Affiliated to Manonmaniam Sundaranar University, Tirunelveli
Nationally Accredited with A+ Grade (CGPA 3.35) by NAAC IV Cycle
An ISO 9001:2015 Certified Institution


SSR
2019-2020
to
2023-2024

3.7.1 Number of functional MoUs/linkages with institutions/ industries in India and abroad for internship, on-the-job training, project work, student / faculty exchange and collaborative research during 2023-2024

DEPARTMENT OF MATHEMATICS (AIDED)

1. Research Collaboration - Doctoral Committee Member

a. S. T. Hindu College, Nagercoil.

 **CENTRE FOR RESEARCH
MANONMANIAM SUNDARANAR UNIVERSITY,
TIRUNELVELI, 627012, TAMILNADU, INDIA
www.msuniv.ac.in**

MINUTES OF THE SECOND DOCTORAL COMMITTEE MEETING

The Doctoral Committee Meeting of the Ph.D. Scholar, Mr/Ms. P. Jaspin Tola (Reg.No. 20123152092018 /Mode Full time) was held on 15.03.2024 at 10-15 A.M./P.M. in the Department/Institution of Mathematics, S.T Hindu College, Nagercoil

The following members were present

- Dr. A. Vijayalekshmi (Supervisor & Convener)
- (Joint Supervisor)
- Dr. V. Nagarajan (Member 1)
- Dr. V. Sujin Flower (Member 2)

Mr/Ms. P. Jaspin Tola has successfully completed the following course works recommended by the Doctoral Committee. He/ She has obtained the following grades in the course works.

Sl.No	Course Code	Course title	Credits	Category	Grade / Marks
1	ACOM301	Commutative Algebra	4	D100	B+
2	ACOM302	Advanced Graph Theory	4	D100	C
3					
4				CGPA	2.50

COE signed result sheet of the course works should be duly attested by the Supervisor with seal.

The scholar had completed the first seminar presentation on 15.03.2024 to the faculty members and research scholars. The attendees list is enclosed herewith. The committee also evaluated the research work carried out by the scholar and satisfied / not satisfied with the performance of the scholar. Hence the Committee permits / not permits the scholar to proceed with his/her research work in the Faculty of S.T Hindu College, Nagercoil

Member
Dr. V. Nagarajan
M.Sc., M.Phil., M.Ed., Ph.D.
Asst. Professor in Mathematics
S.T. Hindu College
Nagercoil - 629 002
(Signature with Name and Seal)
(if applicable)


Supervisor
Dr. V. Sujin Flower M.Sc., M.Phil., P
Member Assistant Lecturer
Department of Mathematics
Holy Cross College (Autonomous)
Nagercoil - 629 004
(Signature with Name and Seal)

Principal
Dr. T. M. Padmanabhan
PRINCIPAL
S.T. HINDU COLLEGE
NAGERCOIL - 629 002



2. Research Collaboration - Doctoral Committee Member

a. Women's Christian College, Nagercoil.



WOMEN'S CHRISTIAN COLLEGE
NAGERCOIL - 629 001

Re-accredited (2nd Cycle) by NAAC with A Grade
91st Rank of the National Level / NIRF 2023
(Affiliated to Manonmaniam Sundaranar University, Tirunelveli - 12)

Dr. D.USHA, M.Sc., M.Phil., Ph.D.
Principal-in-Charge
E-mail : wccnagercoil@yahoo.com
Website : www.wccnagercoil.edu.in

Kanyakumari District,
Tamilnadu, India.
☎ 04652 - 231461
☎ 9443134599

ATTENDANCE CERTIFICATE


This is to certify that Dr. K. ANGEL JEBITHA , Assistant Professor, Department of Mathematics, Holy Cross College (Autonomous), Nagercoil, has attended the Third Doctoral Committee Meeting of Mrs. A. Annie Froe, (Reg. No: 20123112092024), Ph.D Scholar in the Research Department of Mathematics, Women's Christian College, Nagercoil on 23.01.2024.

23.01.2024

Dusha
23/1/2024
Principal-in-charge
Women's Christian College
Nagercoil.

3. Research Collaboration - Doctoral Committee Member

- a. Pioneer Kumara Swamy College, Nagercoil.
- b. Women's Christian College, Nagercoil.



PIONEER KUMARASWAMY COLLEGE
NAGERCOIL - 629 003
Kanniyakumari District, Tamilnadu, India
(Re-accredited with B⁺⁺ grade by NAAC)
(Govt. Aided College, Affiliated to M.S. University, Tirunelveli)

Dr. N. Indira, M.Com., M.Phil., Ph.D.,
Principal

☎ 04652 - 232448. ☎ 7845367987
✉ indraprincipa@pkc@gmail.com

08.01.2024

ATTENDANCE CERTIFICATE

This is to certify that **Dr. M. K. Angel Jebitha**, Assistant Professor, Department of Mathematics, Holy Cross College (Autonomous), Nagercoil has served as Member in the III DC Meeting for Research Scholar **Ms. V.G. Michael Florance** (Reg. No.19223042092019) on 08.01.2024.

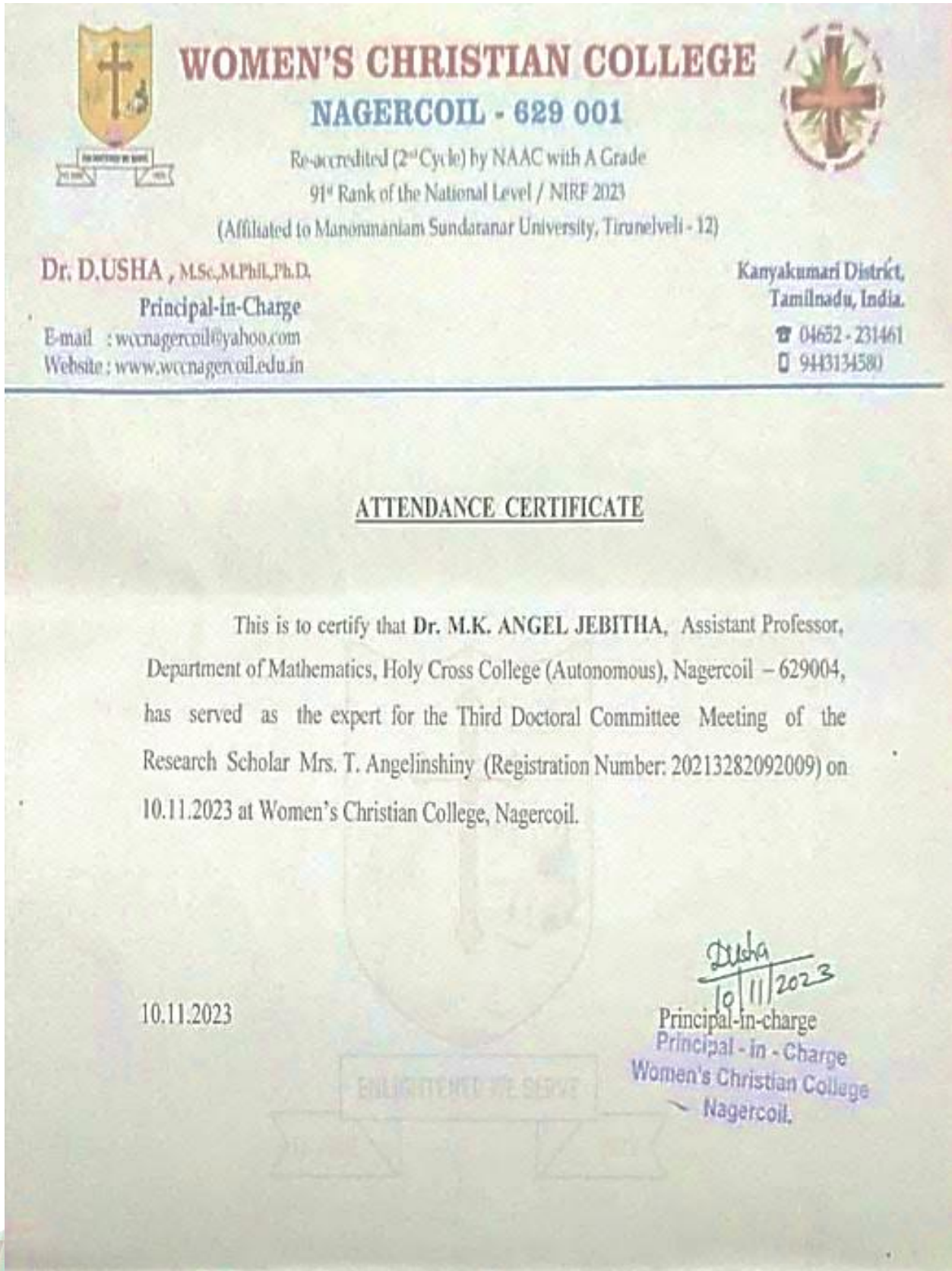


N. Indira
08/01/2024
PRINCIPAL
PIONEER KUMARASWAMY COLLEGE
NAGERCOIL - 629 003



4. Research Collaboration - Doctoral Committee Member

a. Women's Christian College, Nagercoil.



5. Research Collaboration - Doctoral Committee Member

a. Nesamony Memorial Christian College, Nagercoil.

NESAMONY MEMORIAL CHRISTIAN COLLEGE

MARTHANDAM - 629 165
KANYAKUMARI DISTRICT, TAMIL NADU, INDIA.
RE-ACCREDITED WITH 'A' GRADE BY NAAC

Dr. R. SHEELA CHRISTY, M.Sc., M.Phil., Ph.D.,

Principal-in-charge

Phone : 04651 - 272059, 270257

Cell : 9443370257

Fax : 04651 - 272059

E-mail : principalnmcc2014@gmail.com

Website : www.nmcc.ac.in

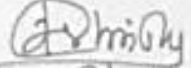


Date: 08-11-2023

Attendance Certificate

This is to certify that **Dr.M.K. Angel Jebitha** , Assistant Professor, PG & Research Department of Mathematics Holy Cross College (Autonomous), Nagercoil , has attended the Doctoral Committee meeting of Mrs. C. Sheeja, Research Department of Mathematics, Nesamony Memorial Christian college, Marthandam held on 08-11-2023.





8/11/23
PRINCIPAL (i/c)
Principal-in-charge
Nesamony Memorial Christian College
Marthandam




6. Research Collaboration - Doctoral Committee Member

a. Scott Christian College (Autonomous), Nagercoil.



MANONMANIAM SUNDARANAR UNIVERSITY
CENTRE FOR RESEARCH
 ABISHEKAPATTI, TIRUNELVELI – 627 012, TAMIL NADU, INDIA



MINUTES OF THE THIRD DOCTORAL COMMITTEE MEETING FOR SUBMISSION OF THESIS

The Doctoral Committee Meeting of the Ph.D. Scholar, Mr./Ms. SINJU MANOHAR. V.S (Reg.No. 20113162092016) was held on 27/07/2023 at 2.15 A.M./P.M. in the Department of Mathematics, Scott Christian College (Autonomous), Nagercoil.

Dr. T. Binu Selin, M.Sc., M.Phil., B.Ed., Ph.D.,
 Assistant Professor
 PG & Research Department of Mathematics
 Scott Christian College (Autonomous)
 Nagercoil - 629 003 (Supervisor & Convener)

The following members were present

1.	<u>Dr. T. BINU SELIN</u>	(Supervisor & Convener)
2.	_____	(Joint Supervisor, if applicable)
3.	<u>Dr. Y.S. IRINE SHEELA</u>	(Member) <u>Yes</u>
4.	<u>Dr. M.K. ANGEL JEBITHA</u>	(Member) <u>Yes</u>


The Doctoral Committee critically reviewed the research work entitled _____
A study on Energy Concepts of Graphs
 Carried out by Mr./Ms. SINJU MANOHAR. V.S and the contents of the draft thesis. The Scholar had completed the second seminar presentation on 18/07/2023 to the faculty members and Research scholars. The attendees list is enclosed herewith. The scholar has 3 publications in the referred journals from his/her research work. The Committee is satisfied with the research performance of the scholar and approves the Thesis submission. The committee also recommends the panel of Examiners for the evaluation of the Thesis.

<p>Signature of the Joint Supervisor (Name with seal) (if applicable)</p> <p style="text-align: center;"><u>Yes</u> <u>Selin</u></p> <p>Head of the Department (University / College) Dr. (Name & Seal) <u>Selin</u> Associate Professor and Head Postgraduate and Research Centre Department of Mathematics Scott Christian College (Autonomous) Nagercoil.</p>	<p>Signature of the Supervisor (Name and seal)</p> <p style="text-align: center;"><u>Selin</u></p> <p>Dr. T. Binu Selin, M.Sc., M.Phil., B.Ed., Ph.D. Assistant Professor PG & Research Department of Mathematics Scott Christian College (Autonomous) Nagercoil - 629 003</p> <p>Forwarded by</p> <p style="text-align: center;"><u>Selin</u></p> <p>Principal of the College Dr. (Name & Seal) <u>Raja</u> PRINCIPAL I/c SCOTT CHRISTIAN COLLEGE (AUTONOMOUS) NAGERCOIL - 629 003</p>
--	---




7. Research Collaboration - Doctoral Committee Member

a. Scott Christian College (Autonomous), Nagercoil.



MANONMANIAM SUNDARANAR UNIVERSITY
CENTRE FOR RESEARCH
 ABISHEKAPATTI, TIRUNELVELI - 627 012, TAMIL NADU, INDIA



MINUTES OF THE THIRD DOCTORAL COMMITTEE MEETING FOR SUBMISSION OF THESIS

The Doctoral Committee Meeting of the Ph.D. Scholar, Mr./Ms. R. DIANA
 (Reg. No. 20113162092015) was held on 26/07/2023 at 2.15 AM/P.M.
 in the Department of Mathematics, Scott Christian College (Autonomous) Nagercoil

The following members were present

1. <u>Dr. T. Binu Selin</u>	(Supervisor & Convener) <u>Dr. T. Binu Selin</u> , M.Sc., M.Phil., Ph.D., Postgraduate and Research Centre Department of Mathematics Scott Christian College (Autonomous) Nagercoil - 627 012
2. _____	(Joint Supervisor) _____
3. <u>Dr. Y.S. Trine Shoola</u>	(Member) <u>Dr. S. Sujitha</u> , M.Sc., B.Ed., M.Phil., Ph.D., Assistant Professor, Department of Mathematics Holy Cross College (Autonomous) Nagercoil - 629 004.
4. <u>Dr. S. Sujitha</u>	(Member) _____

The Doctoral Committee critically reviewed the research work entitled A study on Laplacian Energy concepts of graphs
 Carried out by Mr./Ms. R. DIANA and the contents of the draft thesis. The Scholar had completed the second seminar presentation on 14/07/2023 to the faculty members and Research scholars. The attendees list is enclosed herewith. The scholar has _____ publications in the referred journals from his/her research work. The Committee is satisfied with the research performance of the scholar and approves the Thesis submission. The committee also recommends the panel of Examiners for the evaluation of the Thesis.

Signature of the Joint Supervisor
 (Name with seal)
 (if applicable)

Y.S. Trine Shoola
 Head of the Department (University / College)
Dr. Y. S. Trine Shoola, M.Sc., B.Ed., M.Phil., Ph.D.,
 Vice-Principal and Head
 Postgraduate and Research Centre
 Department of Mathematics
 Scott Christian College (Autonomous)
 Nagercoil.

Signature of the Supervisor
 (Name with seal)

Dr. T. Binu Selin, M.Sc., M.Phil., Ph.D.,
 Assistant Professor
 PG & Research Department of Mathematics
 Scott Christian College (Autonomous)
 Nagercoil - 627 012

Forwarded by

Dr. Y. S. Trine Shoola
 Principal of the College
 (Name with Seal)
 SCOTT CHRISTIAN COLLEGE (Autonomous)
 NAGERCOIL

8. Research Collaboration - Doctoral Committee Member

- a. Women's christian College, Nagercoil
- b. Nesamony Memorial Christian College, Nagercoil



WOMEN'S CHRISTIAN COLLEGE

Nagercoil - 1

RESEARCH DEPARTMENT OF MATHEMATICS

Invitation

First Research Advisory Committee (RAC Meeting)

Name of the Scholar : ABIAH T
Register Number : 23113282092004
Mode of Registration : Full Time
Discipline : Mathematics
Date and Time : 27-06-2023, 2.00 PM
Venue : Research Department of Mathematics
Name and Address of the Supervisor : Dr. T. Anitha Baby,
Assistant Professor,
Department of Mathematics,
Women's Christian College,
Nagercoil.

Research Advisory Committee Members : 1. Dr. E Ebin Raja Merly,
Assistant Professor,
Department of Mathematics,
Nesamony memorial Christian college,
Marthandam- 629 165.

2. Dr. S. Sujitha,
Assistant Professor,
Department of Mathematics,
Holy cross college ((Autonomous),
Nagercoil 629 002.



9. Research Collaboration - Doctoral Committee Member

a. Scott Christian College (Autonomous), Nagercoil.



SCOTT CHRISTIAN COLLEGE

(AUTONOMOUS)

NAGERCOIL - 629 003,

Kanyakumari District, Tamilnadu, India

Dr. D. HENRY RAJA

Principal in-charge

E-mail : sccprincipal@yahoo.com

Office : 04652-235240

Website : www.scott.ac.in

Mobile No. : 9488748900

June 9, 2023

ATTENDANCE CERTIFICATE

This is to certify that Dr. M.K. Angel Jebitha, Assistant Professor of Mathematics, Holy Cross College (Autonomous), Nagercoil served as External Examiner for the Doctoral Committee of M.J. Angelin Jenisha (Reg. No.23113162092013) in the Department of Mathematics and Research Centre, Scott Christian College (Autonomous), Nagercoil - 629 003 on 09.06.2023.



Principal

PRINCIPAL/IC
SCOTT CHRISTIAN COLLEGE (Autonomous)
NAGERCOIL



DEPARTMENT OF BOTANY

1. Research Collaboration - Doctoral Committee Member

a. Scott Christian College, Nagercoil

DEPARTMENT OF BOTANY & RESEARCH CENTRE
SCOTT CHRISTIAN COLLEGE (AUTONOMOUS)
NAGERCOIL - 629 003



DR. A.E. DULIP DANIELS, Ph.D.
Vice Principal & Head of the Department
Mob. No.: 9791245551
Email: dulipdaniels@yahoo.co.uk

KANNIYAKUMARI DISTRICT
TAMIL NADU, INDIA
Off. 04652 231007
Res. 04652 279031

21.12.2023

Dr. A. Anami Augustus Arul
Assistant Professor
Department of Botany
Holy Cross College (Autonomous)
Nagercoil - 629 004

Dear Madam,

I hereby inform you that the second Doctoral Committee Meeting of my scholar Miss. Dhanyasree, B. is scheduled to be conducted on 02.1.2024 at 2.00 pm in the audio-visual room. Please make it convenient to attend the meeting.

Thank you,

Nagercoil

Yours Sincerely,

A.E. Dulip Daniels



2. Research Collaboration - Doctoral Committee Member

a. Annai Velankanni College, Tholayavattam



3. Research Collaboration - Doctoral Committee Member

a. Women's Christian College, Nagercoil

From

Dr. R. Medo Merina,
Department of Botany,
Women's Christian College,
Nagercoil – 629001.

To

Dr. A. Anami Augustus Arul,
Head, Department of Botany,
Holy Cross College (Autonomous),
Nagercoil – 629001.

Respected Sir/Madam

Sub: Doctoral Committee Meeting - Regarding;

It is to bring your kind notice that the Second Doctoral Committee meeting of my Ph.D candidate T.JERIN ASHA has to be conducted on 17-07-2023 at 3.15 pm in the PG and Research Department of Botany, Holy Cross College (Autonomous), Nagercoil. I humbly request you to conduct the meeting.

Thanking You

Nagercoil,
14-07-2023.

Your's Sincerely,

Medo Merina
Dr. R. MEDO MERINA
Assistant Professor
Research Guide
Department of Botany
Women's Christian College
Nagercoil



DEPARTMENT OF PHYSICS

1. Research Collaboration – Joint Author Publication

- Department of Mechanical Engineering and Chemistry & Research Centre, Mohamed Sathak Engineering College, Kilakarai, 623 806, Ramanathapuram, Tamil Nadu, India
- Department of Mechanical Engineering, Lord Jegannath College of Engineering and Technology, Marungoor, 629402, Kanyakumari District, Tamil Nadu, India
- Green Technology and Sustainable Development in Construction Research Group, Van Lang School of Engineering and Technology, Van Lang University, Ho Chi Minh City, Viet Nam
- Division of Chemistry, AAA College of Engineering and Technology, Amathur, 626005, Virudhunagar District, Tamil Nadu, India
- School of Chemical Engineering, Yeungnam University, Gyeongsan-si, 712–749, South Korea

Environmental Research 233 (2023) 116435

Contents lists available at ScienceDirect

Environmental Research

journal homepage: www.elsevier.com/locate/environres




Physico-chemical and extraction properties on alkali-treated Acacia pennata fiber

K.R. Jaya Sheeba^{a,b,1}, Jagadeesh Kumar Alagarasan^{c,1}, Jeyaprakash Dharmaraja^d,
S. Anne Kavitha^{a,b}, Sotha Shobana^c, Sundaram Arvindnarayan^e, Manoharan Vadivel^f,
Moonyong Lee^g, Krishna Priya Retnam^{a,b,*,**}

^a PG & Research Department of Physics, Holy Cross College (Autonomous), Nagercoil, India
^b Mammamman Sundaram University, Tiruvelli, 627012, Tamil Nadu, India
^c School of Chemical Engineering, Yeungnam University, Gyeongsan-si, 712-749, South Korea
^d Division of Chemistry, AAA College of Engineering and Technology, Amathur, 626005, Virudhunagar District, Tamil Nadu, India
^e Green Technology and Sustainable Development in Construction Research Group, Van Lang School of Engineering and Technology, Van Lang University, Ho Chi Minh City, Viet Nam
^f Department of Mechanical Engineering, Lord Jegannath College of Engineering and Technology, Marungoor, 629402, Kanyakumari District, Tamil Nadu, India
^g Department of Mechanical Engineering and Chemistry & Research Centre, Mohamed Sathak Engineering College, Kilakarai, 623 806, Ramanathapuram, Tamil Nadu, India

ARTICLE INFO

Keywords:
Acacia pennata fibers
Physico-chemical
Thermal
Crystallinity index
Surface morphology
Tensile properties

ABSTRACT

The production of reinforced composite materials can generally benefit greatly from the use of natural cellulosic woody fibers as good sustainable resources. Natural plants like hemp, cotton, and bamboo are great options for knitters and crocheters looking to make eco-friendly goods. The current study examines the properties of natural fiber obtained from the stem of the Acacia pennata (AP) plant, as well as its basic physico-chemical, structural, thermal, and mechanical characteristics. The key goal of this work was to investigate how alkali treatment affected the AP fibers' morphology, chemical composition, tensile capabilities, morphological changes, structural changes, and thermal degradation (APFs). The SEM image and pXRD analyses support the improved surface roughness of the fiber, and that was seen after the alkaline treatment. From XRD analysis, the fiber crystallinity index (54.65%) was improved and it was connected to their SEM pictograms in comparison to untreated APF. Alkali-treated AP fibers include a higher percentage of chemical components including cellulose (51.38%) and ash (5.13%). Alkali-treated AP fibers have a lower amount of hemicellulose (30.30%), lignin (20.96%), pectin (8.77%), wax (0.12%), and moisture (13.44%) than untreated APF. Their low density and high cellulosic content will improve their ability to fiber matrices. The thermal behavior of AP fiber at various temperatures was demonstrated by TG-DTA analysis, and tensile strength was also investigated.

1. Introduction

In nature, there is a variety of natural fiber materials that can be notable by their origin. Precisely, those materials are falling into three categories viz. animal, mineral, and plant-derived fibers (Celiño et al., 2014; Gopinath et al., 2022a, 2022b; Machuka et al., 2014; Pal et al., 2022; Tiwari and Sarangi, 2022). Such fiber materials find their wide applications in the manufacture of composite materials (Kim et al., 2020; Ramesh et al., 2022a, 2022b; Sivaubramanian et al., 2021).

Natural fibers are a renewable resource and possessing several advantages associated with them, such as providence of high specific stiffness along with strength, desirable fiber aspect ratio, biodegradability, and ease of availability from natural sources (Kim et al., 2020; Mohanavel et al., 2022; Veerasimhan et al., 2022). Further, such characteristics made them predominantly attractive to various industrial applications. Regarding the raw wood materials utilized for papermaking industry, due consideration is given to the global environment as of the waste needle leaf tree materials from lumber mills can be applied in a large

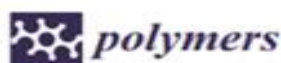
^{*} Corresponding author.
^{**} Corresponding author.
 E-mail addresses: myrived@yu.ac.kr (M. Lee), krishtnprtya@holycrossng.edu.in (K.P. Retnam).
 K.R. Jaya Sheeba and Jagadeesh Kumar Alagarasan have equal contribution to this work.

<https://doi.org/10.1016/j.environres.2023.116435>
 Received 31 October 2022; Received in revised form 30 April 2023; Accepted 12 June 2023
 Available online 19 June 2023
 0013-9351/© 2023 Elsevier Inc. All rights reserved.



2. Research Collaboration – Joint Author Publication

- Facultad de Salud y Ciencias Sociales, Universidad de las Américas, Providencia, Santiago 7500975, Chile.
- Departamento de Ingeniería Civil, Universidad Católica de la Santísima Concepción, Concepción 4090541, Chile.
- Department of Physiology, Saveetha Dental College and Hospitals, SIMATS, Chennai 600077, India.
- Centro Nacional de Excelencia para la Industria de la Madera (CENAMAD), Pontificia Universidad Católica de Chile, Av. Vicuña Mackenna 4860, Santiago 8330024, Chile.
- Departamento de Ingeniería Civil, Universidad de Concepción, Concepción 4070386, Chile.
- Department of Civil Engineering, University College of Engineering Nagercoil, Anna University, Nagercoil 629004, India.



Article

Investigating the Mechanical, Thermal, and Crystalline Properties of Raw and Potassium Hydroxide Treated Butea Parviflora Fibers for Green Polymer Composites

Abisha Mohan ¹, Retnam Krishna Priya ^{1,*}, Krishna Prakash Arunachalam ^{2,*}, Siva Avudaiappan ^{3,4,5}, Nelson Maureira-Carsalade ^{6,7} and Angel Roco-Videla ^{7,*}

¹ PG & Research Department of Physics, Holy Cross College, Nagercoil, Affiliated to Maronemaniam Sundaranar University, Tirunelveli 627012, India; mabisha@proton.me

² Department of Civil Engineering, University College of Engineering Nagercoil, Anna University, Nagercoil 629004, India

³ Departamento de Ingeniería Civil, Universidad de Concepción, Concepción 4070386, Chile; savudaiappan@udec.cl

⁴ Centro Nacional de Excelencia para la Industria de la Madera (CENAMAD), Pontificia Universidad Católica de Chile, Av. Vicuña Mackenna 4860, Santiago 8330024, Chile

⁵ Department of Physiology, Saveetha Dental College and Hospitals, SIMATS, Chennai 600077, India

⁶ Departamento de Ingeniería Civil, Universidad Católica de la Santísima Concepción, Concepción 4090541, Chile

⁷ Facultad de Salud y Ciencias Sociales, Universidad de las Américas, Providencia, Santiago 7500975, Chile

* Correspondence: rkrishnapriya@protonmail.com (R.K.P.); krishnaprakash3191@gmail.com (K.P.A.); aroco@udla.cl (A.R.-V.)



Citation: Mohan, A.; Priya, R.K.; Arunachalam, K.P.; Avudaiappan, S.; Maureira-Carsalade, N.; Roco-Videla, A. Investigating the Mechanical, Thermal, and Crystalline Properties of Raw and Potassium Hydroxide Treated Butea Parviflora Fibers for Green Polymer Composites. *Polymers* **2023**, *15*, 3522. <https://doi.org/10.3390/polym15173522>

Academic Editor: Raffaella Striani

Received: 24 June 2023

Revised: 13 August 2023

Accepted: 17 August 2023

Published: 28 August 2023



Copyright: © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Abstract: The only biotic factor that can satisfy the needs of human species are plants. In order to minimize plastic usage and spread an immediate require of environmental awareness, the globe urges for the development of green composite materials. Natural fibers show good renewability and sustainability and are hence utilized as reinforcements in polymer matrix composites. The present work concerns on the usage of Butea parviflora fiber (BP), a green material, for high end applications. The study throws light upon the characterization of raw and potassium hydroxide (KOH)-treated Butea Parviflora plant, where its physical, structural, morphological, mechanical, and thermal properties are analyzed using the powder XRD, FTIR spectroscopy, FESEM micrographs, tensile testing, Tg-DTA, Thermal conductivity, Chemical composition, and CHNS analysis. The density values of untreated and KOH-treated fibers are 1.238 g/cc and 1.340 g/cc, respectively. The crystallinity index of the treated fiber has significantly increased from 83.63% to 86.03%. The cellulose content of the treated fiber also experienced a substantial increase from 58.50% to 60.72%. Treated fibers exhibited a reduction in both hemicelluloses and wax content. Spectroscopic studies registered varying vibrations of functional groups residing on the fibers. SEM images distinguished specific changes on the raw and treated fiber surfaces. The Availability of elements Carbon, Nitrogen, and Hydrogen were analyzed using the CHNS studies. The tensile strength and modulus of treated fibers has risen to 192.97 MPa and 3.46 Gpa, respectively. Thermal conductivity (K) using Lee's disc showed a decrement in the K values of alkaliized BP. The activation energy E_a lies between 55.95 and 73.15 kJ/mol. The fibers can withstand a good temperature of up to 240 °C, presenting that it can be tuned in for making sustainable composites.

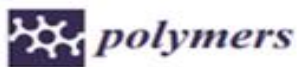
Keywords: green composites; stem fiber; crystallinity; thermal behavior; reinforcement material

1. Introduction

For centuries, the distinctive characteristics of natural fibers have made them valuable for diverse purposes. The properties of natural fibers, including their mechanical, physical, and chemical attributes, are contingent on factors such as the specific fiber type, the plant

3. Research Collaboration – Joint Author Publication

- Departamento de Ingeniería en Obras Civiles, Universidad de Santiago de Chile, Av. Ecuador 3659, Estación Central, Santiago 8320000, Chile
- Faculty of Engineering and Sciences, Universidad Adolfo Ibáñez, Santiago 7941169, Chile
- Department of Physiology, Saveetha Dental College and Hospitals, SIMATS, Chennai 600077, India
- Centro Nacional de Excelencia para la Industria de la Madera (CENAMAD), Pontificia Universidad Católica de Chile, Av. Vicuña Mackenna 4860, Santiago 8330024, Chile
- Departamento de Ingeniería Civil, Universidad de Concepción, Concepción 4070386, Chile
- Department of Civil Engineering, University College of Engineering Nagercoil, Anna University, Nagercoil 629004, India



Article

Biodegradable Green Composites: Effects of Potassium Permanganate (KMnO₄) Treatment on Thermal, Mechanical, and Morphological Behavior of Butea Parviflora (BP) Fibers

M. Abisha ¹, R. Krishna Priya ^{2,*}, Krishna Prakash Arunachalam ², Siva Avudaiappan ^{3,4,5}, Erick I. Saavedra Flores ⁶ and Pablo Fernando Parra ⁷

¹ PG & Research Department of Physics, Holy Cross College, Nagercoil, Affiliated to Maronmaniam Sundazhanar University, Tirunelveli 627012, India

² Department of Civil Engineering, University College of Engineering Nagercoil, Anna University, Nagercoil 629004, India; krishnaprakash3191@gmail.com

³ Departamento de Ingeniería Civil, Universidad de Concepción, Concepción 4070386, Chile

⁴ Centro Nacional de Excelencia para la Industria de la Madera (CENAMAD), Pontificia Universidad Católica de Chile, Av. Vicuña Mackenna 4860, Santiago 8330024, Chile

⁵ Department of Physiology, Saveetha Dental College and Hospitals, SIMATS, Chennai 600077, India

⁶ Departamento de Ingeniería en Obras Civiles, Universidad de Santiago de Chile, Av. Ecuador 3659, Estación Central, Santiago 8320000, Chile

⁷ Faculty of Engineering and Sciences, Universidad Adolfo Ibáñez, Santiago 7941169, Chile

* Correspondence: rkrishnapriya@protonmail.com

Abstract: This study emphasizes the importance of utilizing biodegradable material Butea parviflora (BP) fiber for sustainable solutions. BP fiber offers numerous ecological benefits, such as being lightweight, biodegradable, and affordable to recycle. The study examines the effects of potassium permanganate (KMnO₄) treatment on BP fiber and analyzes its physical and chemical behavior using various methods, including X-ray Diffraction (XRD) analysis, tensile testing, thermogravimetric analysis, thermal conductivity, Scanning Electron Microscopy (SEM), and Fourier Transform Infrared spectroscopic (FTIR) analysis. The results demonstrate that BP fiber possesses low density (1.40 g/cc) and high cellulose content (59.4%), which fosters compatibility between the matrix and resin. XRD analysis indicates a high crystallinity index (83.47%) and crystallite size (6.4 nm), showcasing exceptional crystalline behavior. Treated fibers exhibit improved tensile strength (198 MPa) and Young's modulus (4.40 GPa) compared to untreated fibers (tensile strength—92 MPa, tensile modulus—2.16 GPa). The T_g-DTA thermograms reveal the fiber's thermal resistance up to 240 °C with a kinetic activation energy between 62.80–63.46 KJ/mol. Additionally, the lowered thermal conductivity (K) from Lee's disc experiment suggests that BP fiber could be used in insulation applications. SEM photographic results display effective surface roughness for composite making, and FTIR studies reveal vibrational variations of cellulosic functional groups, which correlates with increased cellulosic behavior. Overall, the study affirms the potential of BP fiber as a reinforcing material for composite-making while emphasizing the importance of utilizing biodegradable materials for sustainability.

Keywords: cellulosic fiber; crystallinity; sustainability; green composites



Citation: Abisha, M.; Priya, R.K.; Arunachalam, K.P.; Avudaiappan, S.; Saavedra Flores, E.I.; Parra, P.F. Biodegradable Green Composites: Effects of Potassium Permanganate (KMnO₄) Treatment on Thermal, Mechanical, and Morphological Behavior of Butea Parviflora (BP) Fibers. *Polymers* **2023**, *15*, 2197. <https://doi.org/10.3390/polym15092197>

Academic Editor: Kristine V. Aleksanyan

Received: 20 March 2023

Revised: 17 April 2023

Accepted: 22 April 2023

Published: 5 May 2023



Copyright: © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

Technological advancement provides valuable resources along with ruins that are primarily non-biodegradable. There are high hopes that bio composites infused with natural fibers will attain a pollution-free environment and reduce synthetic acquisition. Reduced mass fraction and density are the two key variables that prioritize the use of natural fibers as reinforcements. A key factor that impacts the utility and availability of product in the market is its structural design, which is predominantly overtaken by synthetic materials. Now, the natural fiber composites are turning out to be trend-setters with their adaptability

4. Research Collaboration – Joint Author Publication

- a. Manonmanium Sundaranar University, Tirunelveli, 627012, Tamil Nadu, India
- b. School of Chemical Engineering, Yeungnam University, Gyeongsan-si, 712-749, South Korea.
- c. Division of Chemistry, AAA College of Engineering and Technology, Amathur, 626005, Virudhunagar District, Tamil Nadu, India.
- d. Green Technology and Sustainable Development in Construction Research Group, Van Lang School of Engineering and Technology, Van Lang University, Ho Chi Minh City, Viet Nam.
- e. Department of Mechanical Engineering, Lord Jegannath College of Engineering and Technology, Marungoor, 629402, Kanyakumari District, Tamil Nadu, India.
- f. Department of Mechanical Engineering and Chemistry & Research Centre, Mohamed Sathak Engineering College, Kilakarai, 623 806, Ramanathapuram, Tamil Nadu, India

Environmental Research 253 (2023) 116415



Contents lists available at ScienceDirect

Environmental Research

journal homepage: www.elsevier.com/locate/environres



Physico-chemical and extraction properties on alkali-treated Acacia pennata fiber

K.R. Jaya Sheeba^{a,b,c,d}, Jagadeesh Kumar Alagarasan^{c,e}, Jeyaprakash Dharmaraja^d, S. Anne Kavitha^{a,b}, Sutha Shobana^c, Sundaram Arvindnarayan^e, Manoharan Vadivel^e, Moonyong Lee^c, Krishna Priya Retnam^{a,b,c,f}

^a PG & Research Department of Physics, Holy Cross College (Autonomous), Nagercoil, India
^b Manonmaniam Sundaranar University, Tirunelveli, 627012, Tamil Nadu, India
^c School of Chemical Engineering, Yeungnam University, Gyeongsan-si, 712-749, South Korea
^d Division of Chemistry, AAA College of Engineering and Technology, Amathur, 626005, Virudhunagar District, Tamil Nadu, India
^e Green Technology and Sustainable Development in Construction Research Group, Van Lang School of Engineering and Technology, Van Lang University, Ho Chi Minh City, Viet Nam
^f Department of Mechanical Engineering, Lord Jegannath College of Engineering and Technology, Marungoor, 629402, Kanyakumari District, Tamil Nadu, India
^g Department of Mechanical Engineering and Chemistry & Research Centre, Mohamed Sathak Engineering College, Kilakarai, 623 806, Ramanathapuram, Tamil Nadu, India

ARTICLE INFO

Keywords:
 Acacia pennata fibers
 Physico-chemical
 Thermal
 Crystallinity index
 Surface morphology
 Tensile properties

ABSTRACT

The production of reinforced composite materials can generally benefit greatly from the use of natural cellulosic woody fibers as good sustainable resources. Natural plants like hemp, cotton, and bamboo are great options for knitters and crocheters looking to make eco-friendly goods. The current study examines the properties of natural fiber obtained from the stem of the Acacia pennata (AP) plant, as well as its basic physico-chemical, structural, thermal, and mechanical characteristics. The key goal of this work was to investigate how alkali treatment affected the AP fibers' morphology, chemical composition, tensile capabilities, morphological changes, structural changes, and thermal degradation (APFs). The SEM image and pXRD analyses support the improved surface roughness of the fiber, and that was seen after the alkaline treatment. From XRD analysis, the fiber crystallinity index (54.65%) was improved and it was connected to their SEM pictograms in comparison to untreated APF. Alkali-treated AP fibers include a higher percentage of chemical components including cellulose (51.38%) and ash (5.13%). Alkali-treated AP fibers have a lower amount of hemicellulose (30.30%), lignin (20.96%), pectin (8.77%), wax (0.12%), and moisture (13.44%) than untreated APF. Their low density and high cellulosic content will improve their ability to fiber matrices. The thermal behavior of AP fiber at various temperatures was demonstrated by TG-DTA analysis, and tensile strength was also investigated.

1. Introduction

In nature, there is a variety of natural fiber materials that can be notable by their origin. Precisely, those materials are falling into three categories viz. animal, mineral, and plant-derived fibers (Celino et al., 2014; Gopinath et al., 2022a, 2022b; Machaka et al., 2014; Pal et al., 2022; Tivari and Sarangi, 2022). Such fiber materials find their wide applications in the manufacture of composite materials (Kim et al., 2020; Ramesh et al., 2022a, 2022b; Sévastremanian et al., 2021).

Natural fibers are a renewable resource and possessing several advantages associated with them, such as providence of high specific stiffness along with strength, desirable fiber aspect ratio, biodegradability, and ease of availability from natural sources (Kim et al., 2020; Mohanaveli et al., 2022; Veerasimman et al., 2022). Further, such characteristics made them predominantly attractive to various industrial applications. Regarding the raw wood materials utilized for papermaking industry, due consideration is given to the global environment as of the waste needle leaf tree materials from lumber mills can be applied in a large

^{*} Corresponding author.
^{**} Corresponding author.
 E-mail addresses: moonyong@yu.ac.kr (M. Lee), krishnapriya@holycross.edu.in (K.P. Retnam).
[†] K.R. Jaya Sheeba and Jagadeesh Kumar Alagarasan have equal contribution to this work.

<https://doi.org/10.1016/j.environres.2023.116415>
 Received 31 October 2022; Received in revised form 30 April 2023; Accepted 12 June 2023
 Available online 19 June 2023
 0013-9351/© 2023 Elsevier Inc. All rights reserved.



5. Research Collaboration – Joint Author Publication

- Facultad de Salud y Ciencias Sociales, Universidad de las Américas, Providencia, Santiago 7500975, Chile
- Departamento de Ingeniería Civil, Universidad Católica de la Santísima Concepción, Concepción 4090541, Chile
- Department of Physiology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai 600077, India
- Centro Nacional de Excelencia para la Industria de la Madera (CENAMAD), Pontificia Universidad Católica de Chile, Av. Vicuña Mackenna 4860, Santiago 8330024, Chile
- Departamento de Ingeniería Civil, Universidad de Concepción, Concepción 4070409, Chile
- Department of Civil Engineering, College of Engineering Nagercoil, Anna University, Kanyakumari 629004, India




Article

Characterisation of Sodium Acetate Treatment on *Acacia pennata* Natural Fibres

Kasirajan Rajam Jaya Sheeba ¹, Retnam Krishna Priya ^{2,*}, Krishna Prakash Arunachalam ^{2,3}, Siva Avudalappan ^{3,4,5}, Nelson Moreira-Carsalade ^{6,7} and Ángel Roco-Videla ^{7,8,*}

- ¹ PG & Research Department of Physics, Holy Cross College (Autonomous), Manonmaniam Sundaranar University, Nagercoil 627012, Tamil Nadu, India
- ² Department of Civil Engineering, College of Engineering Nagercoil, Anna University, Kanyakumari 629004, India; krishnaprakash1191@gmail.com
- ³ Departamento de Ingeniería Civil, Universidad de Concepción, Concepción 4070409, Chile
- ⁴ Centro Nacional de Excelencia para la Industria de la Madera (CENAMAD), Pontificia Universidad Católica de Chile, Av. Vicuña Mackenna 4860, Santiago 8330024, Chile
- ⁵ Department of Physiology, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai 600077, India
- ⁶ Departamento de Ingeniería Civil, Universidad Católica de la Santísima Concepción, Concepción 4090541, Chile
- ⁷ Facultad de Salud y Ciencias Sociales, Universidad de las Américas, Providencia, Santiago 7500975, Chile
- ⁸ Correspondence: rkrishnapriya@protonmail.com (R.K.P.); aroco@udla.cl (Á.R.-V.)

Abstract: The present study concerns the physico-chemical, structural, mechanical and thermal characterization of *Acacia pennata*, a natural and almost inexpensive fibre, as a potential reinforcement in polymer composites. The effect of treating the fibre with sodium acetate to increase its qualities has been seen through the use of thermogravimetric analysis, scanning electron microscope (SEM) analysis, X-ray diffraction (XRD), mechanical property tester, and Fourier transform infrared spectroscopy (FTIR). According to XRD analysis, the elimination of lignin and wax-like impurities resulted in an increase in the AP fibre's crystalline index (79.73%). The fibre's thermal stability was also discovered to be 365 °C. Tensile strength (557.58 MPa) and elongation at break both increased by 2.9% after treatment with sodium acetate. The surface nature and quality of AP fibres improved after sodium acetate treatment. It was confirmed by the reduction of chemical compositions (such as hemicellulose, lignin and pectin). Given its density, the fibre can be suggested as a reinforcement in polymer composites for light-weight applications because its lightweight property will be more useful for composite manufacturing.

Keywords: chemical composition; X-ray diffraction; fourier transform infrared spectroscopy; thermal stability; tensile strength

1. Introduction

In recent years, interest in the powerful use of bio-polymeric materials has expanded significantly. Natural fibres, sometimes referred to as non-wood lignocellulose materials, are being researched as potential environmentally friendly composites that could reduce or replace synthetic fibres and polymers. Environmentally friendly materials have come into consideration as a result of rising environmental awareness and public interest, new environmental rules, and unsustainable petroleum consumption. Natural fibre is regarded as one of the eco-friendly materials with superior qualities to synthetic fibre [1]. Natural fibres are fibres that are not artificial or synthetic. They may come from either plants or animals [2]. The production of composite materials using natural fibres such as jute, flax, sisal and oil palm, both renewable and non-renewable resources, has attracted a lot of attention in recent decades [3–5].

 **check for updates**

Citation: Sheeba, K.R.J.; Priya, R.K.; Arunachalam, K.P.; Avudalappan, S.; Moreira-Carsalade, N.; Roco-Videla, Á. Characterisation of Sodium Acetate Treatment on *Acacia pennata* Natural Fibres. *Polymers* **2023**, *15*, 1996. <https://doi.org/10.3390/polym15091996>

Academic Editor: Sand Kumar Ramamoorthy

Received: 28 February 2023
Revised: 14 April 2023
Accepted: 17 April 2023
Published: 25 April 2023



Copyright: © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Polymers **2023**, *15*, 1996. <https://doi.org/10.3390/polym15091996> <https://www.mdpi.com/journal/polymers>



6. Research Collaboration – Joint Author Publication

- Facultad de Salud y Ciencias Sociales, Universidad de las Américas, Providencia, Santiago 7500975, Chile.
- Departamento de Ingeniería Civil, Universidad Católica de la Santísima Concepción, Concepción 4090541, Chile.
- Department of Physiology, Saveetha Dental College and Hospitals, SIMATS, Chennai 600077, India.
- Centro Nacional de Excelencia para la Industria de la Madera (CENAMAD), Pontificia Universidad Católica de Chile, Av. Vicuña Mackenna 4860, Santiago 8330024, Chile.
- Departamento de Ingeniería Civil, Universidad de Concepción, Concepción 4070386, Chile.
- Department of Civil Engineering, University College of Engineering, Anna University, Nagercoil 629004, India.



Article

Investigation on Properties of Raw and Alkali Treated Novel Cellulosic Root Fibres of Zea Mays for Polymeric Composites

S. Anne Kavitha ¹, D. Krishna Priya ^{1*}, Krishna Prakash Arunachalam ², Siva Avudaiappan ^{3,4,5}, Nelson Maureira-Carsalade ⁶ and Angel Roco-Videla ^{7,*}

¹ PG & Research Department of Physics, Holy Cross College (Autonomous), Nagercoil, Manonmaniam Sundaranar University, Tirunelveli 627012, India

² Department of Civil Engineering, University College of Engineering, Anna University, Nagercoil 629004, India

³ Departamento de Ingeniería Civil, Universidad de Concepción, Concepción 4070386, Chile

⁴ Centro Nacional de Excelencia para la Industria de la Madera (CENAMAD), Pontificia Universidad Católica de Chile, Av. Vicuña Mackenna 4860, Santiago 8330024, Chile

⁵ Department of Physiology, Saveetha Dental College and Hospitals, SIMATS, Chennai 600077, India

⁶ Departamento de Ingeniería Civil, Universidad Católica de la Santísima Concepción, Concepción 4090541, Chile

⁷ Facultad de Salud y Ciencias Sociales, Universidad de las Américas, Providencia, Santiago 7500975, Chile

* Correspondence: rkrishtupriya@protonmail.com (R.K.P.); anoco@udla.cl (Á.R.-V.)

Abstract: Today, new materials based on natural fibres have been emerging day by day to completely eradicate plastics to favour our environmental nature. In this view, the present work is based on the extraction and characterisation of the novel root fibres of the Zea mays (Zm) plant, grown by the hydroponic method. Both the dried untreated and alkali treated root fibres are investigated using a variety of structural, morphological, thermal, elemental and mechanical tests by subjecting both the samples to p-XRD, FT-IR, SEM-EDAX, TGA-DTA, CHNS and tensile strength analyses. Thermal conductivity of the untreated and treated fibres is found using Lee's disc experiment. From p-XRD analysis, the Crystallinity Index, Percentage Crystallinity and Crystallite size of the samples are found. FT-IR studies clarify the different vibrational groups associated with the fibre samples. SEM images show that the surface roughness increases for the chemically treated samples, such that it may be effectively utilised as reinforcement for polymeric composites. The diameter of the fibre samples is found using SEM analysis. According to the EDAX spectrum, Zm fibres in both their raw and processed forms have high levels of Carbon (C) and Oxygen (O). The TGA-DTA tests revealed that the samples of natural fibre have good thermal characteristics. CHNS studies show that Carbon content is high for these samples, which is the characteristic of many natural fibres. Chemical analysis is used to ascertain the prepared samples' chemical makeup. It reveals that both samples have significant amounts of cellulose. The density of the fibres is found to be in the range 0.3–0.6 g/cc, which is much less than any other natural fibre. Therefore, it can be used in light weight applications. From the tensile strength analysis, physical properties such as Young's modulus and micro-fibril angle are determined. The fibres in the roots exhibit a lower tensile strength. Thus, these fibres can be used in powdered form as reinforcement for natural rubber or epoxy composites. After examining all of its properties, it could be reasonably speculated that Zea mays root fibres can be considered as an efficient reinforcement for various matrices to produce attractive bio-composites.

Keywords: Zea mays (Zm); root fibres; structural; TGA-DTA; light weight; reinforcement



Citation: Kavitha, S.A.; Priya, R.K.; Arunachalam, K.P.; Avudaiappan, S.; Maureira-Carsalade, N.; Roco-Videla, A. Investigation on Properties of Raw and Alkali Treated Novel Cellulosic Root Fibres of Zea Mays for Polymeric Composites. *Polymers* **2023**, *15*, 1802. <https://doi.org/10.3390/polym15071802>

Academic Editors: Anamaria Irimia and Carmen-Mihaela Popescu

Received: 26 February 2023

Revised: 29 March 2023

Accepted: 30 March 2023

Published: 6 April 2023



Copyright: © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

The prevailing philosophy of the modern world is "Go green and Earth will be clean". This credo inspires engineers and scientists to develop novel materials based on natural fibres. A group of cells with a small diameter relative to their length may be referred to as a natural fibre. Using a variety of extraction techniques, natural fibres are removed from

7. Research Collaboration – Joint Author Publication

- Department of Physics, Alagappa University, Karaikudy 630003, India
- National Centre for Nanoscience and Nanotechnology, Guindy Campus, University of Madras, Chennai 600025, India
- Department of Physics, Mar Ivanios College (Autonomous), Thiruvananthapuram, Kerala, 695015, India

METSZET JOURNALISSN:2061-2710

Mechanically potent Organo-strontium crystal as optical filters in the Ultraviolet region

T. Retna Kumar¹, M. Abila Jeba Queen^{2*}, L.C. Bright³ and R. Ilangoan⁴

¹ Department of Nanoscience and Nanotechnology, Alagappa University, Karaikudi-630003, India
² Department of Physics, Holy Cross College (Autonomous), Nagercoil -629004, India.
³ Department of Physics, Mar Ivanio's College, Thiruvananthapuram - 695015, India.
⁴ National Centre for Nanoscience and Nanotechnology, Guindy Campus, University of Madras, Chennai 600025, India

Abstract
Organometallic complex crystals are evolving as a mechanically potent and chemically flexible for optical filters. Here we crystallised Alanine cadmium chloride (ACC) and strontium admixed Alanine cadmium chloride amino metallic crystals by a simple technique at normal atmospheric pressure and temperature. Density measurements of the grown crystals were carried out using the simple flotation technique. On the particular face of (101) plane high mechanical properties achieved for the strontium admixed crystal. Optical properties are analysed by means of the spectroscopic techniques, the higher transmittance in the region 250 -1800 nm. This property and calculated optical parameters favours the material is possible for optical filters in ultra violet region.

Keywords
L-Alanine Cadmium Chloride; Microhardness; Refractive index; Strontium.

Introduction
Single crystals of organometallic compounds have been assessed as a feasible material for an optical and mechanical properties therefore actively researched in the recent years [1, 2]. Organo-strontium is an organometallic compound that contains at least one or more linkage between the strontium carbon bonds. The main application of strontium compound considered as a high beta emitter which prevents X-ray emission [3, 4]. In the medical field also strontium plays an important role such as prevents teeth sensitivity, main composition in bones and dentals [5]. L-Alanine is the simplest and neutral amino acid which exists as zwitterions; it possesses high transparency with favourable mechanical and optical properties crystallized in orthorhombic crystal structure with space group $P2_1$ and the cell parameters are $a = 6.032 \text{ \AA}$, $b = 12.343 \text{ \AA}$, $c = 5.784 \text{ \AA}$; $\alpha = \beta = \gamma = 90$ [6]. The incorporation of L-Alanine Cadmium chloride and strontium have been developed as a potential organic crystals as organic waveguides in the visible region. As some of the organometallic compounds that stands before as a organic wave guides, their optical, physical and mechanical properties are accessible and tuneable [1].

The single crystal namely L-Alanine Cadmium Chloride was first crystallized by the team of Kathleen et al. [7] and its physico chemical properties are studied by different research groups due to its wide optical applications [8, 9]. The wide varying properties of the compound have been altered and reported by adding different metallic compounds as impurities [10-13]. This review proves that no such report based on the strontium added

VOLUME 8 ISSUE 1PAGE NO: 171

8. Research Collaboration – Joint Author Publication

- Department of Physics, Alagappa University, Karaikudy 630003, India
- National Centre for Nanoscience and Nanotechnology, Guindy Campus, University of Madras, Chennai 600025, India
- Department of Physics, Mar Ivanios College (Autonomous), Thiruvananthapuram, Kerala, 695015, India
- Department of Nanoscience and Nanotechnology, Alagappa University, Karaikudi, 630003, India

Investigation on the physico-chemical properties of Sodium L-Alanine Cadmium chloride crystal and assessment for their Non Linear Optical response

Section A-Research paper



Investigation on the physico-chemical properties of Sodium L-Alanine Cadmium chloride crystal and assessment for their Non Linear Optical response

T. Retna Kumar¹, M. Abila Jeba Queen^{2,*}, K.C. Bright³, R. Ilangoan⁴ and V. Sathyanarayana⁵

¹ Department of Nanoscience and Nanotechnology, Alagappa University, Karaikudi 630003, India

² Department of Physics, Holy Cross College (Autonomous), Nagercoil 629004, India.

³ Department of Physics, Mar Ivanio's College (Autonomous), Thiruvananthapuram, Kerala 695015, India.

⁴ National Centre for Nanoscience and Nanotechnology, Guindy Campus, University of Madras, Chennai 600025, India

⁵ Department of Physics, Alagappa University, Karaikudy 630003, India.

*Corresponding Author, e-mail:jeba.abi@gmail.com

Abstract

Non linear optical crystals L-Alanine Cadmium Chloride (LACC) and sodium admixed LACC have been grown as semi-organic single crystals using the slow evaporation crystal growth process at pH 5.0. Densities of the crystals are measured using Flotation method. The host lattice of LACC has sodium compounds, according to the Atomic Absorption Spectroscopy (AAS) technique and Energy Dispersive X-ray (EDAX) Analysis. From the Single Crystal X-ray Diffraction (SCXRD) studies, the crystalline structure and associated crystallographic axes were calculated. To distinguish between the various functional groups present Fourier transform infrared (FTIR) spectroscopic method is applied. Thermo gravimetric analysis determines the thermal properties of the pure and sodium admixed LACC crystal. The micro hardness test is used to determine the nature of the formed crystals. Absorbance percentage of sodium mixed LACC crystals were recorded using Ultra - Violet Spectrophotometer instrument and the calculated optical band gap confirms that the crystals are insulators. Using Nd-YAG LASER source, non linear optical phenomena of the prepared crystals was confirmed and sodium doped LACC crystals shows higher Second Harmonic Generation (SHG) efficiency than the pure LACC crystal. Dielectric properties were reported using the dielectric studies and found that the AC activation energy is higher at 100 Hz.

Keywords

L-Alanine Cadmium chloride; Activation energy; Density; Micro Hardness.

INTRODUCTION

In modern days the growth of semi organic crystals with nonlinear optical properties are mostly utilized in the research areas like optical data storage devices, optical signal processing technique, optical switching purpose etc., [1]. An amino acid crystal has wide NLO properties due to the presence of carboxyl group which act as a proton donors and amino group as proton acceptors. Sodium atom is an ionic compound having only one electron in the valance shell [2]. Because of its unique properties of low atomic mass and large atomic radius, sodium has least dense compared to all elemental metals which act as a best insulators and electrides [3]. Sodium compounds have immense commercial industry



9. Research Collaboration – Joint Author Publication

- Department of Physics, Mar Ivanios College (Autonomous), Thiruvananthapuram, Kerala, 695015, India
- Department of Nanoscience and Nanotechnology, Alagappa University, Karaikudi, 630003, India


SPRINGER LINK Log In

Find a journal | Publish with us | Track your research | Cart

Home > Chemistry Africa > Article

Comparative Study on Structural, Mechanical, Optical and Dielectric Properties of L-Alanine Cadmium Chloride and Manganese L-Alanine Cadmium Chloride Crystal


Original Article | Published: 13 May 2023
Volume 6, pages 3223–3236, (2023) [Cite this article](#)




Chemistry Africa

[Aims and scope](#) →



[Submit manuscript](#) →

T. Retna Kumar, M. Abila Jeba Queen,  K. C. Bright, R. Rangovan & K. Sankaranarayanan

 58 Accesses | [Explore all metrics](#) →

Abstract

Here in, we reported the comparative study of L-Alanine Cadmium chloride (ACC) and Manganese L-Alanine Cadmium chloride (MnACC) crystal on its growth, structural, mechanical, optical and dielectric properties for NLO applications. Initially ACC and MnACC single crystals were grown at the ambient temperature by solvent evaporation solution growth technique. Both crystals are members of the monoclinic crystal system, according to an X-Ray Diffraction investigation. The crystals were identified as belonging to the soft material category by Vickers micro hardness investigations, which also measured the crystal's yield strength and tensile strength. Optical studies exhibit lower cut off wavelength and the linear and non linear transmittance enhances in the visible region. Dielectric natures of the samples were studied and the activation energy at 100 Hz was found to be as 0.16 eV and 0.26 eV for L-Alanine Cadmium chloride (ACC) and Manganese L-Alanine Cadmium chloride respectively. The effects of manganese on the functional groups are analyzed using Fourier Transform Infra Red (FTIR) analysis.

 This is a preview of subscription content. [log in via an institution](#)  to check access.

Data Availability

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

References


- Arivuoli D (2001) J Phys 57:5

Access this article

Log in via an institution →

Buy article PDF 39.95 €

Price includes VAT (India)
Instant access to the full article PDF.

Rent this article via [DeepDive](#) 

[Institutional subscriptions](#) →

sections | [Figures](#) | [References](#)

[Abstract](#)

[Data Availability](#)

[References](#)

[Author information](#)


[Ethics declarations](#)

[Rights and permissions](#)

[About this article](#)

Advertisement

Topics in Current Chemistry Collections



Explore the submission guidelines and our author services.

Learn more


Springer | [springer.com](#)

Crossref Scholar


10. Research Collaboration – Joint Author Publication

- a. Department of Physics, Mar Ivanios College (Autonomous), Thiruvananthapuram, Kerala, 695015, India

J Mater Sci: Mater Electron
(2023)34:181



Investigation on the effect of Potassium on the structural, optical and thermal properties of the L-Threonine Cadmium acetate: Elucidation of organo-cadmium compound for dielectric filters

M. Abila Jeba Queen^{1*} , K. C. Bright², and P. Aji Udhaya¹

¹Department of Physics, Holy Cross College (Autonomous), Nagercoil 629004, India
²Department of Physics, Mar Ivanios College (Autonomous), Thiruvananthapuram, Kerala 695015, India

Received: 22 April 2022
Accepted: 7 December 2022

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2023

ABSTRACT

In this study, the metal cation potassium-doped organo-cadmium compound has been prepared from the chemical reaction between amino acid and metal complexes by slow evaporation technique. The resultant compound belongs to monoclinic crystal system with two ligancies and a two-fold configuration. The presence of potassium metal via the organo-cadmium compound has been estimated using energy-dispersive X-ray analysis. The optical characteristics and bandgap edges calculations show that it is a good insulator for energy storage applications. The integration of potassium causes disruption within the parent compound's host lattice, resulting in an increase in static permittivity. Furthermore, the influence of potassium increases Fermi velocity, Fermi temperature, and plasma energy, according to theoretical studies. Potassium also improves thermal stability and magnetic properties. Using a Neodymium-doped Yttrium Aluminum Garnet (Nd-YAG) laser, the crystal's nonlinear optical property was investigated.


1 Introduction

Nowadays, the developments of new organometallic compounds with excellent optical and dielectric properties are attracted toward the researchers due to its biocompatibility and sensor applications [1]. Organometallic species belong to the general class of coordination compound and they have synthesized with a wide variety of organic substrate [2].

Nonlinear optical organometallic crystals with higher Second Harmonic Generation (SHG) efficiency and Ultra Violet (UV)-Visible transparency are necessary for numerous device applications [3, 4]. In this regard, amino acid organometallic crystals are important candidates for NLO applications because of its non-centrosymmetric and zwitterionic structure. The material's superior optical, thermal, and magnetic stabilities lead to their extensive use in a

Address correspondence to E-mail: jeba.abi@gmail.com

<https://doi.org/10.1007/s10854-022-09620-9>
Published online: 20 January 2023





11. Research Collaboration – Joint Author Publication

- a. PG & Research Department of Physics, Paavendhar College of Arts & Science, M.V. South, Thalaivasal, Salem, Tamilnadu, 636 121, India
- b. Department of Biochemistry, Dwaraka Doss Goverdhan Doss Vaishnav College, Chennai, Tamilnadu, 600 106, India
- c. Department of Chemistry, Graphic Era (Deemed to be University), Bell Road, Clement Town, Dehradun, Uttarakhand, 248002, India
- d. Department of Chemistry, College of Science, King Saud University, P.O. Box 2455, 11451, Riyadh, Saudi Arabia
- e. Department of Electronics and Communication Engineering, Centurion University of Technology and Management, Bhubaneswar, Odisha, 752050, India
- f. Department of Materials Science and Engineering and Chemical Engineering, Universidad Carlos III de Madrid, Avenida de la Universidad 30, Leganés, 28911, Madrid, Spain
- g. Division of Research Innovation, Uttaranchal University, Dehradun, India
- h. Division of Research and Development, Lovely Professional University, Punjab, India
- i. Department of Chemistry, GLA University, Mathura, 281406, India
- j. Department of Biotechnology, Periyar University Centre for Post Graduate and Research Studies, Dharmapuri, Tamil Nadu, 635 205, India
- k. Department of Applied Physics, Sri Venkateswara College of Engineering, Ponnalur, Sriperumbudur, Tamil Nadu, 602 117, India

Journal of Inorganic and Organometallic Polymers and Materials
<https://doi.org/10.1007/s10904-023-02820-8>

RESEARCH



Facile Synthesis of Ni²⁺ Doped MgFe₂O₄ Spinel Nanoparticles: Structural, Optical, Magnetic, and Dielectric Behavior

R. Revathi¹ · M. Sukumar² · Anuj Kumar³ · Manish Gupta⁴ · F. Aji Udhaya⁵ · Satbir S. Sehgal⁶ · Bidhan Pandit⁷ · M. Sundararajan⁸ · A. Subramani⁹ · Chandra Sekhar Dash¹⁰ · N. Semnikumar¹¹ · Mohd Ubaidullah¹²

Received: 4 May 2023 / Accepted: 3 August 2023

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2023

Abstract

Nickel-doped magnesium cubic spinel ferrite nanoparticles (NPs) were prepared through the microwave combustion method (MCM). The structure of magnesium ferrite normal spinel is obtained from XRD analysis. The average crystallite size is between 26 and 17 nm. The elemental compositions and oxidizing states of Ni²⁺ doped MgFe₂O₄ ferrites were evaluated by using XPS analysis. The morphology of spinel nanoparticles was studied using HR-SEM images. The energy dispersive X-ray method is used for ensuring the presence of elements and the band gap value 2.09, 2.02, 1.85, and 1.82 eV have been obtained using the tau*c relation. The magnesium spinel structure is confirmed in the band at 434 and 561 cm⁻¹ which corresponds to the stretching vibration of the octahedral site (Mg²⁺-O²⁻) and tetrahedral site (Fe³⁺-O²⁻) respectively. From the hysteresis loops the magnetic features viz. H_c, M_r, and M_s were determined. Further dielectric studies and AC conductivity of the prepared samples are performed.

Keywords Magnesium ferrite · Surface chemistry · Band gap · Ferromagnetism · Dielectric properties

✉ M. Sukumar
msukumsc@gmail.com

✉ M. Sundararajan
sundar15msc@gmail.com

✉ Chandra Sekhar Dash
chandu0071@gmail.com

✉ Mohd Ubaidullah
mtayyab@ksu.edu.sa

¹ Department of Biotechnology, Periyar University Centre for Post Graduate and Research Studies, Dharmapuri, Tamil Nadu 635 205, India

² Department of Applied Physics, Sri Venkateswara College of Engineering, Ponnalur, Sriperumbudur, Tamil Nadu 602 117, India

³ Department of Chemistry, GLA University, Mathura 281406, India

⁴ Division of Research and Development, Lovely Professional University, Punjab, India

⁵ Department of Physics, Holy Cross College (Autonomous), Nagercoil, Tamilnadu 629 004, India

⁶ Division of Research Innovation, Uttaranchal University, Dehradun, India

⁷ Department of Materials Science and Engineering and Chemical Engineering, Universidad Carlos III de Madrid, Avenida de la Universidad 30, Leganés, 28911 Madrid, Spain

⁸ PG & Research Department of Physics, Paavendhar College of Arts & Science, M.V. South, Thalaivasal, Salem, Tamilnadu 636 121, India

⁹ Department of Biochemistry, Dwaraka Doss Goverdhan Doss Vaishnav College, Chennai, Tamilnadu 600 106, India

¹⁰ Department of Electronics and Communication Engineering, Centurion University of Technology and Management, Bhubaneswar, Odisha 752050, India

¹¹ Department of Chemistry, Graphic Era (Deemed to be University), Bell Road, Clement Town, Dehradun, Uttarakhand 248002, India

¹² Department of Chemistry, College of Science, King Saud University, P.O. Box 2455, 11451 Riyadh, Saudi Arabia

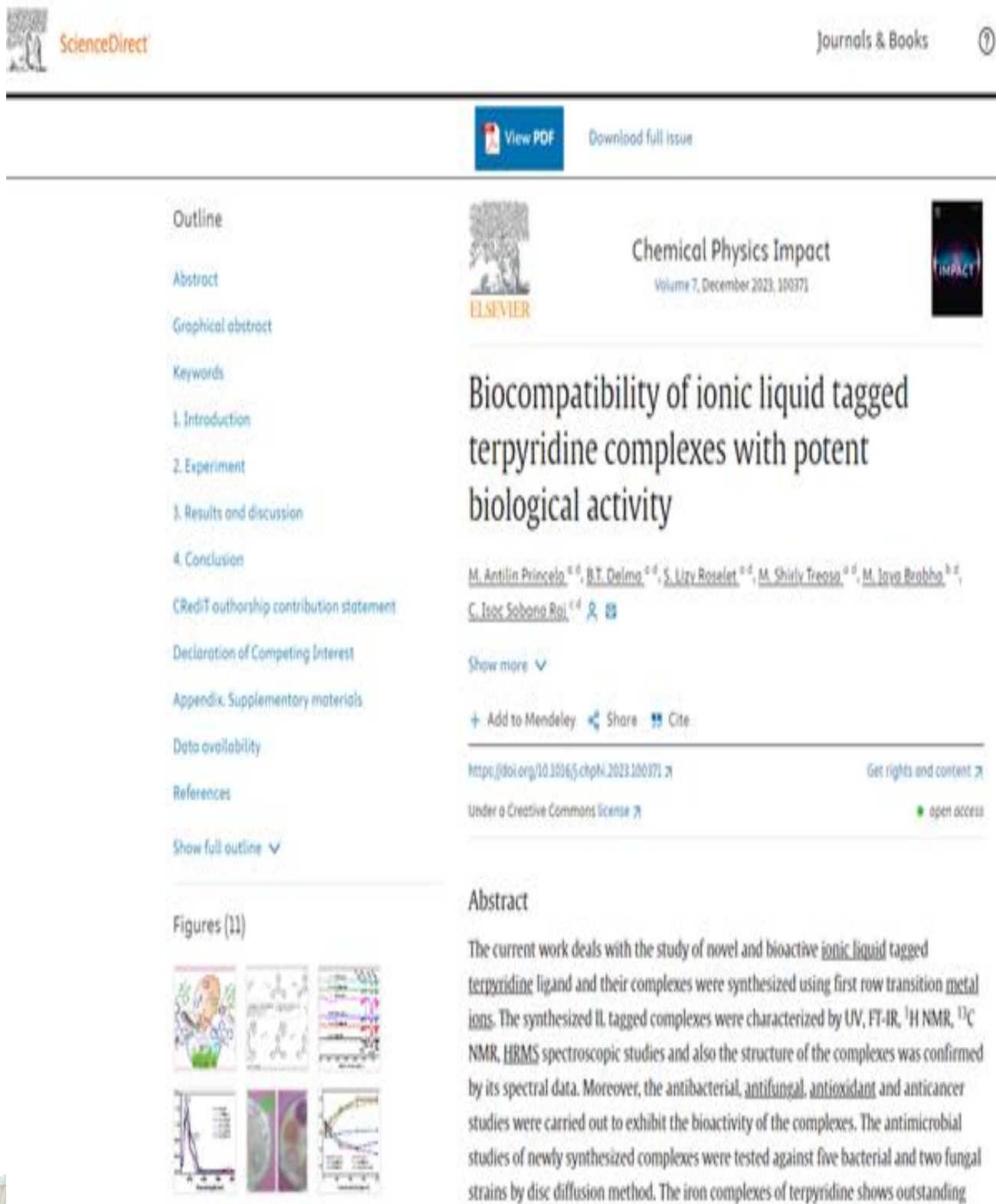
Published online: 26 August 2023

Springer

DEPARTMENT OF CHEMISTRY

1. Research Collaboration – Joint Author Publication

- Department of Chemistry, Nesamony Memorial Christian College, Marthandam, 629165
- Department of Chemistry, Annai Velankanni College, Tholayavattam - 629 157

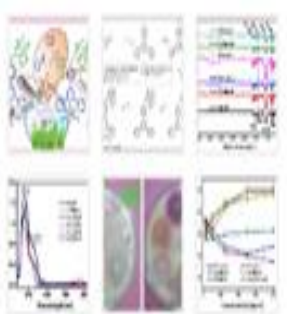


The screenshot shows the ScienceDirect interface for the article "Biocompatibility of ionic liquid tagged terpyridine complexes with potent biological activity". The journal is "Chemical Physics Impact", Volume 7, December 2023, 100371. The authors listed are M. Antlin Princeia, B.T. Dalma, S. Lizy Roselet, M. Shirly Treasa, M. Jaya Babha, C. Isaac Sabana Raj, and others. The article is under a Creative Commons license and is open access. The abstract states that the study deals with novel and bioactive ionic liquid tagged terpyridine ligands and their complexes, synthesized using first row transition metal ions. The complexes were characterized by UV, FT-IR, ¹H NMR, ¹³C NMR, and HRMS spectroscopic studies. The structure of the complexes was confirmed by their spectral data. Moreover, antibacterial, antifungal, antioxidant, and anticancer studies were carried out to exhibit the bioactivity of the complexes. The antimicrobial studies of newly synthesized complexes were tested against five bacterial and two fungal strains by disc diffusion method. The iron complexes of terpyridine shows outstanding

Outline

- Abstract
- Graphical abstract
- Keywords
- 1. Introduction
- 2. Experiment
- 3. Results and discussion
- 4. Conclusion
- CRediT authorship contribution statement
- Declaration of Competing Interest
- Appendix. Supplementary materials
- Data availability
- References
- Show full outline

Figures (11)




Abstract

The current work deals with the study of novel and bioactive ionic liquid tagged terpyridine ligand and their complexes were synthesized using first row transition metal ions. The synthesized IL tagged complexes were characterized by UV, FT-IR, ¹H NMR, ¹³C NMR, HRMS spectroscopic studies and also the structure of the complexes was confirmed by its spectral data. Moreover, the antibacterial, antifungal, antioxidant and anticancer studies were carried out to exhibit the bioactivity of the complexes. The antimicrobial studies of newly synthesized complexes were tested against five bacterial and two fungal strains by disc diffusion method. The iron complexes of terpyridine shows outstanding

2. Research Collaboration – Joint Author Publication

a. Department of Chemistry, Annai Velankanni College, Tholayavattam - 629 157



The screenshot shows the ScienceDirect interface for the journal *Chemical Physics Impact*, Volume 7, December 2021, 100248. The article title is "Synthesis, characterization and biological activity of zinc complexes of ethylenediamine and its derivatives" by M. Jeyarajitha¹, M. Anitha Malvi², & R. S. The authors' ORCID iD is also visible. The article is available as a PDF and can be downloaded. The left sidebar contains a table of contents with links to Outline, Abstract, Graphical Abstract, Keywords, Introduction, Synthesis of chelating metal complexes, Elemental analysis, FT-IR Spectroscopy, ¹H NMR spectroscopy, Powder X-ray diffraction study, Conclusion, Credit author contribution statement, Declaration of Competing Interest, Appendix: Supplementary materials, Data availability, References, and Show full outline. Below the sidebar is a section for Figures (9), which includes a Venn diagram and several chemical structures. The abstract text is as follows:

Abstract

Inorganic Complexes are widely used in pharmaceutical industry. Especially chelating complexes are used as the scavengers of heavy metal ions. This present study is aimed to synthesis ethylenediamine and its derivative Zn (II) complexes, and identifies the biological efficiency of the complexes. The ¹H NMR spectra of ligands and Zn complexes are confirming the complexation. Downfield shifts of complexes further support the complexation. All the complexes are well crystalline and the average particle size is 80. The calculated percentage of an element in all the complexes is well agreed with the percentage of elements obtained from the CHNS analyzer. Applications of the complexes are studied by its *in vitro* Anti-diabetic activity. [Zn(pren)₂]²⁺ complex exhibits greater percentage inhibition (63.57%). The homo catenation of the ligand is response to increase the drug efficiency.



DEPARTMENT OF BOTANY

1. Research Collaboration – Joint Author Publication

- a. Department of Physics, Mailam Engineering College, Mailam, Tindivanam, Tamil Nadu.
- b. Department of Chemistry, Aditya College of Engineering & Technology, Surampalem, Kakinada, Andhra Pradesh.
- c. Department of Biochemistry, Vellalar College for Women (Autonomous), Erode, Tamil Nadu.
- d. Department of Civil Engineering, R.V.S College of Engineering, Dindigul, Tamil Nadu.



LAND RESOURCE MANAGEMENT AND PLANNING USING REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS

A. Meharajbegum

Department of Physics, Mailam Engineering College, Mailam, Tindivanam, Tamil Nadu.
 Email: ameharaj18@gmail.com

Prakash Gadipelli

Department of Chemistry, Aditya College of Engineering & Technology, Surampalem, Kakinada, Andhra Pradesh.
 Email: Jamesprakash68669@gmail.com

A. Jansy Isabella Rani

Department of Biochemistry, Vellalar College for Women (Autonomous), Erode, Tamil Nadu, E-mail: jansyisabella@gmail.com

B. Rajeshkanna

Department of Civil Engineering, R.V.S College of Engineering, Dindigul, Tamil Nadu.
 Email: bvrkanna@gmail.com

J. Celin Pappa Rani

Department of Botany, Holy Cross College (Autonomous), Nagercoil, Tamil Nadu.
 Email: celinpapparani@gmail.com

Abstract

The natural resources of a country are the foundation for its economic and social growth. Natural resources are vital to a country's economy because they generate wealth and jobs, supply crucial materials for manufacturing, feed and power the population, and heal and cure the sick. Overexploitation causes resource exhaustion because of population growth. The depletion of natural resources has had a domino effect, driving up prices, altering weather patterns, and eroding the economic, social, and cultural gains made possible by those resources' earlier exploitation. Nations must learn to use these resources sustainably if they want current and future generations to reap the advantages. Due to the importance of properly managing these sensitive resources in light of recent developments in information technology, natural resource managers have placed a strong emphasis on remote sensing and geographic information system (GIS) technologies. Managers now have a solid foundation upon which to build data and knowledge that will guide sustainable development decisions thanks to these technologies. Therefore, the purpose of this study is to provide an overview of the use of GIS and Remote Sensing in the context of managing land resources and promoting long-term sustainability.

Keywords: Technology for Land Use Planning, Resource Management, and Remote Sensing

2. Research Collaboration – Joint Author Publication

- Department of Biochemistry, PSG College of Arts and Science (Autonomous), Coimbatore, Tamil Nadu.
- Department of Zoology, Vivekananda College, Agasteeswaram, Tamil Nadu.
- Department of Biomedical Engineering, Noorul Islam Centre for Higher Education, Kumaracoil, Kanyakumari District, Tamil Nadu.
- Department of Biotechnology, Noorul Islam College of Arts and Science, Kumaracoil, Tamil Nadu.



Biological Analysis of *Cocos Nucifera* L Endocarp Extracts

¹K Lavanya , ²S Agneswari, ³S Kala Vetha kumari, ⁴K Indirani ⁵M Murugan, ⁶Abisha B

¹Department of Biochemistry, PSG College of Arts and Science (Autonomous), *affiliated to Bharathiar University, Coimbatore, Tamil Nadu, India.*

²Department of Zoology, Vivekananda College, Agasteeswaram, Kanyakumari, *affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India.*

³Department of Botany, Holy Cross College (Autonomous), Nagercoil *affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India.*

⁴Department of Clinical Nutrition and Dietetics, PSG College of Arts and Science (Autonomous), *affiliated to Bharathiar University, Coimbatore, Tamil Nadu, India.*

⁵Department of Biomedical Engineering, Noorul Islam Centre for Higher Education, Kumaracoil, Kanyakumari District, Tamil Nadu, India.

⁶Department of Biotechnology, Noorul Islam College of Arts and Science, Kumaracoil *affiliated to Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu, India.*
email: lavanya@psgcas.ac.in

ABSTRACT

Cocos nucifera L commonly called as Coconut tree is used for its several beneficial health effects as antitumor, anthelmintic, antidotal, antiseptic, bactericidal activity, etc. Coconut shell or its endocarp is an agricultural waste and is available in very large quantities throughout the tropical countries of the world. Endocarp of *C. nucifera* L was supposed to be the hardest part of the fruit but ionically richest source of phenolic and flavonoid compound which are responsible for diverse biological activities beneficial to human health and disease prevention. Therefore the present study was conducted to determine the phytochemical constituents and antioxidant activity of four different extracts of *C. nucifera* L endocarp prepared by cold percolation (CNL-01), hot percolation (CNL-02), aqueous extraction (CNL-03) and by dry distillation (CNL-04) methods. All the investigated phytochemicals except amino acids, proteins and alkaloids were present in different extracts. Antioxidant activity of extracts using reducing power methods revealed CNL-02 as the better extract.

1. INTRODUCTION

Cocos nucifera Linn commonly known as coconut belonging to *Arecaceae* family is considered as an important fruit tree in the world providing food and used in the world playing a significant role in the economic, cultural and social life of over 80 tropical countries. Currently coconut is mainly an oil crop rich in lauric acid with a variety of others uses in addition to commercial oil production. The most important coconut

producing countries in the world are India, Sri Lanka, Malaysia and Indonesia (Harries, 1995). For thousands of year, coconut products have held a respected and valuable place in Indian folk medicine. It is believed to be antibleorrhagic, antibronchitis, febrifuga, antigingivitic, immunostimulant, antioxidant, antiparasitic etc. Endocarp of *Cocos nucifera* was supposed to be the hardest part of the fruit but ionically richest source of phenolic and flavonoid compound which are responsible for diverse biological



3. Research Collaboration – Joint Author Publication

a. Department of Botany and Research Centre, Women's Christian College, Nagercoil

A Preliminary Qualitative and Quantitative Phytochemical Screening of *Annona muricata* L. Leaf Using Various Solvent Extracts

Jerin Asha T^{1*}, Medo Merina R² and Bojaxa A Rosy³

¹19223042262017, Ph.D Research Scholar, Department of Botany and Research Centre, Holy Cross College (Autonomous), Nagercoil, Tamil Nadu, India.

² Assistant Professor, Department of Botany and Research Centre, Women's Christian College, Nagercoil, Tamil Nadu, India.

³ Assistant Professor, Department of Botany and Research Centre, Holy Cross College (Autonomous), Nagercoil, Tamil Nadu, India.

*Corresponding Author E-mail ID : aknaths.thileeban@gmail.com

Affiliated to Manonmanium Sundaranar University, Abishekapatti, Tirunelveli, Tamil Nadu, India.

ABSTRACT

The main objective of the present study was to find out the phytochemicals present in aqueous, ethanol, chloroform, ethyl acetate and acetone extracts of *Annona muricata* L. (Soursop) by both qualitative and quantitative screening methods. In qualitative analysis various phytochemicals such as alkaloids, flavonoids, tannins, phenols, terpenoids, glycosides, saponins, steroids, carbohydrates, reducing sugars and proteins were present. In quantitative analysis total amount of available phytochemical constituents were quantified. The ethanol leaf extract showed maximum number of compounds, followed by ethyl acetate, chloroform and aqueous extracts. Least number of secondary metabolites present in acetone. The highest quantity of alkaloids shown in ethanolic leaf extract. The quantity of glycosides is remarkable in both ethanol and acetone. Among all phytochemicals present, terpenoids and reducing sugars showed the least quantity in all extracts. The results obtained during the study also highlights the value in the field of pharmacology to develop new drugs.

Keywords: Extracts, leaf, phytochemical screening, qualitative, quantitative, soursop,

INTRODUCTION

Plants represents a priceless tank of new bioactive molecules with various medicinal and pharmacological applications (Singh *et al.*, 2014). Plants have been thus known to be a reservoir of secondary metabolites which are being exploited as source of bioactive substance for various pharmacological purposes. Numerous studies have been carried out to screen extracts from medicinal plants for the

presence of novel compounds and to test their biological activities (Ahmedulla and Nayar, 1999). Medicinal plants which contain phytochemicals are good for human health and for the prevention of diseases (Mlozi, 2022).

The phytochemical research that has been done based on the ethno-pharmacological information forms the effective approach in the discovery of new anti-infective agents from higher plants. It plays a vital role



4. Research Collaboration – Joint Author Publication

- a. Department of Zoology, Vivekananda College, Agasteeswaram, Kanyakumari.
 b. Department of Zoology, Sree Ayyappa College for Women, Chunkankadai. Department of Zoology and Research Centre, Muslim Arts College, Thiruvithancode, Tamil Nadu

BioGecko

Vol 12 Issue 04 2023

ISSN NO: 2230-5807

Genetic Variability of Uropathogenic Strains of *Klebsiella Pneumoniae* in Diabetic Women

¹S Agneswari, ²Sreeya G. Nair, ³S Kala Vetha Kumari, ⁴C Christo Queensly

¹Assistant Professor, Department of Zoology, Vivekananda College, Agasteeswaram, Kanyakumari, affiliated to Manonmaniam Sundaranar University, Tirunelveli.

²Assistant Professor, Department of Zoology, Sree Ayyappa College for Women, Chunkankadai, affiliated to Manonmaniam Sundaranar University, Tirunelveli.

³Assistant Professor, Department of Botany, Holy Cross College, Nagercoil, affiliated to Manonmaniam Sundaranar University, Tirunelveli.

⁴Assistant Professor, Department of Zoology and Research Centre, Muslim Arts College, Thiruvithancode, affiliated to Manonmaniam Sundaranar University, Tirunelveli.

Corresponding author: s.agneswari@yahoo.com

Abstract

Objective: To study the genetic variability of uropathogenic strains of *Klebsiella pneumoniae* in diabetic patients.

Materials and methods: *Klebsiella pneumoniae* strains isolated from five diabetic patients with UTI were collected and transported to laboratory and tentatively confirmed through various morphological, biochemical and plating techniques using standard procedures. Plasmid DNA was then isolated from all strains and subjected to RFLP analysis after restriction digestion with BamH1.

Results: All the strains were found to be morphologically similar and capable of utilizing glucose. Biochemical analysis revealed that the five strains of *Klebsiella pneumoniae* were positive for catalase and indole test and negative for MP-VP coagulase, H₂S production and gas production. RFLP pattern of five *Klebsiella pneumoniae* stains revealed the existence of 4 distinct clones.

Conclusion: The above findings in the present study suggest the possibility of emergence of new strains of *Klebsiella pneumoniae*.

Key words: *Klebsiella pneumoniae*, diabetes, UTI, RFLP.

1. INTRODUCTION

Diabetes is a pathological condition in which the metabolism of blood glucose is abnormal because of insulin receptor defect. Glucose level in blood is elevated with subsequent excretion in urine. High glucose level in blood can cause glycation of various cellular proteins. Formation of advanced glycation end products has been implicated in various diseases (Basta *et al.*, 2004). Patients with diabetes have been reported to have an increased susceptibility to infections. Any increase in blood glucose level above 200mg/dl results in impaired leukocyte function, thus increasing the risk for development of urinary tract infections, ulcers, and pneumonia. Such infections may be asymptomatic but is potentially life threatening (Bagdade *et al.*, 1978)

Urinary Tract Infection (UTI) is an infection that affects part of the urinary tract. When it affects the lower urinary tract it is known as a simple *cystitis* (a bladder infection) and when it affects the upper urinary tract it is known as *pyelonephritis* (a kidney infection). Symptoms from a lower urinary tract infection include painful urination and either frequent urination or urge to urinate (or both), while those of pyelonephritis include fever and flank pain in addition to the symptoms of a lower UTI. In the elderly and the very young, symptoms may be vague or nonspecific. The main causal agent of

DEPARTMENT OF ZOOLOGY

1. Research Collaboration - Joint author Publication

- a. Department of Zoology, JKK Nataraja College of Arts and Science, Komarapalayam, Namakkal District.

Indian Journal of Natural Sciences



www.insroindia.org.in ©IJONS

Vol.14 / Issue 78 / June / 2023 International Bimonthly (Print) – Open Access ISSN: 0976 – 0997

RESEARCH ARTICLE

Screening of Secondary Metabolites by FT-IR Spectroscopy

Venci Candida X^{1*}, Tresina L², Rashmi VS², Jayashree V², Mary Ajisha S², Antony Jenisha J² and Shenkani K³

¹Assistant Professor, Department of Zoology, Holy Cross College, Nagercoil, 629004. Kanyakumari District, Tamil Nadu, India.

²Student, Department of Zoology, Holy Cross College, Nagercoil, 629004. Kanyakumari District, Tamil Nadu, India.

³Assistant Professor, Department of Zoology, JKK Nataraja college of Arts and Science, Komarapalayam, 638183. Namakkal District, Tamil Nadu, India.

Received: 15 Feb 2023

Revised: 25 Apr 2023

Accepted: 30 May 2023

*Address for Correspondence

Venci Candida X

Assistant Professor,

Department of Zoology,

Holy Cross College, Nagercoil, 629004.

Kanyakumari District, Tamil Nadu, India.

E.Mail: venciaugustine@gmail.com



This is an Open Access Journal / article distributed under the terms of the Creative Commons Attribution License (CC BY-NC-ND 3.0) which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. All rights reserved.

ABSTRACT

The secondary metabolites present in various vegetable products showed medicinal properties. Four common vegetable products which we often add in our diet were taken as samples for our study. The four samples Amla (*Emblica officinalis*), Drumstick leaves (*Moringa oleifera*), beetroot (*Beta vulgaris*) and turmeric (*Curcuma longa*) were selected for our study. The samples Amla and drumstick leaves were collected from local area and beetroot and turmeric were collected from the local market. The samples were cut into thin slices and shade dried for three weeks. When it is completely dried, it was ground in the mixer jar to a smooth powder. The smooth powder of the four samples were extracted with ethanol and tested for secondary metabolites by FT-IR analysis. The obtained peaks of each sample were identified using the standard IR values. From the results obtained, we could conclude that all the four samples Amla (*Emblica officinalis*), Drumstick leaves (*Moringa oleifera*), beetroot (*Beta vulgaris*) and turmeric (*Curcuma longa*) have sufficient diversity of secondary metabolites which have high medicinal properties.

Keywords : FT-IR, Phytochemicals, IR chart, Amla (*Emblica officinalis*), Drumstick leaves (*Moringa oleifera*), beetroot (*Beta vulgaris*), turmeric (*Curcuma longa*)



57272



2. Research Collaboration - Joint author Publication

a. Department of Zoology, Bharathiyar University, Coimbatore

Fish and Shellfish Immunology 141 (2023) 109000

Contents lists available at ScienceDirect

Fish and Shellfish Immunology

journal homepage: www.elsevier.com/locate/fsi

Full length article

Antimicrobial, anti-inflammatory and anti-arthritic activity of hemolymph lectin (NagLec) isolated from the freshwater crab, *Oziotelphusa naga*

F. Vargila^{a,*}, S. Mary Metilda Bai^a, J. Vinoliya Josephine Mary^a, M. Ramesh^b

^aDepartment of Zoology, Holy Cross College (Autonomous), Nagercoil, Affiliated to Muziris Institute Indira University, Thiruvananthapuram, 617 011, Tamil Nadu, India
^bDepartment of Zoology, Bharathiyar University, Coimbatore, 641 046, Tamil Nadu, India

<p>ARTICLE INFO</p> <p>Keywords: COX Erythrocyte Glycoprotein Lectin LCK</p>	<p>ABSTRACT</p> <p>Lectins are non-immune glycoproteins or proteins having a unique capacity to interact with carbohydrate ligands bound on the surface of their host cells. In the present investigation, the lectin was purified from the hemolymph of freshwater crab, <i>Oziotelphusa naga</i> and its antimicrobial, anti-inflammatory and anti-arthritic activity was analysed. The preliminary characterization of the hemagglutinin was carried out to identify the erythrocyte and sugar specificity, optimum pH and temperature and cation dependence. The agglutinin was found to be highly specific to rabbit erythrocytes and inhibited by heparin and α-lactose. Maximum hemagglutination activity was noted at pH 7.5-8 and temperature 20-40 °C. An O-acetyl stialic acid specific 75 kDa hemolymph lectin, designated as NagLec was isolated from the freshwater crab, <i>Oziotelphusa naga</i> by affinity chromatography on heparin coupled Sepharose 4B, with a purification fold of 1:15. The bacteria <i>Staphylococcus aureus</i>, <i>Proteus mirabilis</i> and <i>Staphylococcus albicans</i> had the greater zone of inhibition when treated with NagLec. The results of the Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC) assays showed that the purified lectin inhibited the growth of <i>Staphylococcus aureus</i> at 0.031 and 0.065 µg/ml, which proved the bactericidal property of NagLec. NagLec generated alterations on the bacterial cells and led to protein leakage, which was dosage (24 and 40 µg/ml) and time dependent (10-40 min). COX and LCK enzyme was inhibited to 49.43% and 61.81% with 100 µg/ml concentration of NagLec respectively, demonstrating NagLec's ability to reduce inflammation. Furthermore, NagLec (300 µg) suppressed protein denaturation up to 77.12% whereas diclofenac sodium (a standard drug) was inhibited by 79.59%. The results indicate that NagLec, a stialic acid specific lectin isolated from the freshwater crab-<i>O. naga</i> could be formulated as a nano drug in future owing to its antimicrobial, anti-inflammatory and anti-arthritic potential that could be targeted to specific pathogenic micro-organisms and treat arthritis.</p>
---	---

1. Introduction

A lectin is a protein or glycoprotein of non-immune origin that binds to carbohydrates and either aggregates cells, precipitates glycoconjugates, or does both without changing the characteristics of the carbohydrates. Lectins can originate from plant, microbial, or animal origins. They can either be membrane-bound or soluble. Lectins may bind carbohydrates, and when the specificity of the sugar is not known, the term "agglutinin" is used. They feature at least one non-catalytic domain that can bind to certain monosaccharides or oligosaccharides in a reversible manner. Lectins may bind carbohydrates, and when the specificity of the sugar is not known, the term "agglutinin" or "hemagglutinin" is used. They feature at least one non-catalytic domain that can bind to certain monosaccharides or oligosaccharides on the surface of cells/erythrocytes and agglutinate in a reversible manner [1].

The ability of different sugars or saccharides to suppress the hemagglutination of erythrocytes is assessed in hapten inhibition assays, which determine the specificity of a lectin based on the monosaccharide or simple oligosaccharide lectin associated response [2]. A lectin may recognize a sugar, such as N-acetyl sialosaminic acid [3], or a component of it, such as acetyl groups, N or O connected glycosyl side chains of stialic acids [4], or their glycosidic connections (Gal-Glc; NeuAc 2-2,3 Ga l; NeuAc 6-2,6 Ga l; NeuAc 6-2,8 NeuAc) [5] or a sequence of sugars [6].

Lectins, one of the defence molecules, have captured the attention of scientists, especially in relation to research and potential medical uses

* Corresponding author.
 E-mail address: vargil@proton.com (F. Vargila).

<https://doi.org/10.1016/j.fsi.2023.109000>

Received 21 December 2022; Received in revised form 15 June 2023; Accepted 14 August 2023

Available online 18 August 2023

1050-4644/© 2023 Elsevier Ltd. All rights reserved.



3. Research Collaboration - Joint Author Publication

a. School of Biosciences and Technology, Vellore Institute of Technology, Vellore



Journal of Environmental Biology

p-ISSN: 0254-8104 • e-ISSN: 2254-4375 • CODEN: JEBDP
Journal website: www.jeb.vit.ac.in • E-mail: editorial@jeb.vit.ac.in



Original Research

DOI: <http://dx.doi.org/10.22464/jeb/44613388>

Morphological and molecular identification of the freshwater crab, *Barytelphusa cunicularis* from Kanniyakumari, India

T.G. Teeni Janet Raj¹, A. Shyla Suganthi^{2*}, T.G. Tyri Joice Raj³ and G. Anilkumar³

¹Department of Zoology, Holy Cross College (Autonomous), Nagercoil, Affiliated to Marianamma Sundaranar University, Tirunelveli - 627 012, India

²Department of Zoology, Holy Cross College (Autonomous), Nagercoil-629 004, India

³School of Biosciences and Technology, Vellore Institute of Technology, Vellore-632 014, India

*Corresponding Author Email: shylasuganthi@holycrossngl.edu.in

*ORCID: <https://orcid.org/0009-0001-0174-2897>

Received: 23.08.2022

Revised: 10.05.2023

Accepted: 05.09.2023

Abstract

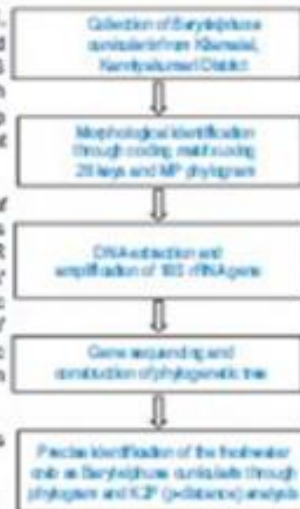
Aim: The present study aims to assess the taxonomical identification of a commercially important freshwater crab, *Barytelphusa cunicularis* from Kumba River, Kanniyakumari using morphological and molecular tools.

Methodology: Samples of *B. cunicularis* were collected from Kumba River flowing in Klamala, Kanniyakumari district. The species identification was carried out through morphological keys constructed out of a coding matrix and phylogenetic tree (Maximum Parsimony) using Mesquite and PAUP4 software. 18S rRNA sequence was subjected to BLAST analysis, and the phylogenetic tree was constructed through Maximum Likelihood method using MEGA 11 software. Pairwise genetic distance of the species (p -distance $p = nd/h$) was also assessed by comparing the K2P values involving phylogenetically close and distant relatives.

Results: Coding matrix prepared using the morphological keys, ruled out of 28 distinctive characteristics of *B. cunicularis* and comparison with its phylogenetic relatives, have brought in valuable information on status of the species. These findings were further established by Maximum Likelihood Analysis, using the PCR amplicons of 18S rRNA. The phylogenetic tree prepared out of the sequence clearly revealed the candidate species' phylogenetic proximity to other members of the genus *Barytelphusa*. Further, the species' monophyletic status (with a BS value of 81%) suggests its early divergence from its congeners. The K2P pairwise genetic 'p' distance analysis ($p = nd/h$) of the 18S rRNA has helped us not only to further ascertain the identity of its genetic identity with its congeners, but also well has clearly provided us with the valuable cues for precise identification of the species.

Interpretation: Along with the morphological parameters, the present study, using molecular tools, provides valuable information for precise identification of the commercially important freshwater crab.

Key words: *Barytelphusa cunicularis*, Crustacea, Fresh water crab, Decapodnecidae, Phylogram, Taxonomy



How to cite: Teeni Janet Raj, T.G., A. Shyla Suganthi, T.G. Tyri Joice Raj and G. Anilkumar: Morphological and molecular identification of the freshwater crab, *Barytelphusa cunicularis* from Kanniyakumari, India. *J Environ Biol*, 44, 804-810 (2023).



4. Research Collaboration - Joint Author Publication

a. Aquatic Animal Health Laboratory, Centre for Marine Science and Technology,
Manonmaniam Sundaranar
University, Rajakkamangalam

Journal of Aquatic Biology & Fisheries | 2023 | 11(1) | pp. 130-146
ISSN 2321-340X
OPEN ACCESS

<http://www.jabf.in/>



Macrobenthic polychaetes in Manakkudy Backwater, South West Coast of India

Balasubramanian, S.¹, Citarasu, T.^{1*}, Michael Babu, M.¹, Lazarus, S.²,
Renu, A.³ and Mary Mettilda Bai, S.⁴

¹ Aquatic Animal Health Laboratory, Centre for Marine Science and Technology,
Manonmaniam Sundaranar University, Rajakkamangalam - 629 502, Tamil Nadu, India.

² Institute for Environmental Research and Social Education, 150, Nesamony Nagar,
Nagercoil - 629001, Tamil Nadu, India.

³ SR Centre for Scientific Research and Social Resource, 54th, 4th Jawahar street,
Ramavarampuram, Nagercoil-629001, TamilNadu, India.

⁴ Department of Zoology, Holy Cross College (Autonomous), Nagercoil-629004,
TamilNadu, India (Affiliated to Manonmaniam Sundaranar University, Tirunelveli).
*E.mail: citarasu@gmail.com

ABSTRACT

Polychaetes are wide diverse group of organisms, contributing significantly to marine biodiversity, supporting a wide range of ecological niches and roles within different habitats. They are playing a vital role in nutrient cycling within marine ecosystems. They are often involved in the breakdown of organic matter, helping to decompose dead plants and animals. This process releases essential nutrients back into the environment, supporting the overall health of the ecosystem. The current study documented 14 species were collected from this Manakkudy backwater and mangrove ecosystem. Its including 6 species newly recorded from the west coast of India and Two species newly documented from south west coast of India. *Nephtys dussumieri* Quatrefages, 1866 re recorded after 150 years; *Spio bengalensis* Willey, 1908 rediscovered more than 110 years ago and *Goniadopsis agnesiae* (Fauvel, 1928) recorded more than 90 years back. The current study important for polychaete fauna of India and exploration of future polychaete research.

ARTICLE HISTORY

Received on: 29-03-2023
Revised on: 22-11-2023
Accepted on: 20-12-2023

KEYWORDS

Barmouth, Manakkudy Estuary,
Mangroves, Polychaetes,
Redisc

1. Introduction

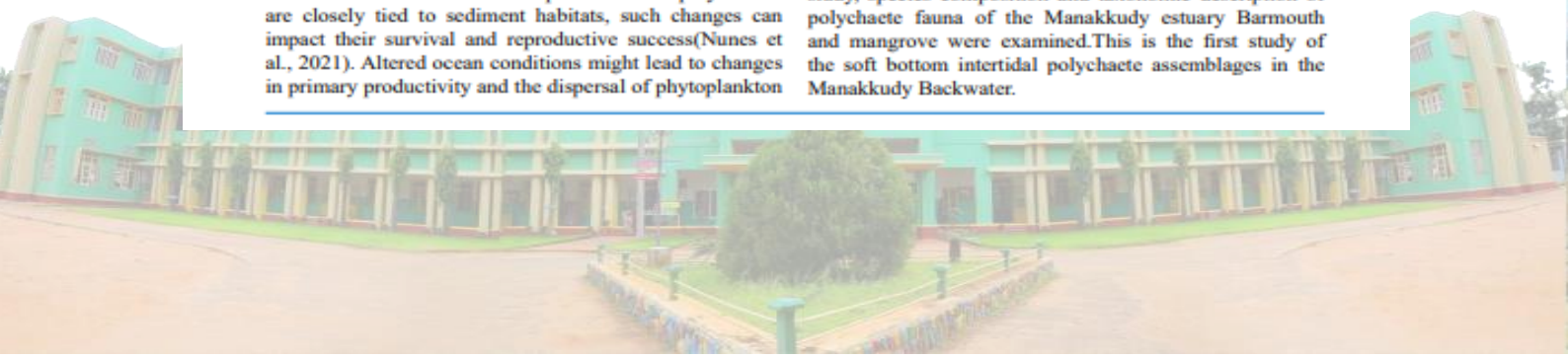
Macro benthic polychaetes are essential to the food web; they prey on various predators, including fish, crustaceans, and other invertebrates. Their abundance influences the dynamics of higher trophic levels and contributes to energy transfer through the ecosystem (Ricci et al., 2019). Changes in the abundance and diversity of macrobenthic polychaetes can indicate shifts in environmental conditions. Their presence or absence can reflect changes in sediment quality, pollution levels, and overall ecosystem health. Monitoring polychaete populations can provide valuable insights into ecosystem changes and assist in assessing environmental impacts (Herman et al., 1998). Macrobenthic polychaetes are pivotal components of marine ecosystems due to their roles in bioturbation, nutrient cycling, habitat structuring, and serving as indicators of environmental health. Their activities contribute to marine ecosystems overall functioning and resilience, underscoring their significance in maintaining ecological balance (Lalli and Parsons, 1996; Gage, 2000; Joye and Anderson, 2007).

Annelida are found in nearly every marine habitat, from intertidal algal mats to the deepest sediments (Rouse et al., 2022). The phylum Annelida exhibits high morphological diversity, describing over 21,000 species and a lot of ecological diversity (Glasby, 2008; Rouse et al., 2022). Climate change can affect the physical characteristics of marine habitats, such as changes in sediment composition or alterations in currents and wave patterns. Since polychaetes are closely tied to sediment habitats, such changes can impact their survival and reproductive success (Nunes et al., 2021). Altered ocean conditions might lead to changes in primary productivity and the dispersal of phytoplankton

and other primary producers, which can, in turn, affect the availability of prey for polychaetes (Mittra et al., 2014; Bindoff et al., 2019).

Polychaetes are one of the main components in the estuarine and marine environment and play an important role in plankton, finfish, and shellfish populations. They are the main food for bottom fishes (Parulekar et al., 1980) and are preferred as food by snails, crustaceans, fishes and birds and thus form an essential component of the complex food chain both in their adult as well as larval stages (Willey 1905). In India, 727 species belonging to 334 genera and 72 families were recorded (Sivadasan & Carvalho 2020). A total of 152 species have been described from various parts of the Indian coasts, and 88 species are endemic to the region of Indian coastal waters (Sivadasan & Carvalho 2020).

Manakkudy is a pristine, eco-sensitive zone where the river Pazhayar joins the sea, forming a big estuarine ecosystem with a mangrove forest and bird sanctuary. Near the estuary, there is a salt pan, sand dune, turtle nesting ground and two thickly populated coastal villages, Melamanakkudy and Keezhamanakkudy. Because of this unique nature of the ecosystem, the Manakkudy site was selected for the study of polychaete taxonomy. Further, a detailed systematic work on the polychaete fauna of the Manakkudy mangrove is lacking, and hence an attempt was made here. In this study, species composition and taxonomic description of polychaete fauna of the Manakkudy estuary Barmouth and mangrove were examined. This is the first study of the soft bottom intertidal polychaete assemblages in the Manakkudy Backwater.



5. Research Collaboration - Joint Author Publication

- a. Aquatic Animal Health Laboratory, Centre for Marine Science and Technology,
Manonmaniam Sundaranar
University, Rajakkamangalam



Uttar Pradesh Journal of Zoology

Volume 45, Issue 6, Page 133-142, 2024; Article no.UPJOZ.3288
ISSN: 0256-971X (P)

Potential Effects of Live and Nutrient-Enhanced Food on Growth Performance and Biochemical Composition of Blue Acara (*Andinoacara pulcher*)

Siva Santhiya R. ^a, Aiswarya M. V. ^a, Mary Mettilda Bai S. ^a,
Vinoliya Josephine Mary J. ^a, Citarasu T. ^b, Uma G. ^b
and Anusha J. R. ^{b*}

^a Department of Zoology, Holy Cross College, Nagercoil, Kanyakumari District, Tamil Nadu, 629004, India.

^b Aquatic Animal Health Laboratory, Centre for Marine Science and Technology, Manonmaniam Sundaranar University, Rajakkamangalam, Kanyakumari District, Tamil Nadu, 629 502, India.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.56557/UPJOZ2024V45I63959

Open Peer Review History:

This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: <https://orh.ubiajournals.com/review-history/3288>

Original Research Article

Received: 09/01/2024

Accepted: 13/03/2024

Published: 20/03/2024

ABSTRACT

Fish food and feeding play an important role in understanding the rate of growth, development and reproduction in ornamental fish culture. The current study evaluated the impact of different types of food on the growth of Ornamental fish, *Andinoacara pulcher*. A comparative analysis of live,

*Corresponding author: Email: anushajr@gmail.com;



DEPARTMENT OF COMPUTER SCIENCE

1. Research Collaboration – Joint Author Publication

- a. Bethlahem Institute of Engineering, Karungal, India

CYBERNETICS AND SYSTEMS: AN INTERNATIONAL JOURNAL
2024, VOL. 53, NO. 1, 243–257
<https://doi.org/10.1080/0169173220312166250>



Taylor & Francis
Taylor & Francis Group



ODMNet: Automated Glaucoma Detection and Classification Model Using Heuristically-Aided Optimized DenseNet and MobileNet Transfer Learning

Felix Joseph Xavier^a and Fanax Femy F.^b

^aDepartment of Electrical and Electronics Engineering, Bethlahem Institute of Engineering, Karungal, India; ^bDepartment of Computer Science, Holy Cross College (Autonomous), Nagercoil, India

ABSTRACT

In various existing works, glaucoma detection is not predicted accurately, which may lead to irreversible vision loss. A new framework is designed for detecting glaucoma by transfer learning approach. In the initial stage, the source images are gathered from standard datasets. After collecting the raw images, it is fed for image enhancement, performed through the Retinex approach. Further, the segmentation process is carried out by Modified DeepLabV3, where the significant Regions of Interest (ROI) are extracted by enhanced images and segmented the abnormalities. To meet the optimal value, the parameters in DeepLabV3 are tuned optimally by the Improved Rain Optimization Algorithm (IROA). Once the image is segmented, it is subjected to the detection or classification task, where the glaucoma is effectively classified by the hybrid learning method called Optimized DenseNet and MobileNet Transfer Learning (ODMNet) that is constructed with Densely Connected Convolutional Networks (DenseNet) and MobileNet, where the layers are optimized by IROA approach. Finally, the performance is assessed with the assistance of diverse metrics. In experimental analysis, the accuracy and F1-score of the designed method attain 96% and 93%. The recommended detection model achieves higher detection performance in telemedicine and healthcare applications.

KEYWORDS

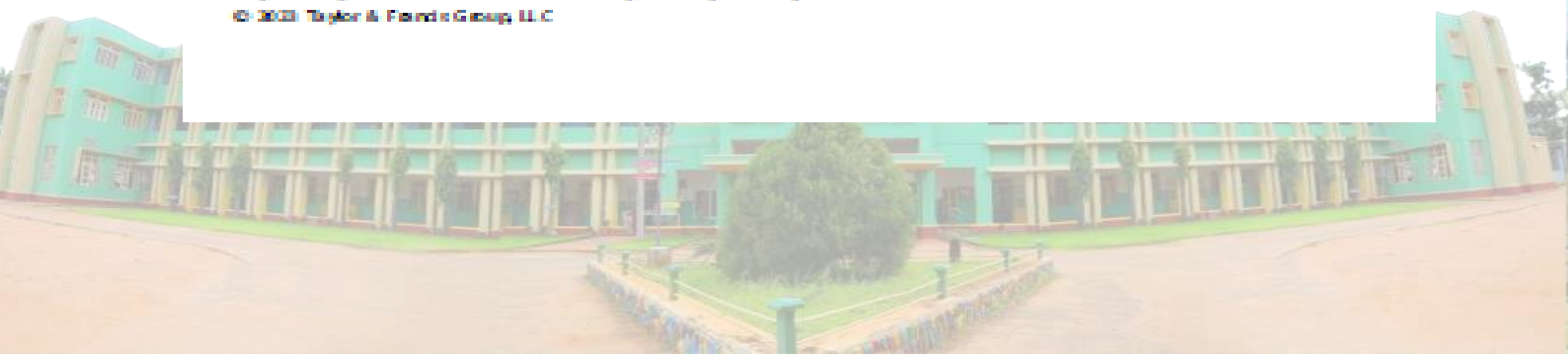
Ab normality segmentation; automated glaucoma detection; improved rain optimization algorithm; modified DeepLabV3; optimized DenseNet and MobileNet transfer learning; retinex-based image enhancement

1. Introduction

Glaucoma is one of the major causes of irreversible blindness worldwide (George et al. 2020). Generally, the eye is categorized into glaucomatous and non-glaucomatous eyes by considering the characteristics of the eye. Blind spots developed in the glaucoma eye while observing the damage to optic nerve fibers (Islam et al. 2022). However, until noticing the damage to the optic nerve, the blind spots cannot be detected (Civit-Masot et al.

CONTACT Felix Joseph Xavier  felixjoseph75@gmail.com  Department of Electrical and Electronics Engineering, Bethlahem Institute of Engineering, Karungal, Tamilnadu, India.

© 2023 Taylor & Francis Group LLC



2. Research Collaboration – Joint Author Publication

a. Nesamony Memorial Christian College, Marthandam.

Multimedia Tools and Applications
<https://doi.org/10.1007/s11042-023-17405-3>



Adaptive golden eagle optimization based multi-objective scientific workflow scheduling on multi-cloud environment

S. Immaculate Shyla¹ · T. Beula Bell² · C. Jaspin Jeba Sheela³

Received: 3 November 2022 / Revised: 15 July 2023 / Accepted: 1 October 2023

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2023

Abstract

An exemplary for emerging knowledges and the capacity to provide reliable cloud services, cloud computing. Giving consumers on-demand access to “unlimited” computer resources is one of the key components of cloud computing. Single cloud-holding resources, however, are typically constrained and might not be able to handle the unexpected spike in user demands. In order to support resource sharing amongst clouds, the multi-cloud concept is thus established. These days, offering resources and administrations across numerous clouds is unquestionably amazing. The goal of conventional research on cloud scheduling is to reduce costs or increase speed. However, the major indicator of QoS and a vital problem is the dependability of work process scheduling. As a result, multi-objective scheduling for a logical work process in a multi-cloud environment is suggested in this research with the goal of controlling the work process while also balancing cost and timeliness while satisfying the criterion of reliability. The adaptive golden eagle optimisation (AGEO) algorithm is created to realise this idea. The solution encoding, fitness analysis, and updating functions are used in the proposed algorithm’s validation. Different workflow models are employed for the experimental study, and performance is assessed using various indicators. The projected approach attained 1920 utilization. Similarly, the PSO and GA achieved 1901 and 1900 utilization.

Keywords Makespan · Task scheduling · Multi-cloud environment · Golden eagle optimization · Normalized cost · Resource utilization

✉ S. Immaculate Shyla
 immaculatejuchit@gmail.com

T. Beula Bell
 Beulamaglin@gmail.com

C. Jaspin Jeba Sheela
 jaspinjebasheela@gmail.com

¹ Department of Computer Science, Holy Cross College (Autonomous), Nagercoil, India

² Department of Computer Applications, Nesamony Memorial Christian College, Marthandam, India

³ Department of PG Computer Science, Nesamony Memorial Christian College, Marthandam, India

Published online: 26 October 2023

Springer



Summer Training Programme – Internship

Department of Zoology, Kannur University, Mananthavady Campus, Wayanad.


KANNUR UNIVERSITY
DEPARTMENT OF ZOOLOGY
Mananthavady Campus
Edavaka Post, WAYANAD Dt. 670645 Ph: 9847803136

Dr Prasadon P K
Professor & Director, Western Ghats Study Centre

17th January 2024

To
The Principal
Holy Cross College
Nagercoil
Tamil Nadu

Respected Madam,

Sub: Student Internship- permission – request. reg.

Ms. Saifana K and Ms. Silva Valsan, IV Semester M Sc Applied Zoology students of my Department wish to carry out their project work under the technical supervision of Dr A Shyla Suganthi Assistant Professor, Department of Zoology. Kindly note that Dr Shyla has already expressed her willingness to guide the students in their project work.

It would be grateful, if you could permit them to do their project work in your institution.

I would also like to request you to permit them to utilise laboratory facilities in your esteemed institution. This is for your kind consideration and needful action. Kindly treat this project work as Student Internship.

Sincerely yours,

Prasadon PK



Dr P K PRASADAN PhD
Professor & Head, Dept of Zoology
KANNUR UNIVERSITY
Mananthavady Campus
Edavaka P.O, Wayanad, Kerala



DEPARTMENT OF TAMIL SF

1. Research Collaboration – International Webinar

a. Shanlax Journal

ஹோலிகிறாஸ் கல்லூரி (தன்னாட்சி)
Affiliated to Manonmaniam Sundaranar University, Tirunelveli, India
Accredited With A+ Grade (CGPA 3.35-IV CYCLE) BY NAAC

நாகர்க்காவில்
தமிழ்த்துறை (சுயநிதி)
மற்றும் சான்லாக்ஸ் பன்னாட்டு ஆய்விதழ்
இணைந்து நடத்தும்
பன்னாட்டுக் கருத்தரங்கம்

அழைப்பீழை

**“சமகால தமிழ்
இலக்கியங்களும்
அறிவியல்
சிந்தனைகளும்”**



நாள் : 20.12.2023 | இடம் : பன்னோக்கு அரங்கம்
வருகைப் பதிவு காலை 9.00 மணி | தொடக்கவிழா காலை 9.30 மணி



Crossian Centre for Research and Development in collaboration with Research and Development Cell, Sree Ayyappa College, Chunkankadai
Research Colloquium on Research Ethics

 Phone : 04652-261473
Fax : 04652-260704

HOLY CROSS COLLEGE
(AUTONOMOUS)
(Re-Accredited with 'A' Grade (CGPA3.35) by NAAC)
Nagercoil - 629 004.
Kanyakumari Dt., Tamil Nadu.
E-mail : holycrossage@yahoo.com
Website : www.holycrossngl.edu.in

Date : 17.04.2023

From

The Dean of Research
Crossian Centre for Research & Development
Holy Cross College (Autonomous), Nagercoil

To

The Collaboration and Community Co-ordinator
Research & Development Cell
Sree Ayyappa College, Chunkankadai.

Respected Madam,

Sub: Research Collaboration with R & D Cell, Sree Ayyappa College - Regarding

As per the meeting held at Sree Ayyappa College, Nagercoil on 29th March 2023, Crossian Centre for Research & Development welcome your proposal to collaborate with the Research & Development Cell of Sree Ayyappa College for the following

- Exchange of expertise, information, materials etc.
- Hosting joint conferences / seminars, workshops, training programme etc.

Efforts will be made by both of us (individually or jointly) to find financial resources for carrying out the activities listed above. In fact this kind of formal arrangements would enable both of us to march forward towards the progress of work more efficiently.

Thanks and Regards

S. Mary Mettilda Bai
(Dr. S. MARY METTILDA BAI)
Dean of Research,
Holy Cross College (Autonomous)
Nagercoil - 629004.



Crossian Centre for Research & Development
HOLY CROSS COLLEGE (AUTONOMOUS), NAGERCOIL
An ISO 9001: 2015 Certified Institution & Accredited with A+ grade (CGPA 3.35-IV Cycle) by NAAC
Affiliated to Manonmaniam Sundaranar University, Tirunelveli

Research and Development Cell
SREE AYYAPPA COLLEGE FOR WOMEN, CHUNKANKADAI
Re-accredited by NAAC with B grade (3rd Cycle)
Affiliated to Manonmaniam Sundaranar University, Tirunelveli

jointly organises

Research Colloquium

 Topic: Research Ethics

Resource Person:
Dr. P.K. Suresh Kumar,
Head of the Department,
IT Division, Kerala University

14th February 2024
10 am

Patrons:
Dr. Sr. M. Mary Gilda
(Secretary, Holy Cross College, Nagercoil) &
Sri. M. Sangeeth Kumar
(Secretary, Sree Ayyappa Educational Society)

Chairpersons:
Dr. Sr. S. Sahayasekvi
(Principal, Holy Cross College, Nagercoil) &
Dr. V.R. Anjana
(Principal, Sree Ayyappa College)

Convenors:
Dr. S. Mary Mettilda Bai
(Dean of Research, Holy Cross College),
Dr. M.R. Meera
(Director, RDC, Sree Ayyappa College) &
Dr. S.S. Sandhya
(Collaboration and Community Coordinator, RDC)

Organising Secretaries:
Dr. S. Sonia
(Assistant Professor of Physics),
Dr. N.V. Deepa
(Assistant Professor of Commerce) &
Dr. M.F. Anne Feril
(Nodal Officer, CCRD)

Venue: Sr. Emilie's Seminar Hall, Holy Cross College, Nagercoil



Research Colloquium, Scholars
14.02.2024 11:34
8,15394, 77.41466
5C37+RQC, Holy Cross College Rd, Thollavilai, Nagercoil 629002



Crossian Centre for Research and Development in collaboration with Research and Development Cell, Sree Ayyappa College, Chunkankadai

International Conference on Innovative Trends in Multidisciplinary Research

<p>PROGRAMME SCHEDULE</p> <p>Day 1: 07.07.2023</p> <p>Registration: 9.00 am to 9.30 am Inaugural Session: 9.30 am to 11.00 am Prayer Song: Dr. Y. Christobel Shaji & Co Welcome Address: Dr. C. Inabo, Assistant Professor of Commerce Holy Cross College (Autonomous), Nagercoil Felicitation: Dr. Sr. M. Mary Gilda, Secretary Holy Cross College (Autonomous), Nagercoil Inaugural Address: Dr. Sr. S. Sahayasekhi, Principal Holy Cross College (Autonomous), Nagercoil Keynote address: Dr. Satyanarayana Parayitam Professor, Department of Management and Marketing Charlton College of Business University of Massachusetts, Dartmouth 285 Old Westport Road, North Dartmouth, MA 02747 Vote of Thanks: Dr. A. Anas Jalin Jini, Assistant Professor of Mathematics Holy Cross College (Autonomous), Nagercoil</p> <p>Tea Break: 11.00 am - 11.30 am</p> <p>Technical Session 1: 11.30 am to 1.00 pm</p> <p>Resource person: Dr. E. Babu Raj Professor, Dept. of Electrical and Computer Engineering Faculty of Engineering and Technology Blue Horo University, Ethiopia, East Africa.</p> <p>Topic: Systematic Analysis and Publishing Process in Research</p> <p>Lunch Break: 1.00 pm to 2.00 pm</p> <p>Paper Presentation Session: 2.00 pm to 3.30 pm</p>	<p>Day 2: 08.07.2023</p> <p>Technical Session 2: 9.30 am to 11.00 am</p> <p>Welcome Address: Dr. C. Jenila, Assistant Professor of Mathematics Holy Cross College (Autonomous), Nagercoil</p> <p>Resource person: Dr. J.K. Vijayakumar Director of Library Services & Professor Pedagogical Faculty American University of Antigua College of Medicine Manipal Education Americas, West Indies</p> <p>Topic: Systematic Literature Review & Evidence Based Research Process</p> <p>Tea Break: 11.00 am - 11.30 am</p> <p>Technical Session 3: 11.30 am to 1.00 pm</p> <p>Welcome Address: Dr. S. S. Sandhya, Head, Research Department of Mathematics, Sree Ayyappa College for Women, Chunkankadai</p> <p>Resource person: Dr. P.K. Suresh Kumar Head of the Department IT Division, Kerala University Library</p> <p>Topic: Research Ethics and Academic Integrity</p> <p>Lunch Break: 1.00 pm to 2.00 pm</p> <p>Technical Session 4: 2.00 am to 3.30 pm</p> <p>Resource person: Dr. Satyanarayana Parayitam Professor, Department of Management and Marketing Charlton College of Business University of Massachusetts, Dartmouth 285 Old Westport Road, North Dartmouth, MA 02747</p> <p>Topic: Research Design, Sampling and Multidisciplinary Approaches</p> <p>Valedictory Session: 3.30 pm to 4.00 pm</p> <p>Valedictory Address: Dr. Sr. P. Leema Rose, Vice-Principal Holy Cross College (Autonomous), Nagercoil</p> <p>Certificate distribution to the participants Report of the Conference: Dr. M.F. Anne Faril Vote of Thanks: Dr. M.R. Meera, Assistant Professor of Physics Sree Ayyappa College for Women, Chunkankadai National Anthem</p>	<p>Two Days International Conference on</p> <p>"Innovative Trends in Multidisciplinary Research"</p> <p>7th & 8th July 2023</p>  <p>Organised by</p> <p>Crossian Research Forum (CRF) Holy Cross College (Autonomous), Nagercoil – 4 Accredited by NAAC with "A+" Grade with CGPA 3.35 (4th Cycle)</p> <p>Phone: 04652-261473 E-mail: holycrosscra@yahoo.com Website: www.holycrossingl.edu.in</p> <p>In Collaboration with</p> <p>Research and Development Cell Sree Ayyappa College for Women, Chunkankadai, Nagercoil - 3 Accredited by NAAC with "B" Grade (3th Cycle)</p> <p>Phone: 04652-230980 E-mail: sreeayppacollege1969@gmail.com Website: http://www.sreeayppacollege.com</p> <p>Venue</p> <p>Multipurpose Hall, Holy Cross College (Autonomous), Nagercoil</p>
---	--	---



DEPARTMENT OF ZOOLOGY

Jayaraj Annapackiam College for Women, Periakulam, Theni
Reviewer

JAYARAJ ANNAPACKIAM COLLEGE FOR WOMEN (AUTONOMOUS)



PERIYAKULAM - 625 601, THENI DT.

Accredited with 'A+' Grade (Cycle 4) by NAAC

DST - FIST Supported College

(Affiliated to Mother Teresa Women's University, Kodaikanal)

Dr. Sr. S. Jesurani, M.Sc., M.Phil., B.Ed., PGDCA., Ph.D.
Principal

Res : 04546 - 231382
Off : 04546 - 231482
Fax : 04546 - 231482

Website : www.annejac.ac.in
E-mail : principal@annejac.ac.in

Date: 07.10.2021

To

Dr. C. Josephine Priyatharshini
Assistant Professor, Department of Zoology
Holy Cross College (Autonomous)
Nagercoil - 629 004.

Dear Madam,

Warm Greetings from JAC!

Thank you very much for your consent to be the Reviewer to review the Research Articles in Zoology, for the "JAC Journal of Science, Humanities and Management (JACJOSHAM, ISSN: 2347-9868 Biannual) published by our College to inspire, recognize and support quality in Research.

I am pleased to inform you that this assignment is for a period of three academic years 2021-2024 and I solicit your support for the success of the Journal.

Thank you,

Yours sincerely,


Jayaraj Annapackiam College
for Women (Autonomous)
Periyakulam - 625 601.
Theni District.

Paper for review Inbox



jacjosham... 7/7/2023
to me



Dear madam
Plz find the attached file for review. Plz send the comments and suggestions in a word file I will be grateful if you could send the report before 17 th July
Thank you

With Regards,

Dr. M. Kalanithi,
Dean of Research and Associate Professor of Chemistry,
Jayaraj Annapackiam College for Women (Autonomous),
Periyakulam, Theni dt, Tamil Nadu
Mob.No. 9488177617
Google scholar id : [cjQNx7UAAAAJ](https://scholar.google.com/citations?user=cjQNx7UAAAAJ)

Scopus id: <https://www.scopus.com/authid/detail.uri?authorId=36992132500>

ORCID id : <https://orcid.org/0000-0002-8734-4548>

Researcher id (Web of Science) : [AAW-9436-2021](https://orcid.org/0000-0002-8734-4548)